Elsberry Plant Materials Center

2004 Annual Technical Report

Northern Missouri Germplasm Grayhead Coneflower, *Ratibida pinnata*

Plant Solutions for Conservation Needs

Plant Materials Program

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ELSBERRY PLANT MATERIALS CENTER
2004

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2004
Annual Technical Report
Elsberry Plant Materials Center
Elsberry, Missouri

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Introduction

The Elsberry Plant Materials Center (PMC) was established in June 1934. The Center is located approximately 60 miles northwest of St. Louis, Missouri, on Highway 79. It includes 243 acres of various soil types.

The Elsberry PMC primarily serves Illinois, Iowa and Missouri; however, it makes significant contributions to other states in the Midwest region.

The mission of the NRCS Plant Materials Program is to develop and transfer plant materials and plant technology for the conservation of natural resources. In working with a broad range of plant species, including grasses, forbs, trees, and shrubs, the program seeks to address priority needs of field offices and land managers in both public and private sectors. Emphasis is focused on using native plants as a healthy way to solve conservation problems and protect ecosystems.

The objectives of the Elsberry PMC and of the plant materials program are to assemble, test, select and develop improved plants; and to develop reliable techniques for successfully establishing and maintaining plants for conservation uses.

Of particular importance is finding suitable plants for wetland situations, high traffic areas, wildlife food and habitat, farmstead and field windbreaks, windbarriers, pastures, landscape and beautification, roadside restoration, riparian plantings, woodland, erosion control on cropland and etc.

Each of the three states served by the Center has identified its plant materials problems, needs and priorities. PMC activities are directed toward meeting the needs and priorities set forth in the states' long-range plans.

History

The Elsberry Plant Materials Center was established in June 1934, which makes it the oldest Center in the nation. During the Center's earlier existence it produced 10,000,000 seedlings for use in windbreaks during the dust bowl era. As early as 1939 the Center began searching for plants to respond to specific conservation problems. The Center is located approximately 60 miles northwest of St. Louis, Missouri, on Highway 79. It includes 243 acres of land of which 60 percent is bottomlands and 40 percent is uplands.

Plant Materials Center Operations

The Center's operations are carried out in accordance with policies set forth in the National Plant Materials Handbook.

Guided by the Center's Multi-Year Business Plan, plant species are collected (mainly local field collections [95%]). Other collections come from locations within the species range in the United States. Center personnel then prepare the seed/plant for planting. Each collection is given an identification number (accession) and planted in a uniform nursery. Initial evaluation data is recorded on such factors as seedling emergence and vigor, rate of growth, disease and insect resistance, and ability to spread. Also recorded are date and amount of bloom, seed production, winter hardiness, and foliage characteristics. Selections are made and seed increased for advanced evaluation plantings. Field plantings are then conducted to determine plant performance and soil and climatic adaptation throughout its intended area of use. Evaluations are made comparing selected candidate accessions with "standards of comparison" such as cultivars or varieties that are already in the commercial market, or other species used for the same purpose.

After several years (10-15) of evaluation, selected accessions are cooperatively released with the USDA-Agricultural Research Service (ARS), State Agricultural Experiment Stations, Conservation Commissions, Universities, Departments of Transportation, and/or other interested agencies. The Center releasing a named variety is responsible for maintaining the breeder and foundation seed. These fields undergo annual inspections by the Missouri Crop Improvement Association to insure that seed is available to commercial producers and ultimately to the public for solving conservation problems.

Additional avenues have been established and used by the Plant Materials discipline to release plants to the commercial market: Source Identified Releases, Selected, and Tested Releases. These three new avenues provide a quicker release of plants as compared to cultivar release (10-15 years).

The Elsberry Plant Materials Center has released 79 plants during its 70-year history. In 2004 there were three new plant releases. The PMC released two Missouri ecotypes (Zone 3 Little Bluestem and Zone 1 Greyhead Coneflower) and OZ-70 Big Bluestem. Of the 79 plants the center has released, 76 of them are native.

CLIMATIC DATA – CALENDAR YEAR 2004

TEMPERATURE (Fahrenheit)

Month	72 Year Monthly High Average	Year 2004 Monthly High Average	Year 2004 Monthly High Departure	72 Year Monthly Low Average	Year 2004 Monthly Low Average	Year 2004 Monthly Low Departure
January	37.99	34.77	-3.22	19.08	18.12	-.96
February	43.12	41.10	-2.02	24.00	22.38	-1.62
March	53.86	56.39	+2.53	37.45	36.63	-.82
April	66.69	67.39	+1.24	44.13	42.00	-2.13
May	76.50	76.03	-.47	56.23	56.84	+.61
June	85.31	81.37	-5.14	61.67	71.29	+9.62
July	89.56	82.10	-7.46	63.58	64.58	+1.00
August	87.54	80.13	-7.41	60.23	62.43	+2.23
September	80.37	80.47	+.10	54.93	49.14	-5.79
October	69.44	66.68	-2.76	48.39	43.16	-5.23
November	50.45	53.93	+3.48	40.00	32.26	-7.74
December	42.08	44.17	+2.09	26.73	22.82	-3.91

2004	
Last Killing Frost (26 & below)	March 13
First Killing Frost (26 & below)	November 25
Number of Frost-Free Days	256

CLIMATIC DATA – CALENDAR YEAR 2003

Precipitation (Inches)

Month	74 Year Average	2004 Total	Departure
January	1.87	3.23	+1.36
February	1.98	.65	-1.33
March	3.18	4.48	+1.30
April	3.69	.254	-1.15
May	4.17	5.76	+1.59
June	3.80	3.27	-.53
July	3.43	5.57	+2.14
August	3.38	6.80	+3.42
September	3.29	.62	-2.67
October	3.05	6.25	+3.20
November	2.91	5.23	+2.32
December	2.46	1.50	-.96
Year Total	37.21	45.90	+8.79

2004
Tours, Visitors, and Meetings

The Elsberry Plant Materials Center entertained 253 registered visitors in 2004. Guests included researchers and other professionals, farmers, students, and the general public.

All visitors expressed an interest in the Plant Materials Program and its relevance to current conservation programs, practices, and future needs.

The following is a list of groups touring and holding meetings at the Elsberry Center in 2004.

2004 Elsberry Plant Materials Center Visitors
Plant Materials Center Managers, Specialists, Technicians
State Resource Conservationists
University of Illinois (Chicago) Students
Cultural Resources Training Group
Family and Community Education/Extension Group
Missouri Department of Conservation Representatives
Annual Plant Materials Center Tour/Training
B.K. Leach Tour/Meeting
Fire Management Level I Training
Ehmler Acres Meeting
Missouri Area Conservationist and Biologists Tour/Meeting
Lincoln/Pike Counties SWCD Watershed Project Committee

Study: 29I093R

Study Title: Miscellaneous Herbaceous Plant Evaluation.

Study Leader: Bruckerhoff, S. B.

Introduction:

Plants arrive at the Plant Materials Center (PMC) from many sources and for many different purposes. Most of the plants are assigned to a specific study. Plants are also received that are not tied to a specific study. These can be from other PMC's for area of adaptation or plants in advanced stages of evaluation. Plants are received from individuals who are interested in an unfamiliar species or a plant with unusual characteristics. Many species exist on the center that are not involved with an active study addressing a specific problem.

Problem:

Keeping track of numerous miscellaneous plants around the PMC without an organized evaluation system became inefficient. This study organizes miscellaneous plant material coming into the center for evaluation.

Objective:

Evaluate winter hardiness, insect and disease resistance, and vigor of plants for climatic adaptation. Plants brought in for other specific reasons like forage production, landscape beautification, shoreline stabilization, etc., will be evaluated accordingly.

Procedure:

As miscellaneous plants are received at the center, they are assigned an accession number and as much background information as available or necessary are documented. The accession is then assigned a location for planting that best suits its needs for evaluation. Plants are evaluated as necessary. Many plants are left for plant identification sessions or demonstrations for several years.

Discussion:

1984-1990

This study was initiated in April 1984 in the PMC pipeline area. There are approximately 150 different accessions of the following species of plants: indiangrass, switchgrass, big bluestem, purpletop, little bluestem, buffalograss, wheatgrass, fescue, timothy, ryegrass, redtop, orchardgrass, kura clover, blackeyed susan, and lespedeza. Factors involved in evaluations dealt with area of adaptation.

1991-1994

Approximately 75 accessions were added during 1991. Forty of them were warm season grasses used in three FEP (Field Evaluation Planting) variety studies: 29A111G, 29A118G, and 29A127G. Twenty-six were accessions of common cool season grasses and legumes used for pasture and hay in the three-state area. These were commonly used for plant identification sessions.

1995-1998

The accessions added in 1997 are being looked at for forage. They include 'Steadfast' birdsfoot trefoil, 'Mandan' Canada wildrye, and several bermudagrasses including Hardy and OK-74-12-6. Also zoysia grass, centipedegrass, and buffalograss from the Fort Leonard Wood Wear Tolerance Study are being looked at for adaptation. Several big bluestem accessions from Study 29I097G are being evaluated as landscape plants.

1999

The accessions added in 1999 are a Lincoln County Missouri collection of Virginia wildrye and a Crawford County Missouri collection of Virginia wildrye variation geneses. These species are being looked at for shade tolerance for riparian areas and covercrop for tree plantings.

2000

No new accessions were added in 2000. Two species that are getting the most interest are the Lincoln County accessions of Virginia wildrye and 'Tufcote' bermudagrass.

The Lincoln County accession of Virginia wildrye is a shade tolerant cool season grass that has potential for a cover crop for woody plantings as well as a possible buffer species along riparian areas. This accession should be in commercial production and available soon.

The 'Tufcote' bermudagrass accession was tested at Fort Leonard Wood for wear tolerance and showed very good potential. It could be used on playgrounds, sports fields, lawns, as well as having potential for high livestock use areas. This species is not native and does show potential for spreading so it should not be planted in areas where it could escape and cause problems.

2001

Three new species of native legumes were added in 2001. Native legumes are seldom used in mixtures with warm season grasses planted for pastures primarily because of their cost, lack of availability, and lack of knowledge on which ones will perform best in a mixture.

The following species were planted for observational evaluation: goats rue, *Tephrosia virginiona;* sensitive brier, *Schrankin uncinata;* and Sampson's snakeroot, *Orbexilium peduncolatum*.

The Lincoln County Missouri collection of Virginia wildrye, accession 9083169, has shown excellent vigor and seed production. Forage quality is comparable to tall fescue, spring green-up earlier than tall fescue and seedhead emergence is approximately two weeks later than tall fescue. This accession is scheduled for release in 2002.

2002

One new collection was planted in the miscellaneous block. Accession 9083240, western wheatgrass, *Pascopyrum smithii*, was planted as greenhouse plugs May 10, 2002. This material was collected in Audrain County, Missouri.

The Lincoln County Missouri collection of Virginia wildrye, accession 9083169, was released as a selected class and given the name Cuivre River. The Cuivre River selection has early vigorous growth that is earlier than tall fescue. Booting occurred at the end of May to the first week of June at Elsberry. This is approximately two weeks later than tall fescue.

Although Cuivre River was released as a selection and only limited testing has been done, its anticipated uses are wildlife food/cover, plant diversity in wetland and riparian plantings, covercrop for woody plantings, erosion control, and forage.

Cuivre River has not been tested for grazing but forage clippings were taken at different stages of growth and compared to tall fescue clippings from adjacent plots. Forage quality of the Cuivre River selection compared favorably to tall fescue as indicated by data below.

Clipping Date	**Percent Protein**		**Percent ADF**		**Percent NDF**	
	TF	**VWR**	**TF**	**VWR**	**TF**	**VWR**
4/24/02		**27**		**26**		**47**
5/30/01	**9**	**12**	**40**	**34**	**61**	**60**
10/11/01	**15**	**15**	**31**	**34**	**52**	**55**
11/15/01	**20**	**17**	**22**	**24**	**37**	**44**

TF = tall fescue; VWR = Cuivre River Virginia wildrye; ADF = acid detergent fiber; NDF = neutral detergent fiber.

2003

One new accession was added during 2003 and this was the medium height, forage type switchgrass that was selected and isolated from the low growing switchgrass assembly.

2004

Three accessions of cluster fescue, *Festuca paradoxa*, were added during 2004. The plants were germinated in the greenhouse from seed and transplanted April 7, 2004, to the initial evaluation area, tier F/a. The accessions established well and had excellent survival the first year. The plants will be evaluated on percent stand, vigor, height, and seed production next year. See collection information below.

Genus	Species	Common Name	Accession No.	Origin
Festuca	**paradoxa**	**Cluster fescue**	**9083254**	**Tucker Prairie, MO**
Festuca	**paradoxa**	**Cluster fescue**	**9083255**	**Paintbrush Prairie, MO**
Festuca	**paradoxa**	**Cluster fescue**	**9083252**	**Harrison Co, MO**

Study: 29I097G

Study Title: Assembly and Evaluation of Big Bluestem*, Andropogon gerardii Vitman.*

Study Leader: Bruckerhoff, S. B.

Introduction:

Big bluestem is a tall, warm-season, perennial, native grass with stiff, erect culms; flattened and keeled sheaths; membranous ligules; and flat or folded leaf blades. Big bluestem has developed a very efficient spreading root system that may reach depths of 5-8 feet (150-200 cm). Big bluestem reaches a mature height of 3-4 feet (90-120 cm) in northern latitudes, and 6-8 feet (180-240 cm) or more in the southern part of its natural range. Although short rhizomes may be present, it usually makes a bunch type growth. Big bluestem is composed of many ecotypes with a wide range of adaptation to soil and climate. Big bluestem is one of the most widespread and important forage grasses of the North American tallgrass prairie region. It is usually associated with one or more of the other three dominant species, Indiangrass *(Sorghastrum nutans* (L) Nash.), switchgrass *(Panicum virgatum L.),* and little bluestem (*Schizachyrium scoparium* (Michx.) Nash.). Big bluestem occurs on subirrigated lowlands, nearly level to gently undulating glacial till plains, overflow sites, level swales and depressions, residual and glacial uplands, and stream terraces and bottomlands along rivers and tributaries. The abundant, leafy forage is palatable to all classes of livestock.

Problem:

There is a need for an adapted variety of big bluestem for pasture and range seedings, surface mine reclamation, critical area planting, recreational area development and other conservation uses in Arkansas and Southern Missouri.

Objective:

The objective is to assemble, evaluate, develop and cooperatively release an adapted variety and/or varieties of big bluestem for conservation use in the following Major Land Resource Areas: 116A, 116B, 117, 118, and 119.

Cooperators:

USDA-NRCS Plant Materials Center at Elsberry, Missouri and the USDA-NRCS Plant Materials Center at Booneville, Arkansas.

Assembly:

The assembly consists of vegetative materials from adapted ecotypes throughout Northwestern Arkansas and Southwestern Missouri Major Land Resource Areas: 116A, 116B, 117, 118, and 119. Collection dates were between November 9 and 13, 1987. Four collection sites per county within the geographic area of collection were made. The number of sites was determined by the size of the county. The study plan supplement lists the states and the number of sites per county.

Procedure:

Four collections per county in the targeted Major Land Resource Areas were requested. The intent was to get a broad genetic base of plant material; therefore, the site selection attempt was to get as diverse sampling as practical when selecting superior big bluestem plants in the field. If a county had more than one Major Land Resource Area, collections were made in each area. Collections were from typical locations, which included natural grasslands (range), relic areas, and road right-of-ways. Avoided areas were those that may have been artificially seeded. Where possible, collections came from diverse soil textural types, such as sandy and silty; or range site groupings such as: (1) Run-in sites represented by overflow, or subirrigated; (2) normal upland sites represented by sandy, silty or clayey. Six subsamples (6" x 6" x 8" deep) were collected vegetatively at each site.

The samples were transported in material provided by the Plant Materials Center that included cartons, plastic bags, accession data sheets, and instructions for handling.

Plant Materials Center personnel picked up the cartons containing the samples at designated central locations within each administrative area in November 1987.

Transplanting procedures included temporary storage and handling. The samples were first assigned accession numbers and placed in temporary storage. On February 15, 1988, each subsample was transplanted into separate containers and maintained under controlled greenhouse conditions. The plants were then divided between two locations, Elsberry, Missouri and Booneville, Arkansas Plant Materials Centers, and established in space plant initial evaluation nurseries.

Discussion:

1987-1989

A total of 370 accessions (collections) of big bluestem were initially collected during November, 1987, from the targeted areas: 194-Missouri; 85-Arkansas; 82-Oklahoma; and 8-Illinois. Individual plantlets were separated, transplanted into cone-tainers, and grown out in Forrest Keeling Nursery's greenhouse from February until May 1998. More than 4400 individual plantlets were transplanted into a space plant nursery with two replications and six plants per replication. The nursery is located in Field #14 at the PMC and was planted June 1988. The entire nursery was irrigated three times weekly in 1988 to insure good survival.

Data collected in 1988 was mostly survival. Data collected in 1989 included survival, vigor, disease resistance, plant size, foliage size, and abundance and visual seed production. Accessions from each state were selected from the above criteria. The numbers selected from each state were as follows: Arkansas-14, Missouri-46, and Oklahoma-13. Table #1 shows the 73 accessions selected from the initial space plant nursery located in Field #14 on the PMC. These plants were vegetatively removed from the initial evaluation nursery in November 1989.

1990-1991

The plants selected in 1989 were transplanted into cone-tainers and grown out in the greenhouse that winter. These plants were planted in an isolated crossing block in Field #1 on May 23, 1990. Fifteen bulk pounds of clean seed were harvested in 1991.

1992-1993

The seed harvested in 1991 was sorted by weight and grown in cone-tainers in the greenhouse from January until April. Approximately 500 plants were planted in Field #7 in April and May 1992 for further evaluation.

Beginning in July 1993, the great flood began flooding approximately 86 acres on the PMC. The area where this planting was located was completely inundated with approximately eight feet of water. Just prior to the flooding of this site (July 8, 1993), the PMC staff uprooted 62 selections of big bluestem and re-established them to an upland site on the PMC (Field #8).

1994-1996

The nursery block established in Field #8 in July 1993 was evaluated for forage quality and quantity, seed production, plant maturity differences, and disease and insect resistance. Twenty-eight of the 62 plants were selected and allowed to cross. Seed from this crossing block is a composite of the original 73 accessions collected and is the breeders' block for the new accession 9078831. Seed was harvested in 1995 and 1996 and a seed increase plot will be established in 1997. The Booneville PMC also has made their selection and both will be included in the advanced evaluation.

1997-1998

The diversity in the original nursery block containing all 370 accessions is tremendous. There is a lot of variation within this species. The need for plant diversity for prairie restoration led to the release of the source-identified composite of all 370 accessions. This composite was given the accession number 9062323 and given the name OH-370 which stands for a composite of 370 collections made from the Ozark Highlands of Southern Missouri, Northern Arkansas, Eastern Oklahoma, and Southern Illinois. This plant was released in April 1997.

A 0.4-acre increase planting of 9078832 was planted May 22, 1997, in Field # 6. This planting was established in a conventional seedbed in 36" rows. The first year the planting produced 10 pounds bulk clean seed and in 1998 it produced 27 pounds bulk clean seed. The 1998 seed tested poorly but it is not known why. When seed becomes available from the Arkansas PMC the study will begin an advanced evaluation to compare the new accession, 9078831 with available varieties and also the accession Booneville has selected out of the original assembly of 370 collections.

The original planting was again evaluated the spring of 1997 looking for a tall, stiff stemmed, upright plant to use in wind barriers. Wind erosion is a problem in the flat and sandy crop fields in the bootheel area of Missouri. Switchgrass windbarriers are being tried in areas where field windbreaks using trees are not acceptable. Big bluestem was requested by the Missouri plant materials committee as an additional species to go along with switchgrass since the nursery is still intact. Five accessions (Table #2) were selected and increased vegetatively in the greenhouse and transplanted into an isolation block in Field #4. This block contained 126 plants and of those, 34 plants were selected to represent the crossing block that will serve as the breeders' block for a wind barrier selection. The final accessions represented in this block are 9065960, 9056913, and 9056914.

Selections were also made for landscape and beautification (Table # 3). These selections were transplanted into the rod row initial evaluation area for further evaluation.

1999

The increase plot of 9078831 was expanded in 1999 but did not develop as the 1997 original increase plot did. This accession is scheduled for release as a pre-varietal selection in 2000 if enough seed is available and field plantings are successful.

The wind barrier selection block was again evaluated in 1999 and narrowed down to a single accession, 9066960 (Table #2).

No additional selections were made for landscape plants in 1999 (Table #3).

2000

The increase plot of 9078831 was again expanded in 2000 but again was very slow to germinate. Seed was sent for testing and the sample contained a high percentage of dormant seed. This prevarietal selection was scheduled to be released in 2000 and given the name OZ-70 that stands for Ozark Highland composite of 70 collections. The release has been delayed until a solution can be found for its high seed dormancy.

Seed was harvested from the wind barrier block and an increase planting will be made in 2001.

2001

The increase plot of 9078831 (OZ-70) was again expanded in 2001 but this year it was planted the first week of March to allow for stratification. Seed harvested in 2000 was used in the planting because seed less than one year old appears to have more dormancy than seed that has had time in storage. The portion of the plot that was planted in 2001 established well and even produced a small amount of seed the first year.

Seed harvested from the wind barrier accession was propagated in the greenhouse and transplanted into an evaluation nursery. The evaluation nursery has approximately 250 plants on a three-foot grid. These plants will be evaluated for two additional years for height, biomass production and lodging. This plant will be released as a tall, stiff stemmed selection.

2002

Field testing has shown possible problems with establishment of OZ-70 big bluestem. A trial was started using replicated plots to compare the establishment of OZ-70 with Rountree big bluestem. First year data indicates that Rountree establishes quicker with higher stand density than OZ-70. It also indicated that the winter dormant plots (planted March 14, 2002) of OZ-70 were better than the spring planted plots (planted June 21, 2002). This was reversed with the Rountree. This information supports the high seed dormancy problem indicated in seed tests. These plots will be monitored one more year to see if the slow establishment has to do with the long-term density of the plots.

A comparison between new seed and one-year-old seed is planned for 2003. Seed tests indicate a problem with seed dormancy in new seed. Storage for one year could help rectify this problem.

2003

A trial comparing new (previous year's harvest) and older seed (one to five years old) was conducted in 2003. Establishment was quicker if new seed was winter dormant planted. This supports that newly harvested seed has higher seed dormancy but all lots of seed developed into successful stands the establishment year.

The technical review committee recommended proceeding with a Selected Release for this accession and OZ-70 Germplasm Big Bluestem was released December 2003.

Release Documentation
The OZ-70 selection has very good forage production and vigor that appears to be comparable or better than Rountree. OZ-70 is approximately two weeks later in booting than Rountree and forage quality is better when tested at Elsberry (see below). Rountree exhibits considerable more rust when compared to OZ-70 in Southern Missouri. OZ-70 also has very good seed production with a 2003 yield of 280 bulk pounds of clean seed per acre.

Forage clippings of OZ-70 Germplasm were compared with Rountree. These samples were replicated and taken at different stages of growth. Forage quality of the OZ-70 selection compared favorably to Rountree as indicated by following data.

Clipping Date	Percent Protein		Percent ADF		Percent NDF	
	OZ-70	Rountree	OZ-70	Rountree	OZ-70	Rountree
6/19/02	14.3	8	30.9	35.7	55.8	60.8
7/8/02	8.2	5.8	34.1	33.0	59.3	60.5
8/30/02*	11.4	11.9	34.3	34.7	54.6	56.6

*Regrowth material from 7/8/02 clipping.
ADF=acid detergent fiber; NDF=neutral detergent fiber.

OZ-70 Germplasm big bluestem was compared to 'Rountree' big bluestem for establishment and Rountree was quicker to establish indicating better seedling vigor when new (previous year's harvest) seed was planted. A seeding trial was conducted in 2003 and compared seed harvested in 2002, 2001, and a mixture of seed harvested in 1997 through 2000.

The results below indicate some seed dormancy in new crop seed but all plots developed very good to excellent stands and had seedhead production the first year.

	Stems Per Row Foot	Percent Cover
Winter dormant planting, 2002 seed	**16**	**92**
Winter dormant planting, 2001 seed	**14**	**78**
Winter dormant planting, 97-00 seed	**8**	**65**
Spring planting 2002 seed	**10**	**60**
Spring planting 2001 seed	**14**	**87**
Spring planting 97-00 seed	**10**	**75**

2004

The tall, erect, lodging resistant big bluestem currently being evaluated as a wind barrier selection, (accession 9066960) was increased for advanced testing. Seed was harvested in 2003 from the remaining plants in the final evaluation block. The increase block established well but no seed was harvested in 2004. Limited seed production is anticipated for 2005 and available for advanced testing in 2006.

Shorter growing collections were also isolated and evaluated. Six collections were narrowed to three (accessions 9056902, 9056905, and 9056906) and allowed to cross. This composite (accession 9083253) was harvested in 2003 and used to establish an increase block in 2004. Seed production is anticipated for 2005 and available for advanced testing in 2006. This selection will be evaluated for use in vegetative buffers and filters.

Study 29I097G - Assembly and Evaluation of Big Bluestem, *Andropogon gerardii*, Vitman. **Table #1**

Accessions Selected for Crossing Block

Collector	State	County	Accession Number	MLRA	Soil
Levonna S. Vekman	Arkansas	Faulkner	9056956	118	Leadville
Mark L. Kennedy	Arkansas	Fulton	9056968	116A	Geesville
Luther O. Shaw	Arkansas	Izard	9056920	116A	Mako
NRCS-Field Office	Arkansas	Logan	9056964	118	Taff
NRCS-Field Office	Arkansas	Madison	9056962	118	Leadvale
Stephen T. Ford	Arkansas	Madison	9056945	117	Nixa-SL
John Y. Harrington	Arkansas	Madison	9056923	116A	Estate-SC
John Y. Harrington	Arkansas	Madison	9056952	116A	Estate-SC
Lane L. Gentry	Arkansas	Perry	9056922	119	Clebit
John D. Kopf	Arkansas	Scott	9056936	119	Carnasaw
Jeremy R. Funk	Arkansas	Sharp	9056914	116A	Gepp
NRCS-Field Office	Arkansas	White	9057058	118, 134	
NRCS-Field Office	Arkansas	White	9057060	118,134	
Robert S. Garner	Arkansas	Yell	9056908	119,118	Clebit-FSL
H. Dan Philbrick	Missouri	Barry	9056832	116B	
Dudley W. Kaiser	Missouri	Benton	9056840	116B	Bardley
NRCS-Field Office	Missouri	Camden	9056724	116A	Gatewood
William K. Quage	Missouri	Cedar	9056800	116B	Hector
Patricia A. Beneke	Missouri	Cole	9056821	115	Goutewood
Patricia A. Beneke	Missouri	Cole	9056806	115	Gatewood
Melodie Marshall	Missouri	Crawford	9056820	116B	
Melodie Marshall	Missouri	Crawford	9056886	116B	
Melodie Marshall	Missouri	Crawford	9056767	116B, 116A	Lebanon
Myron C. Hartzell	Missouri	Dent	9056773	116B	Coulstone
Myron C. Hartzell	Missouri	Dent	9056763	116B	Lebanon
John L. Lumb	Missouri	Douglas	9056833	116B	Doniphan
Art Kitchen	Missouri	Franklin	9056855	115	Crider
Art Kitchen	Missouri	Franklin	9065771	115	Union
NRCS-Field Office	Missouri	Gasconade	9056848	116B	Gladden
Clayton P. Robertson	Missouri	Gasconade	9056875	116B	
H. Lane Thurman	Missouri	Greene	9056716	116B	Chirty Silt Loam
NRCS-Field Office	Missouri	Hickory	9056839	116A	
Stanley Lamb	Missouri	Iron	9056774	116A	Midco
Howard Combes	Missouri	Howell	9056753	116A	Doniphan
Joe H. Everett	Missouri	Jefferson	9056842	115	GL
NRCS-Field Office	Missouri	LaClede	9056741	116A	Cherty Silt Loam
Kees VanderMer	Missouri	LaClede	9056791	116A	Union
Cecile Allen	Missouri	Lawrence	9056709	116B	Viraton
Ron R. McMurtrey	Missouri	McDonald	9056719	116A	
Larry E. Lewis	Missouri	Miller	9056732	116B	SIL
Larry E. Lewis	Missouri	Miller	9056868	116B	SIL
Henry E. Knipker	Missouri	Moniteau	9056890	116B	Glensted
Mary Beth Roth	Missouri	Morgan	9056831	116B	

Study 29I097G – Assembly and Evaluation of Big Bluestem, *Andropogon gerardii*, Vitman.

Table #1 - continued

Collector	State	County	Accession Number	MLRA	Soil
Mary Beth Roth	Missouri	Morgan	9056837	116B	
Stephen E. Robbins	Missouri	Organ	9056770	116A	
William R. Dilbeck	Missouri	Polk	9056828	116B	
NRCS-Field Office	Missouri	Pulaski	9056746	116A	Wilderness
Clarence Wagy	Missouri	Reynolds	9056701	116A	
Charles E. Johnson	Missouri	Ripley	9056895	116A	
Charles E. Johnson	Missouri	Ripley	9056894	116A	
Steve Wall	Missouri	Shannon	9056762	116A	
Claude A. Peifer	Missouri	Ste. Genevieve	9056819	116B	Bloomsdale
Edward L. Templeton	Missouri	St. Francois	9056845	116A	Crider
Carl Wehrman and Dude Davidson	Missouri	Taney	9056712	116A	Clarksville
Jeff A. Lamb	Missouri	Texas	9056728	116A	Goss
NRCS-Field Office	Missouri	Wayne	9056854	116A	
Patrick L. Adams	Missouri	Washington	9056817	116A	Silty Clay Loam
Patrick L. Adams	Missouri	Washington	9056870	116A	Silty Clay Loam
John N. Emerson	Missouri	Webster	9056737	116B	
Dan D. Divine	Missouri	Wright	9056733	116B	
Andrew R. Inman	Oklahoma	Adair	9056996	117	Hector Complex
Billy D. Dudley	Oklahoma	Cherokee	9057010	116A, 117	Newtonia
Billy D. Dudley	Oklahoma	Cherokee	9057016	116A, 117	Talpa-Rock
Kenneth W. Swift	Oklahoma	Choctaw	9057025	112	Muskogee SL
Warren R. Sanders	Oklahoma	Coal	9057005	119	Boham
Steve D. Clark	Oklahoma	Latimer	9057014	118, 119	Stigler SL
Robert E. Blackman	Oklahoma	Mayes	9056995	112, 116A	Hector
Sam L. Viles	Oklahoma	McIntosh	9057035	118	Karma SL
Patrick I. Bogart	Oklahoma	Okmulgee	9057032	112, 118	Taloka SL
Patrick I. Bogart	Oklahoma	Okmulgee	9057037	112, 118	Taloka SL
NRCS-Field Office	Oklahoma	Ottawa	9057030	116A, 112	ETA-SL
William R. Bin	Oklahoma	Pushmatoho	9957052	119	Bosville
William R. Bin	Oklahoma	Pushmatoho	9057046	119	Bernow FSL

Wind Barrier Selection Isolation Block **Table #2**

Collector	State	County	Accession Number	MLRA	Soil
	Arkansas	Logan	9056960	118	Laedvale

Study 29I097G – Assembly and Evaluation of Big Bluestem, *Andropogon gerardii*, Vitman.

Landscape Selection Rod Row Area **Table #3**

Collector	State	County	Accession Number	MLRA	Soil
Clarence Wagy	Missouri	Carter	9056703	N116A	Opequon
Clarence Wagy	Missouri	Reynolds	9056708	N116A	Clarksville
Myron Hartzell	Missouri	Dent	9056812	116A	Elsah
Kenneth W. Swift	Oklahoma	Latimer	9057025	119	Freestone Variant - Bernow Variant Complex
	Oklahoma	McCurtain	9057049	1336	Kinta Clay Loam
Dennis W. Shirk	Missouri	Maries	9056877	116A	Lebanon
Larry B. Cash	Arkansas	Carroll	9056934	116A	Nixa

Study: 29I101J

Study Title: Assembly and Evaluation of Arrowwood, *Viburnum dentatum* L.

Study Leader: Cordsiemon, R.

Introduction:

Arrowwood is an upright bushy shrub to five meters; bracets are glabrous, becoming gray: leaves suboricular to ovate, 3-8 cm long, short acuminate, rounded or subcordate, coarsely dentate, glabrous and lustrous above, glabrous beneath or bearded in the axils of the reins, with 6-10 pairs of reins; petiole 1-2.5 cm long: cymes slender stalked, 5-8 cm across, glabrous; stamens longer than corolla. Flowers are globose-avoid, 6 mm long, blue-black.

Problem:

There is a need for developing arrowwood for use as wildlife food and habitat in the three states being served by the center.

Objective:

The objective is to assemble, comparatively evaluate, select and release an adapted cultivar of arrowwood.

Discussion:

1988-1992

Collections were requested from the three-state service area but only nine were made. There was concern regarding the correct species being collected because of its rare occurrence in the service area according to the literature reviewed. The collections were stratified and placed in the greenhouse for germination but none germinated.

1993

One hundred and fifty plants were obtained with a field collection origin in the state of Iowa. These plants were planted in Field #7e in May 1993. All plants were surviving in good to excellent condition up to the time of the great flood of 1993.

Approximately eight and a half feet of floodwater inundated this planting. Once the floodwaters receded, it became apparent that the entire planting was destroyed.

More plants will be sought for possible replacing in 1994 or 1995.

1994

This project was reestablished April 25, 1994 in Field #11e at the PMC. There was no seed from native collections available at this time so six accessions of plant materials were purchased from nursery production stock. Three accessions were named and three were common stock with origins from Iowa and Illinois. The summer of 1994 experienced several significant dry periods and although they were hand watered several times, some replanting of the smaller plants was necessary.

1995-1996

The planting was evaluated for survival, height, spread, and form. Survival of five of the six accessions was excellent. The Iowa source was established with smaller plants but had only about 60% survival.

1997-1999

Accession 9068590, origin Iowa; source, Forrest Keeling Nursery, was selected based on the following characteristics: seed production, insect and disease resistance and form. Seed of this accession was harvested in 1997, 1998 and 1999 and propagated in the PMC greenhouse. These plants will be used in field plantings in Iowa starting in the spring of year 2003. Plans are to release this accession as a selected class germplasm in year 2004-2005.

2000

Plans were to release accession 9068590, arrowwood in year 2001 but because of the need for field planting evaluations to support this release; the release date will need to be

put off until at least 2004 or 2005. Nine ounces of clean seed were harvested from the planting located in Field #11 on the PMC on July 19, 2000. Seed was matured and had begun to shatter at the time of harvest. This accession will be evaluated in field plantings only in the state of Iowa.

The source of this accession (9068590) of arrowwood is Floyd County, Iowa near Charles City.

2001

The selected accession of arrowwood (9068590) produced a medium amount of seed this year (0.33 pound). The seed was harvested on July 9, 2001 from a planting located in Field 11 on the PMC. This accession will be placed in field plantings only in the state of Iowa in 2002.

2002

Accession 9068590 from Floyd County Iowa was selected from the *Viburnum dentatum* L., arrowwood assembly. Seed was harvested from this selection on July 22, 2002. This selection produced 1.30 pounds of clean seed. The following is a listing of seed production by year through 2002.

Year of Harvest	Amount of Seed Harvested
2000	9.00 ounces
2001	0.33 pound
2002	1.30 pounds

2003

Two plants of accession 9068590 were removed (transplanted) from the initial planting and relocated in an isolated area in Field #6 in the fall of 2003. Seed (3.30 pounds) from these plants were harvested (July 27, 2003) and planted in the PMC greenhouse. The plantlets will be used in Iowa's field planting program. A tested class release is scheduled for 2005.

2004

Seed produced in 2003 was a cross of the initial planting material and as of 2004 the transplanted plants have not produced isolated seed. The Elsberry PMC and Forrest Keeling Nursery are in the process of propagating bareroot material from the 2003 production. This material will be used in field plantings. The 2005 growing season should produce seed for the first time since the relocation of the selected material (Accession 9068590).

Study*:* 29I107G

Study Title - Assembly and Evaluation of Eastern Gamagrass, *Tripsacum dactyloides, L.*

Study Leader: Bruckerhoff, S. B.

Introduction:

Eastern gamagrass, *Tripsacum dactyloides* L., is a tall warm season perennial grass found from Florida to Texas and Mexico, north and west to Massachusetts, New York, Michigan, Illinois, Missouri, Iowa and Nebraska. Eastern gamagrass grows in large clumps with thick rhizomes, broad flat leaves, the staminate and pistillate flowers in separate parts of the same many-flowered spikes. The pistillate spikelets are solitary and occur in hollowed portions on opposite sides of the thickened hard joints of the lower part of the rachis; this pistillate portion breaks up at maturity into several one-seeded joints. The staminate spikelets are two-flowered and in pairs on one side of a continuous rachis. Eastern gamagrass occurs on prairies, open limestone slopes, borders of woods and thickets, fields, and along roadsides and railroads. Refer to literature review.

Problem:

Eastern gamagrass is high quality forage with few available varieties and none of local origin in the PMC service area. There is need for a better-adapted variety of eastern gamagrass for pasture and range seedings, silage production, recreational area development and other conservation uses in the Midwestern and Eastern states for summer forage and vegetation.

Objectives:

The objective is to assemble, evaluate (identify superior plants), develop and release an adapted variety and or varieties of eastern gamagrass for conservation use in Missouri, Iowa, Illinois, Indiana and Ohio.

Procedure:

The assembly consists of vegetative material from adapted ecotypes primarily from the three-state service area. Additional collections came from Indiana, Ohio, Tennessee, Kentucky, and eastern Nebraska. The targeted collection area included the following Major Land Resource Areas: 103 (south), 104 (south), 105 (south), 106 - 115, 121, 122, 125, 126, 128, 131 (north), and 134 (north). Four collections from four different sites per county were requested. When possible, collections should come from different soil textural types.

Vegetative collections were taken from natural prairie stands or prairie remnants. The intent was to get a broad genetic base of plant material; therefore, attempting to get as diverse sampling as is practical when selecting superior eastern gamagrass plants in the field. Vegetative collections were taken from typical natural areas, prairies, borders of woods, thickets, and along roadsides and railroads. Areas that may have been seeded were avoided.

The samples were collected when the plant was dormant in the fall, divided into plantlets in the winter and placed into square open bottom containers and grown out in the greenhouse. Twelve plants per accession were planted.

The plants were planted in a randomized complete block with three replications. Each plot had three plants and all plants were planted on four-foot centers. A border row was planted around the three replications. This study was planted into a clean tilled seedbed with recommended fertility and weed control. Plants were evaluated for survival, vigor, height, spread, disease and insect resistance, lodging, amount of seed production, plant phenology, forage quantity, and regrowth.

Discussion:

1989-1990

The collection of samples went very well the fall of 1989. Two hundred forty-three samples were collected over a seven-state area. The primary area of collection was Missouri, Iowa, and Illinois with the majority coming from Missouri. Other states sending collections were Nebraska, Tennessee, Indiana, and Virginia.

During February 1990, each sample was cut apart and planted into 2 7/8-inch square by 5 1/2-inch tall open bottom containers for root development by air pruning. Twelve plants of each accession were planted and grown out in the greenhouse. The week of May 7, 1990, the plants were transplanted into a randomized complete block with three replications and three plants per replication. Extra plants were used for the border rows. The study was established at the PMC in Field #7F.

1991-1992

The planting was evaluated several times throughout 1991. Evaluations were made for survival, vigor, disease and insect resistance, amount of seed production, plant phenology, lodging, and size, height, width, and amount of foliage.

The planting was again evaluated in 1992 with an emphasis on amount of regrowth after clipping and late season vigor.

1993

The planting was evaluated in 1993 but was also destroyed by the flood. Before the planting was inundated with approximately eight feet of floodwater, PMC personnel were able to vegetatively remove 45 accessions that were rated the best and replanted them (July 2, 1993) to an upland site. The 45 accessions (Table #1) were selected based on their performance documented with three years of evaluation data. The plants were transplanted during a poor time of year but with irrigation they all survived.

1994-1996

The 45 best accessions were evaluated for forage quality and quantity, phenology, and number of chromosomes. Selections of the top five to ten accessions will be made in early 1997 from data taken in 1995 and 1996 (Table # 2). The plants will be increased in the greenhouse and planted into a crossing block in 1997.

1997-1998

Based on the evaluations of the 45 plants that were saved, the best 13 (Table # 2) were increased in the greenhouse and planted in Field # 6. There was only one plant per accession of these 45 plants that were evaluated, so additional plants were planted for future consideration.

The top four rated diploids, 9061911, 9061984, 9061991, and 9061948 were increased vegetatively in the greenhouse and planted in an isolation block in Field # 7F. This block will be harvested and used as a breeder block for a possible varietal release. Seed from this block will be used to start an increase planting and to also start a new evaluation nursery for recurrent selection. The accession 9061911 was also established in an isolation block by itself as the top diploid and will be compared against the composite. The accession 9061924 was also planted in an isolation block and will be evaluated as a possible northern source as it was the best northern collection and might be best suited for Northern Missouri and Southern Iowa.

Increase plots of the two top rated tetraploids, 9061944 and 9062018, were also established from vegetative material started in the greenhouse.

1999

The composite of the four top rated diploids (9061911, 9061984, 9061991, and 9061948) were assigned the accession number 9083214. Seed was harvested in July and will be used for advanced testing and to also start an increase (foundation) field. Seed was also harvested from the following increase plots: 9061911, 9061924, 9061944, and 9061984.

2000

An increase (foundation) field was planted May 15, 2000, for accession 9083214 using stratified seed. The planting was small and will be expanded in 2001. It did not produce seed in 2000 and was also thin. Accessions 9083214 (composite of the four best diploids), 9061911 (the best diploid), and 9061924 (best northern diploid) were propagated in the greenhouse for use in the advanced study of eastern gamagrass with Agricultural Research Service (ARS) in Woodward, Oklahoma (study MOPMC-P-003-PA, WL). The two best tetraploids (1944 and 9062018) were also propagated in the greenhouse but did not germinate. Seed was harvested from the breeders' blocks of all the above mentioned accessions.

2001

The increase (foundation) field for the accession 9083214 was expanded in 2001 but the stand was thin the first year. The seed was wet treated for stratification and planted April 18, 2001. Two rows of plants propagated in the greenhouse from stratified seed were planted alongside the increase planting. These plants were transplanted in mid April and performed poorly early due to cool weather.

A crossing block in Field #6 consisting of eight diploid accessions was also harvested in 2001. This block contained accession numbers 9061991, 9061948, 9062005, 9062085, 9061937, 9061911, 9061924, and 9061984. This composite was assigned the accession number 9083237. Plants from seed grown from this composite will be planted in an evaluation nursery at the PMC.

2002

An evaluation nursery of the composite 9083237 was started in Field #13 at the PMC. Additional seed from the crossing block in Field #6 was treated and propagated in the greenhouse while selecting for quick emergence.

2003

Seed was again harvested from the crossing block in field #6 and was treated and propagated in the greenhouse. These plants will be used to expand the evaluation nursery in field #13 at the PMC.

2004

The evaluation nursery for accession 9083237 was expanded. This accession is a composite of eight diploids, one of which is a northern Missouri collection. This accession is also being evaluated at the University of Northern Iowa, Cedar Falls, Iowa.

Study 29I107G -Selected Accessions of Eastern Gamagrass Table #1

Collector	State	County	Accession Number
Patrick L. Adams	Missouri	Clinton	9061968
Christopher C. Bordon	Illinois	Calhoun	9062012
William L. Brouk	Missouri	Benton	9061948
Dennis J. Browning	Missouri	Daviess	9061896
Dennis J. Browning	Missouri	Daviess	9061897
Paul Frey	Missouri	Dallas	9062082
Paul Frey	Missouri	Dallas	9062085
Darin W. Gant	Missouri	Stoddard	9061991
C. Mark Green	Missouri	Christian	9062032
Kenneth N. Gruber	Missouri	Rodaway	9061924
Terry A. Gupton	Tennessee	Roane	9034521
Robert T. Hagedorn	Missouri	Johnson	9061940
Thomas J. Hagedorn	Missouri	Pettis	9061911
Montie b. Hawks	Missouri	DeKalb	9061970
Montie B. Hawks	Missouri	DeKalb	9061971
Lynn A. Jenkins	Missouri	Newton	9062005
Lynn A. Jenkins	Missouri	Newton	9062006
David V. Johnson	Missouri	Worth	9061957
Arthur P. Kitchen	Missouri	Franklin	9062071
Viletta F. Langston	Missouri	Stone	9062034
Bob McClenny	Virginia		9034551
Steve A. McMillin	Missouri	Butler	9061994
D. Scott Patterson	Missouri	Cass	9061944
Al Peifer	Missouri	Perry	9061995
Lisa A. Ptasnik	Illinois	Massac	9062015
Lisa A. Ptasnik	Illinois	Massac	9062018
Shepherd Farms	Missouri		9061869
Shepherd Farms	Missouri		9062048
Shepherd Farms	Missouri		9062089
James E. Sturn	Missouri	Mercer	9061892
Edward L. Templeton	Missouri	St. Francois	9061999
Edward L. Templeton	Missouri	St. Francois	9062002
USDA-NRCS-Quicksand-PMC	Tennessee	Anderson	9034501
USDA-NRCS-Quicksand-PMC	Tennessee	Anderson	9034502
USDA-NRCS-Quicksand-PMC	Tennessee	Anderson	9034503
USDA-NRCS-Quicksand-PMC	Tennessee	Anderson	9034504
Curtis W. Walker	Missouri	Andrew	9061923
Stan Wall	Missouri	Shannon	9061992
Stan Wall	Missouri	Shannon	9061984
Ed J. Weilbacher	Illinois	Randolph	9062010
David L. White	Iowa	Wayne	9061876
Melvin Womack	Indiana	DuBois	9062069
Darrel D. Wright	Nebraska	Pawnee	9061887
David L. Wright	Missouri	Hickory	9061906
David L. Wright	Missouri	Hickory	9061937

Study 29I107G - Assembly and Evaluation of Eastern Gamagrass, *Tripsacum dactyloides,* L.

Top Rated Accessions — **Table #2**

Percent Protein

Accession Number	Ploidy Level	5/3/1996	6/27/1996	7/19/1996	Regrowth_3/ 8/27/1996	Regrowth 10/15/1996
9061911	Diploid	17.2	12.0	7.5	11.0	5.9
9061984	Diploid	19.4	11.7	9.3	13.5	8.1
9061991	Diploid	17.3	11.1	9.3	11.1	8.2
9061948	Diploid	17.3	11.4		13.2	7.5
9062005	Diploid	17.3	11.7	8.6	11.7	9.5
9061924	Diploid	17.0	10.3	7.2	11.6	7.8
9062085	Diploid	16.9	11.0	7.0	9.4	8.8
9061937	Diploid	18.8	14.1	6.9	13.0	6.5
Pete	Diploid	11.6	7.0	5.3	11.0	5.2
9061944	Tetraploid	15.6	10.1	8.8	11.7	7.6
9062018	Tetraploid	18.4	9.4	7.0	11.0	8.7
9061994	Tetraploid	16.0	10.0	6.3	11.0	9.1
9061999	Tetraploid	18.2	13.3	7.7	12.2	9.0
9062032	Tetraploid	16.7	11.6	9.0	10.2	9.4

Accession Number	First Seedhead Emergence	_1/ Forage Quantity	_2/ Vigor	Forage Height (ft)	_3/ Forage Reqrowth	_4/ % Seed Fertility
9061911	6/16/1996	1	1.3	5.0	1	59.6
9061984	6/16/1996	1	1.6	5.3	2	41.5
9061991	6/24/1996	1	2.0	5.0	1	66.9
9061948	6/8/1996	2	2.0	5.0	2	71.7
9062005	6/8/1996	2	2.8	4.9	4	82.7
9061924	6/10/1996	2	1.9	4.0	1	75.9
9062085	6/1/1996	5	1.9	4.3	3	83.3
9061937	6/1/1996	3	3.0	4.5	4	85.2
9061944	6/24/1996	3	2.1	4.8	1	76.4
9062018	7/1/1996	2	2.3	4.3	3	59.6
9061994	7/1/1996	3	2.7	4.4	3	67.6
9061999	6/24/1996	3	2.9	4.4	4	68.4
9062032	6/24/1996	2	2.1	4.7	3	67.7

_1/ Forage quantity was a visual 1 to 9 rating with 1 being the best.

_2/ Vigor was a visual 1 to 9 rating of overall condition of the plant with 1 being the best. This is an average of 10 evaluations throughout the growing season.

_3/ All plants were clipped to an 8 inch height on 7/22/96 and plants were rated for amount of regrowth on a 1 to 9 scale. Samples of regrowth were sent in for analysis.

_4/ Percent of 400 seed that are viable; 100 seeds harvested four times at one week intervals.

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Study: 29I108G

Study Title: Assembly and Evaluation of Low Growing, Rhizomatous Switchgrass, *Panicum virgatum L.* for Use in Waterways, Filter Strips and Other Conservation Uses.

Study Leader: Bruckerhoff, S. B.

Introduction:

Switchgrass is a warm-season, perennial, native grass. Plants are usually green or glaucous, with numerous scaly creeping rhizomes. Culms are erect, tough and hard, one to two meters rarely to three meters tall; sheaths glabrous; blades 10-60 centimeters long, three to 15 millimeters wide, flat glabrous, or sometimes pilose above or near the base, rarely pilose all over; panicle 15-50 centimeters long; acuminate; first glume clasping, two-thirds to three-fourths as long as the spikelet. Switchgrass frequents a wide variety of habitat, usually sunny including dry or moist prairies, moist seepage of rocky glades and buff escarpments, gravel bars of streams, open woods and along railroad tracks.

Problem:

There is a need for an adapted variety of a dense low growing, strongly rhizomatous switchgrass for use in waterways, filter strips, and for other conservation uses in Missouri, Illinois, Iowa, and adjacent states.

Objective:

The objective is to assemble, select, and develop a dense low growing strongly rhizomatous switchgrass, with good seedling vigor and seed characteristics, for use in waterways and streambank corridors.

Procedure:

The assembly consists of the collection of vegetative material from adapted ecotypes in Iowa, Illinois, and Missouri. The targeted collection area includes the following Major Land Resource Areas: 102b, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 131, and 134. Five collections from each NRCS administrative area were requested.

Vegetative collections were taken from natural prairie stands, prairie remnants or individual short growing plants growing in areas that are seasonally wet like a waterway. Total height of the plant was to be no more than three feet.

The samples were collected when the plant was dormant in the fall, divided into plantlets in the winter and placed into square open bottom containers and grown out in the greenhouse. Twelve plants per collection were grown out in the greenhouse.

The plants were planted into a randomized complete block with three replications. Each plot had three plants and all plants were planted on four-foot spacing. A border row was planted around the three replications. This study was planted into a clean tilled seedbed with recommended fertility and weed control. Plants were evaluated for survival, vigor, height, and spread that included rhizomatous characteristics, disease and insect resistance, lodging, and seed production.

Discussion:

1990-1991

The collections of *Panicum virgatum* L., low growing highly rhizomatous switchgrass was initiated in November 1990 and extended through 1991. One hundred eighteen collections were obtained from Major Land Resource Areas 102B-116, 131 and 134 in Missouri, Illinois and Iowa. The total number of collections received was 22-Illinois; 28-Iowa and 68-Missouri. All collections were assigned accession numbers and stored in a cool damp building.

1992-1993

The collections were vegetatively propagated in cone-tainers and placed in the greenhouse in January 1992. These plants were then transplanted in Field #7c on the PMC on June 9, 1992, in a randomized complete block with three replications. Baseline evaluations were taken this year; survival, spread, height, and number of panicles per plant. More detailed evaluations were scheduled for succeeding years.

Beginning in July 1993, the great flood began inundating the area where this project was located. Prior to the flooding of this site (July 2, 1993), additional evaluations were started and 67 accessions were vegetatively moved to an upland site on the PMC for continued evaluation. Table #1 lists the selected accessions, origins, and collectors.

1994-1995

Evaluations were continued on the 67 accessions during 1994 and 1995. The original planting in Field #7c that was flooded in 1993 was also checked for survivors. The planting was flooded by as much as eight feet of water for almost eight weeks. Nine plants were found that showed life and were dug up and moved to an upland site. These nine plants represented three accessions (Table #2).

Five accessions were selected out of the block of 67 for a short growing rhizomatous type. The five accessions (Table #3) were allowed to cross and seed was harvested and grown out in the greenhouse. The five accessions were also dug and increased in the greenhouse in containers.

1996

The five selected accessions (Table #3) were planted into a crossing block June 26, 1996. Half the block was from clonal material from each of the five accessions and the other half was from seed harvested from each of the five plants that were allowed to cross with each other. The accessions of each half of the planting were replicated five times with five plants per replication. Unwanted plants will be eliminated and the remainder of the block will be used for seed increase.

1997-1998

The three accessions (Table #2) of flood tolerant switchgrass were vegetatively increased in the greenhouse. Approximately 250 plants were transplanted April 1997 in Field #7. This is now the breeders' block for the accession 9083170 that is a composite of the three accessions listed in Table #2. Seed was harvested from this plot the first year and used to start a small increase plot in 1998. A small amount of seed was harvested from this increase plot the first year. It is also planned to increase the size of this plot in 1999.

The low growing switchgrass block containing five accessions (Table #3) was again evaluated in 1997. Thirty-five plants were selected from the block of 250. Selected plants were allowed to cross and produce seed. This seed was also used to start an increase field in 1998. This small increase plot produced minimal seed the first year. Seed was again harvested from the 35 plants in 1998 and will be used to make the increase plot size bigger in 1999. The 35 selected plants are the breeder's block for the new accession 9083172 that is a composite of the five accessions in Table #3.

1999

The increase plot of flood tolerant switchgrass, accession 9083170, was expanded in May 1999. This planting did not do well, possibly poor seed germination combined with a very dry summer. Weed control was also poor. Establishment of field plantings was also poor. Expanding the increase plot will again be planned for 2000. Seed was harvested from the breeder's block and the 1998-increase plot. This seed was small due to dry weather.

The increase plot of low growing switchgrass, accession 9083172, was also expanded in May 1999. This planting also did poorly, again possibly poor seed germination combined with a very dry summer. Weed control was also poor. Field testing will begin when seed becomes available. Expanding the increase plot will be planned for year 2000. Seed was harvested from the original 35-plant breeder's block and also the increase field. This seed was also small due to dry weather.

2000

Increase plots of the flood tolerant switchgrass, accession 9083170, and the low growing switchgrass, accession 9083172, were again planted in 2000. These plantings were very sparse and slow to establish. The plantings made in 1999 contained some plants with minimal seed produced. Plantings will again be tried in 2001 with more stratification.

2001

The increase plots of the low growing switchgrass, accession 9083172, that were planted in 1998 and 1999 have filled in and produced seed. The plots planted in 2000 and 2001 have failed. This accession appears to have high seed dormancy and combined with excessive weed competition caused poor establishment. An increase planting is planned for 2002 on an upland site with less weed problems.

The increase plots of the flood tolerant switchgrass, accession 9083170 that was planted in 1998 produced seed in 2001. The 1999 planting was very thin and the 2000 and 2001 plantings have failed. This accession appears to have high seed dormancy. Another increase planting is planned in 2002 with additional stratification.

Accession 9062244 was observed in the nursery block in field eight as having high forage production (very leafy), medium height, and late maturity. Protein analysis of a sample taken was 15.6%. This plant was increased in the greenhouse from vegetative material and planted into a 200-plant nursery in 2000. Unwanted plants were rogued out and seed was harvested in 2001. Plants that germinate quicker from the heaviest seed will be placed in an evaluation nursery in 2002.

2002

The low growing switchgrass, accession 9083172, increase plots had limited seed production in 2002. The 17.3-pound bulk seed produced will be used in the field-planting program for advanced testing. An additional 1.5 acres increase field was planted in 2002. No seed was harvested the establishment year from this plot.

The flood tolerant switchgrass, accession 9083170, increase plots also had limited seed production in 2002. The 32.5-pound bulk seed produced will be used in the field-planting program. Due to an extremely wet spring, no additional seed increase field was planted in 2002.

The medium height forage type switchgrass, accession 9062244, was propagated in the greenhouse and plants were selected for quick establishment and seedling vigor. These plants were transplanted into an evaluation nursery in Field #1 at the PMC.

2003-2004

The low growing switchgrass, accession 9083172, increase plots have been expanded but are slower than expected to develop and produce seed. Available seed is being used in the field planting program for advanced testing.

The flood tolerant swithgrass, accession 9083170, increase plots have been expanded but are also slower than expected to develop and produce seed. Available seed is being used in the field planting program for advanced testing.

The medium height forage type switchgrass, accession 9062244, was again propagated in the greenhouse and the evaluation nursery was expanded in 2003. The plants were allowed to develop and mature in 2004 with evaluations to begin in 2005.

Study 29I108G-Selected Accessions of Low Growing Switchgrass Table #1

Accession #	State	County	MLRA	Collector Name
9062155	Iowa	Louisa	108	Dean L. Pettit
9062157	Iowa	Cherokee	107	Lon Allan
9062158	Iowa	Clay	103	John P. Vogel
9062160	Iowa	Freemont	107	NRCS F. O.
9062163	Iowa	Hamilton	103	Dana C. Holland
9062165	Iowa	Woodbury	107	John P. Vogel
9062166	Iowa	Monona	107	Michael J. Kuera
9062178	Iowa	Muscatine	108	Douglas S. Johnson
9062181	Illinois	Champaign	108	Leon W. Wendt
9062188	Illinois	Macoupin	108	Ivan N. Dozier
9062189	Illinois	Macoupin	115	Ivan N. Doxier
9062190	Illinois	Macoupin	108	Ivan N. Dozier
9062195	Illinois	Carroll	105	Raymond J. Hudak
9062196	Illinois	Carroll	105	Raymond J. Hudak
9062205	Missouri	Barton	112	Jerry L. Cloyed
9062207	Missouri	Bates	112	Robert D. Bouland
9062208	Missouri	Pettis	116A	Thomas J. Hagedorn
9062209	Missouri	Christian	116A	C. Mark Green
9062211	Missouri	Ozark	116A	Carroll W. Foster
9062212	Missouri	Johnson	112	Robert T. Hagedorn
9062213	Missouri	Madison	116A	Sandra L. Lewis
9062214	Missouri	Ste. Genevieve	116B	Renee L. Phillips
9062215	Missouri	Oregon	116A	Stephen E. Robbins
9062216	Missouri	Shannon	116A	Steve Wall
9062217	Missouri	Reynolds	116A	Clarence W. Wagy
9062218	Missouri	Christian	116A	C. Mark Green
9062219	Missouri	Perry	116B	Claude E. Peifer
9062220	Missouri	Reynolds	116A	Clarence W. Wagy
9062221	Missouri	Dade	116B	Todd E. Mason
9062222	Missouri	Morgan	116B	James A. Maberry
9062223	Missouri	Franklin	116B	Arthur P. Kitchen
9062224	Missouri	Cedar	116B	Kim C. Ehlers
9062225	Missouri	Christian	116A	C. Mark Green
9062227	Missouri	Ozark	116	Carroll W. Foster
9062228	Missouri	Texas	116	Jeff A. Lamb
9062229	Missouri	Texas	116	Jeff A. Lamb
9062234	Missouri	Saline	107	Wayne E. McReynolds
9062237	Missouri	Ray	107	James M. Rehmsmeyer
9062238	Missouri	Worth	109	David A. Stevens
9062239	Missouri	Sullivan	109	Stuart A. Lawson
9062240	Missouri	DeKalb	109	Wm. A. Throckmorton

Table #1 - continued

Accession #	State	County	MLRA	Collector Name
9062242	Missouri	DeKalb	109	Wm. A. Throckmorton
9062243	Missouri	Buchanan	107	Rodney Saunders
9062244	Missouri	Dent	116	Myron C. Hartzell
9062246	Missouri	Sullivan	109	Stuart A. Lawson
9062247	Missouri	Buchanan	107	Rodney Saunders
9062248	Missouri	Sullivan	109	Stuart A. Lawson
9062250	Missouri	Nodaway	109	Kenton L. Macy
9062251	Missouri	Worth	109	David A. Stevens
9062252	Missouri	Daviess	109	James A. Sturm
9062253	Missouri	Daviess	109	James A. Sturm
9062254	Missouri	Maries	116A	Dennis W. Shirk
9062255	Missouri	Maries	116B	Dennis W. Shirk
9062256	Missouri	Maries	116A	Dennis W. Shirk
9062257	Missouri	Maries	116A	Dennis W. Shirk
9062259	Missouri	Shannon	116A	Steve Wall
9062261	Missouri	Shannon	116A	Steve Wall
9062265	Missouri	Sullivan	109	Stuart A. Lawson
9062267	Missouri	Gentry	109	Gary J. Barker
9062268	Missouri	Platte	107	Terry A. Breyfogle
9062269	Missouri	Sullivan	109	Stuart A. Lawson
9062270	Missouri	Platte	107	Terry D. Breyfogle
9062271	Iowa	Page	104	Kevin J. McCall
9062272	Illinois	Fayette	104	Brad S. Simcox
9062274	Iowa	Madison	108/109	Larry Beeler/Tom Oswald
9062193	Illinois	Fayette	113	Brad S. Simcox

Selected Accessions of Wet Tolerant Switchgrass **Table #2**

Accession #	State	County	MLRA	Collector Name
9062193	Illinois	Fayette	113	Brad S. Simcox
9062213	Missouri	Madison		Sandra L. Lewis
9062235	Missouri	Miller	116	Matt L. Burcham

Final Accessions Selected for Low Growing Switchgrass **Table #3**

Accession #	State	County	MLRA	Collector Name
9062205	Missouri	Barton	112	Jerry L. Cloyed
9062225	Missouri	Christian	116A	C. Mark Green
9062252	Missouri	Daviess	109	James A. Sturm
9062255	Missouri	Maries	116B	Dennis W. Shirk
9062257	Missouri	Maries	116A	Dennis W. Shirk

Study No. 29I110J

Study Title: Assembly and Evaluation of Chokecherry, *Prunus virginiana L.*

Study Leader: Cordsiemon, R.

Introduction:

Chokecherry is one of the most widely distributed native tall shrubs or small trees in North America. It occurs from Newfoundland south to Georgia and west to California and British Columbia. In the Midwest its habitat includes moist sites in open areas, along fencerows, roadsides, borders of woods as well as sandy or rocky hillsides and ravines. Three varieties have been described: var. *virginiana* in the eastern United States, var. *melanocarpa* in the west, and var. *demissa* along the Pacific Coast. Some forms have yellow rather than dark red or black fruit. The leaves of var. *melanocarpa* are thicker and cordate rather than oval, oblong or obovate as in var. *virginiana*. The fruit is less astringent.

Adaptive characteristics of chokecherry includes fast growth, dependable fruit crops, tolerance to harsh climatic extremes, and the ability to grow in a wide variety of soil types.

Problem:

There is a need for developing a cultivar/selection of chokecherry for use as wildlife food and habitat in the three states served by the Center.

Objectives:

Assemble, comparatively evaluate, select, and release adapted cultivars/selections of chokecherry.

Discussion

1989-1992

Seed collection was initiated in 1989 and 11 collections were made before the State Conservationists' Advisory Committee put the study on hold in 1992 due to lack of personnel at the PMC to carry out the work involved. The intent was to make 40-50 collections from the three-state service area to be placed in a randomized complete block planting.

1993-1996

The project remained in an inactive status until 1996. At this time a decision was reached to germinate the seed that was collected earlier. Based on the viability of this seed collection, it may become necessary to recollect this species.

1997-1998

Seed collections of chokecherry were stratified and placed in the greenhouse for germination (March 1997). A total of 15 collections were made but only 11 germinated. Enough plants of the 11 collections were obtained to initiate a randomized complete block planting with 12 replications. This planting was made on June 23, 1998 in Field #6 on the PMC.

1999-2001

Table #1 lists the accessions of chokecherry collected, collector's name, state, county, MLRA, and soil type. Plans are to continue evaluations for survival, fruit production, height, spread, insect and disease resistance and vigor until selection(s) are made. Several accessions produced light to heavy fruit production. An Eastern tent caterpillar *Malacosoma americanum* infestation was noticed throughout this planting (all accessions) in years 2000 and 2001; however there was no serious damage recorded on any accession in this assembly. A solution of Malathion (one tablespoon per gallon of water) was sprayed on all plants. Control was almost instant in both years.

2002

Evaluations for this study were made on April 25, July 11 and October 9. The following characteristics were documented: vigor, insect and disease resistance, height, spread, and fruit production. The eastern tent caterpillar, *Malacosoma americanum*, infested this planting again this year. No chemical (Malathion) was applied this year in order to determine the extent of damage caused by these insects. Table #1 reflects the evaluations along with accession information.

2003

Evaluations of plants were made again this year for selection purposes and all the other plants were removed from the planting (July 2003). Selections of plants were based on the following characteristics: vigor, insect and disease resistance, height, spread and fruit production. The remaining plants will be allowed to cross-pollinate. The seedlings will be bare rooted and placed in a field planting program in the three-state service area of Missouri, Illinois and Iowa.

2004

Collections were made from the selected trees and over 5.2 pounds of clean seed were harvested. The new collection from selected material has been assigned the accession number 9083259. The fruit will be harvested, de-pulped and planted and grown out as seedlings in the PMC greenhouse. Seed from the 2004 collection will be used to start seedlings for field plantings in the three-state service area. A tested class release is scheduled for 2008.

Accession Information

Table #1

Collector	State	County	MLRA's	Soil	Accession
R. W. Nuboer	Illinois	Carroll	111	Seaton Silt Loam	9008107
R. W. Nuboer	Illinois	Whiteside	108	Silt Loam	9057068
R. W. Nuboer	Illinois	Carroll	111	Fayette Silt Loam	9057069
R. E. Szafoni	Illinois	Mclean	108	Unknown	9057089
W. D. Glass	Illinois	Iroquois	110	Sandy Loam	9057143
J. R. Heim	Illinois	Ogle	108	Unknown	9057162
J. P. Vogel	Iowa	Woodbury	107	Kennebec	9057181
J. P. Vogel	Iowa	Woodbury	107	Kennebec Silt Loam	9068669
Maggie Cole	Illinois	Cook	110	Unknown	9068542
Jimmy Henry	Missouri	Lincoln	115	Menfro Silt Loam	9008147
J. R. Heim	Illinois	Lee	108	Martinsville Silt	9068587
Maggie Cole	Illinois	Cook	110		9068660
Maggie Cole	Illinois	Cook	110		9008157
Nancy Pals	Illinois	Coles	108		9068667
Bart C. Pals	Illinois	Effingham	113		9068183
William A Throckmorton	Missouri	DeKalb	109	Lamoni	9068668
Kent A. Boyles	Illinois	Tazewell	108	Stronghurst Silt Loam	9068664
Louis Byford	Missouri	Atchison	107	Napier Silt Loam	9068658

Study No. 29A116W

Study Title: Evaluation of Miscellaneous Trees and Shrubs.

Study Leader: Cordsiemon, R.

Introduction:

The evaluation of woody plant materials on the USDA-NRCS Elsberry Plant Materials Center began in 1989. Since that time plants have been added for multiple purposes. The evaluations of these plant materials have been in cooperation with the USDA-ARS, Plant Introduction Station, Ames, Iowa; Missouri Department of Conservation; and other plant materials centers.

Problem:

Trees and shrubs are needed to provide for windbreaks, recreation, and multipurpose use in the Midwest Region and provide multiple wildlife benefits throughout the three-state area. New selections, collections and public and private releases need to be evaluated as potential conservation species.

Objective:

The objectives of this study are to assemble and evaluate woody plant materials (both collections in the wild and also released cultivars) for conservation uses, area of adaptation, and to select and increase limited quantities of promising woody plants for advanced evaluation. Superior accessions or those exhibiting unique characteristics will be placed in field evaluations and field plantings in the three-state area being served by the PMC.

Assembly:

Plant materials of various woody species representing many species have been planted on the PMC. The sources include other PMC's, commercial nurseries, and other agencies.

Discussion:

1994-2004

This study is a long-term ongoing evaluation of miscellaneous trees and shrubs that are not part of a collection made over several years. New species will be planted as they arrive at the Center. Although this study was started in 1989, it includes some species from past studies. Presently there are 29 different species included. Twenty-two are exhibiting 100 percent survival. Five species have failed to survive. For more information regarding plant performances refer to Table #2.

The trees and shrubs in this study are often utilized during plant identification courses held at the Center.

Table #1 reflects the species included in this assembly, accession numbers, sources and dates planted. Table #2 reflects the plants' performance for years 1990-1992, 1998-2003.

There were no evaluations conducted and no new species added in 2004. There are two new species planned for 2005 that will be received from the Plant Introduction Station in Ames, Iowa. The entire assembly is scheduled to be evaluated in 2005. Very little attention was given to this study in 2004 because the PMC was understaffed.

List of species included in study. **Table #1**

Common Name	Genus	Species	Accession Number	Alternate No.	Source	Date Planted
'Densehead' mountain ash	*Sorbus*	*alnifolia*		7761	F.K. Nursery	11/65
'Ruby' redosier dogwood	*Cornus*	*stolonifera*	443229		Big Flats PMC	5/89
Late lilac	*Syringa*	*villosa*	9006228		Bismarck PMC	5/89
'Redstone' cornelian cherry dogwood	*Cornus*	*mas*	9055585		Elsberry PMC	5/89
'Roselow' sargent crabapple	*Malus*	*sargenti*	477986		Roselake PMC	5/89
'Elsmo' lacebark elm	*Ulmus*	*parvifolia*	9004438		Asia	5/89
Blueleaf honeysuckle	*Lonicera*	*korolkowi*	9062152		Nebraska	5/89
Birch	*Betula*	*species*	502295		Ames, IA	4/90
Willow oak	*Quercus*	*phellos*		4723	Ames, IA	4/90
Fragrant epaulettetree	*Pterostyrax*	*hispida*		A80779	Ames, IA	4/90
Bradford pear	*pyrus*	*calleryana*		19173	Ames, IA	4/69
Prairie rose	*Rosa*	*setigera*	495616		Ames, IA	4/90
Ural false spirea	*Sorbaria*	*sorbifolia*		7778	Ames, IA	4/90
Weeping lilac	*Syringa*	*pekinensis*	478008		Ames, IA	4/90
Flameleaf sumac	*Rhus*	*copallina*		7764	Ames, IA	4/90
Western paper birch	*Betula*	*occidentalis*	495882		Ames, IA	4/90
Amur honeysuckle	*Lonicera*	*mackii*	477998		Ames, IA	4/90
Mountain ash	*Sorbus*	*reducta*		A-8371	Ames, IA	4/90
Blackhaw	*Viburnum*	*prunifolium*		2813	Ames, IA	4/90
Largeleaf dogwood	*Cornus*	*macraphylla*		10178	Ames, IA	4/90

Study 29A116W - List of species included in study – Table #1 continued

Common Name	**Genus**	**Species**	**Accession Number**	**Alternate No.**	**Source**	**Date Planted**
Border privet	*Ligustrum*	*obtusifolium*	477010		Ames, IA	4/90
Willow oak	*Quercus*	*phellos*		4724	Ames, IA	4/90
Arrowwood	*Viburnum*	*dentatum*			Elsberry, MO	4/90
Redbud	*Cercis*	*canadensis*	496399		Ames, IA	5/91
Birch	*Betula*	*species*	14942		Ames, IA	5/91
'Wichita' osage orange	*Maclura*	*pomifera*			Kansas	5/91
'Denmark' osage orange	*Maclura*	*pomifera*			Denmark, IA	6/92
Magenta	*Malus*	*species*	514275		Roselake PMC	4/93
Ocean view beach plum	*Prunus*	*maritima*	518824		Cape May PMC	5/93
'Sandy' rugosa rose	*Rosa*	*rugosa*			Cape May PMC	5/93
Wildwood bayberry	*Myrica*	*pennsylvanica*	548966		Cape May PMC	5/93
Wildwood bayberry	*Myrica*	*pennsylvanica*	434150		Cape May PMC	5/93
Wildwood bayberry	*Myrica*	*pennsylvanica*	548964		Cape May PMC	5/93
Ocean view beach plum	*Prunus*	*maritima*	518822		Cape May PMC	5/93
Ocean view beach plum	*Prunus*	*maritima*	518823		Cape May PMC	5/93
'Oahe' hackberry	*Celtis*	*occidentalis*	476982		Bismarck PMC	5/93
'King Red' Russian olive	*Elaeagnus*	*angustifolia*	434029		NPMC	5/93

	Study 29A116W - Evaluation of Miscellaneous Trees and Shrubs																								Table #2						
Plt.		Accn. /	Date	No.	No. Survived									Ave. Ht. (Ft.)										Ave. Wd. (Ft.)								
No.	Sc. Name	Alt. No.	Plt.	Plt.	90	91	92	98	99	OO	O1	O2	O3	90	91	92	98	99	OO	O1	O2	O3	90	91	92	98	99	OO	O1	O2	O3
1	Sorbus alnifolia	7761	11/65	2	2	2	2	2	2	2	2	2	2	21	22	22	25	26	25.7	26	26	26	8.2	8.2	8.2	12	12.4	12.9	13.3	13.3	13
2	Cornus stolonifera	443229	5/9/1989	4	4	4	4	4	4	4	4	4	4	0.7	3.7	3.9	4	4.7	4.7	5.3	5.4	5.4	1.8	3.6	4.8	3.5	4	4.2	4.7	4.9	5
3	Syringa villosa	9006228	5/9/1989	4	4	4	3	0	0	0	0	0	0	0.4	0.7	2.3	0	0	0	0	0	0	1.2	1.3	2.4	0	0	0	0	0	0
4	Cornus mas	9055585	5/9/1989	3	3	3	3	3	3	3	3	3	3	1.4	1.9	2.8	4.5	5	5	6.2	6.4	6.4	0.4	0.8	1.4	4.5	5	5.5	6.5	7	7.3
5	Malus sargentii	477986	5/9/1989	3	3	3	3	0	0	0	0	0	0	2	2.7	2.9	0	0	0	0	0	0	1	1.7	2.6	0	0	0	0	0	0
6	Ulmus parvifolia	9004438	5/9/1989	2	2	2	2	2	2	2	2	2	2	5.4	9.6	11.8	27	27	27.6	28.3	28.4	28.6	3.3	6.4	7.4	16	16.5	17	18	18.4	18
7	Lonicera korolkowi	9062152	5/9/1989	6	6	6	6	6	6	6	6	6	6	4	6.8	8	12	12	12.4	12.8	12.9	12.9	5.6	8.8	9.8	13	13.3	13.8	14	14.3	14.2
8	Betula species	502295	4/16/1990	3	1	1	1	1	1	1	1	1	1	3.4	3.4	4.1	6	6.5	6.8	7.5	7.7	7.9	1.5	1.9	2.8	5	5.7	6	6.5	6.8	7
9	Quercus phellos	4723	4/16/1990	4	4	4	4	4	4	4	4	4	4	1.7	2.6	4.1	23	23	23	23	23	23	1	1.8	3.7	12	12	12.9	12.9	13	13.2
10	Pterostyrax hispida	A-8079	4/16/1990	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Pyrus calleryana	19173	4/21/1969	2	2	2	2	2	2	1*	1	1	1	27	27	27	29	30	17*	18	18	18	20	20	21	33	33.6	15*	15.5	15.8	16.3

	Study 29A116W - Evaluation of Miscellaneous Trees and Shrubs - Table #2 continued																														
Plt.	Sc. Name	Acc./	Date	No.	No. Survived													Ave. Ht. (Ft.)						Ave. Width (Ft.)								
No.		Alt. No	Plt.	Plt.	90	91	92	98	99	O0	O1	O2	O3	90	91	92	98	99	O0	O1	O2	O3	90	91	92	98	99	O0	O1	O2	O3
12	Rosa	495616	4/16/1990	2	2	2	2	2	2	2	2	2	2	1.5	3.7	4.7	6.6	7	7	7	7	7	1.6	5.5	5.9	10	10.4	10.7	11	11.3	11
	setigera																														
13	Sorbaria	7778	4/16/1990	7	7	7	7	7	7	7	7	7	7	1	1.8	2.3	5	5	5	5	5	5	0.6	1.8	2.1	6	6.5	6.9	7.1	7.3	7.5
	sorbifolia																														
14	Syringa	478008	4/16/1990	3	2	2	2	2	2	2	2	2	2	1	1	1.5	7	7.3	7.7	8	8.2	8.4	0.7	1	2	7.5	7.8	8	8.2	8.5	8.7
	pekinensis																														
15	Rhus	7764	4/16/1990	4	2	2	2	2	2	2	2	2	2	1.6	2.9	5.3	7	7.7	7.9	8.2	8.4	8.6	0.8	2.8	5.3	8	8.3	8.5	8.9	9	9.2
	copallina																														
16	Betula	495882	4/16/1990	3	2	2	2	2	2	2	2	2	2	1.3	4.5	3	8	8.8	9.1	8.8	9	9.2	0.3	2.4	3.9	5	5.6	5.9	6.2	6.7	6.9
	occidentalis																														
17	Lonicera	477998	4/16/1990	4	3	3	3	3	3	3	3	3	3	0.7	1.5	2.7	7.8	7.9	7.9	7.9	7.9	7.9	0.6	1.2	2.7	4.5	5	5.5	5.9	6.2	6.5
	maackii																														
18	Sorbus	A-8371	4/16/1990	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	reducta																														
19	Viburnum	2813	4/16/1990	4	2	2	2	2	2	2	2	2	2	2.6	2.7	3.4	8	8.5	8.7	9	9	9.2	0.7	1.3	2.4	5	5.3	5.5	6	6.4	6.7
	prunifolium																														
20	Cornus	10178	4/18/1990	3	3	3	3	3	3	3	3	3	3	1.7	2.2	3	7.5	7.9	8	8.2	8.2	8.2	0.5	0.9	1.7	4.5	5	5.4	5.7	6	6.3
	macraphylla																														
21	Ligustrum	477010	4/18/1990	4	3	3	3	0	0	0	0	0	0	1.4	2.4	2.6	0	0	0	0	0	0	0.8	2.3	2,3	0	0	0	0	0	0
	obtusifolium																														
22	Quercus	4724	4/18/1990	4	4	4	4	4	4	4	4	4	4	1.3	3.1	4.4	13	13	13.5	14	14	14.1	0.8	2.4	3.8	12	12.4	12.7	13.4	13.7	14.1
	phellos																														

	Study 29A116W - Evaluation of Miscellaneous Trees and Shrubs - Table #2 continued																														
Plt	Sc. Name	Acc./	Date	No.	No. Survived									Ave. Ht. (Ft.)									Ave. Width (Ft.)								
No		Alt. No	Plt.	Plt.	90	91	92	98	99	O0	O1	O2	O3	90	91	92	98	99	O0	O1	O2	O3	90	91	92	98	99	O0	O1	O2	O3
23	Viburnum	9062310	4/91	5	4	4	4	4	4	4	4	4	4	2	4.3	4.5	7	7	7	7	7	7	0.5	2	2.4	4.5	4.7	4.9	5.3	5.5	5.7
	dentatum																														
24	Cercis	496399	5/8/1991	3	3	3	3	3	3	3	3	3	3	0.5	3.2	3.7	11	11	11.6	11.9	12	12	0.25	0.5	2.7	10	10.5	10.8	11.4	11.7	12
	canadensis																														
25	Betula	14942	5/8/1991	5	3	3	3	3	3	3	3	3	3	0.5	0.7	1.4	11	11	11.7	12.3	12.6	12.8	0.4	0.4	1.4	7	7.4	7.9	8.2	8.5	8.7
	nigra																														
26	Maclura		4/92	1	1	1	1	1	1	1	1	1	1	0.5	0.5	1	13	13	13.5	13.9	13.9	13.9	0.25	0.3	2.5	13	13.2	13.7	14.3	14.6	15.3
	pomifera																														
27	Maclura		6/19/1992	1	1	1	1	1	1	1	1	1	1	0.5	0.5	1	13	13	13.5	14	14	14	0.25	0.3	0.5	7	7.3	7.7	8	8.3	8.5
	pomifera																														
28	Eleagnus		4/26/1999	5				5	5	5	5	5	5				2.5	3	3	3	3.3	4.5			1.5	2	3	3.4	3.8	4	4.5
	umbellata																														
29	Salix		4/14/1995	2				2	2	2	2	2	2				30	31	31	31	31	31.2				10	10.5	11	11.3	11.5	12.4
	Mat. X Alba																														

Study: 29I124G

Study Title: Production of Native Iowa Ecotypes of Grasses and Forbs for Roadside, Critical Areas, and All Other Vegetative Plantings Where Native Grasses and Forbs are Now Being Planted.

Study Leader: Cordsiemon, R.

Introduction:

Well-adapted native grass, legume, and forb plantings offer many advantages as low cost sustainable vegetative cover for management of soil and water resources. Native plant communities resist noxious weed invasion, provide excellent erosion control, and generally require relatively low maintenance.

These characteristics make them an excellent selection for use in roadside plantings, critical areas, long term land retirement programs, and all other vegetative plantings where mono-cultures of native grasses are being planted. This is especially true along public transportation right-of-ways. These transportation corridors constitute a major land resource and management problem in the state of Iowa. Based on 1987 Natural Resources Inventory (NRI) data, over one million acres of Iowa land are devoted to rural transportation.

Proper vegetation management along these corridors is an important element in controlling soil loss and unwanted weedy plant species. Many of these acres are now seeded to introduced cool-season grass and legume species which are often invaded by noxious weeds requiring extensive mowing or herbicide treatment programs. These management techniques are expensive and can also result in additional water quality problems where herbicides are used extensively.

Managing or re-seeding these acres to promote native grasses, legumes, and forbs offers a low cost environmentally sound approach to roadside vegetation management. Herbicide use, soil erosion, and most mowing can be reduced significantly where a vigorous native grass, legume, and forb mixture dominates a roadside right-of-way. In addition, these goals are consistent with on-going NRCS programs designed to improve ground and surface water quality, reduce soil loss and increase wildlife habitat.

Problem:

Many adapted native species are either currently not commercially available or available only in very limited quantities. When native species are available, the origin is often from considerable distance away and adaptation can be a concern. The species that are available are often as a ‘variety’ that has been developed for pasture and hay. These are generally high forage producing and more vigorous than wild collections of seed that have not been through an evaluation and breeding program. Seed of local origin that have not been improved or selected for superior forage yield is more likely to remain in a prairie mixture without crowding out other species and becoming monoculture. There is a need for additional native grass, legume, and forb species for use in roadside and other types of conservation plantings.

Objective:

The objective of this study is to accelerate the collection and increase of selected native grass, legume, and forb species through a cooperative program between the University of Northern Iowa (UNI), USDA Natural Resources Conservation Service (NRCS), and the Iowa Roadside Integrated Vegetation Management Program (IRVM).

Cooperators:

The USDA Natural Resources Conservation Service, Plant Materials Center; the University of Northern Iowa; and the Integrated Roadside Vegetation Management Office.

Procedures:

The state of Iowa was divided into three zones: North, Central, and South (Table #1). Seed collected from within each zone was kept separate from the other zones. The IRVM office organized seed collections from each zone. Collections were made from native prairie remnants throughout each zone striving for a relatively equal and representative collection. Seed from each collection site was inventoried by location and a small portion was started in the greenhouse at UNI and transplanted into plots. The remainder of the seed was sent to the PMC, cleaned, and seeded for increase plots. Seed from the plots at UNI was hand harvested and also used to start increase plots or mixed with additional seed and became available to seed growers. When enough seed becomes available, the species is released as 'Source Identified' germplasm from the zone in which it was collected. Source identified seed has not been improved by evaluation and selection or plant breeding procedures.

Discussion:

The study officially started October 1, 1990, at the beginning of fiscal year 1991 with agreements signed. Seed collections had started earlier in the year and seed was available for increase plots the spring of 1991. Most of the plots started from 1991 to 1993 were destroyed in the flood the summer of 1993. Plant re-establishment started in 1994 and new plots have been started each year. Progress of species released to growers as 'Source Identified' germplasm can be seen in Table #2.

2000

New increase plots established in 2000 were *Liatris asper*, rough blazing star; *Monarda fistulosa*, horsemint; and *Lobilia siphilitica*, great blue lobelia. Surflan was used for weed control and the horsemint was not resistant.

New plant releases for 2000 were Northern Iowa Germplasm Big Bluestem, Northern Iowa Germplasm Tall Dropseed, Northern Iowa Germplasm Roundhead Lespedeza, and Southern Iowa Germplasm Prairie Blazing Star.

2001

There were no new plant releases through the plant materials program in 2001 but seed of previous releases was allocated to growers. Initial seed increase is now in production at the new UNI Native Roadside Vegetation Center at the University of Northern Iowa, Cedar Falls, Iowa. A new plot of Southern Iowa June grass was established at the PMC from plants started in the greenhouse. This species exhibits very slow growth and a serious problem is weed control.

2002

There were no new increase plots established in 2002. Seed production and allocation to growers continued on previously established plots.

New plant releases for 2002 were Northern, Central and Southern Iowa Germplasm New England Aster, Northern and Southern Iowa Germplasm Pale Purple Coneflower, Southern and Central Iowa Germplasm Rigid Goldenrod, and Southern Iowa Germplasm Tall Dropseed.

2003

In 2003 there were no new plantings or increases added. Production and allocations to growers continued from previously established plots. Weed control was maintained by using a non-selective herbicide in late winter/early spring on most plots, followed by a pre-emergent herbicide on all plots. Late spring and summer weed control was achieved by manual labor and selective herbicides.

There were eight new plant releases for 2003. They were Southern Iowa Germplasm Wild Burgamot (*Monarda fistulosa*), Northern, Central, and Southern Iowa Germplasm Rough Blazing Star *(Liatris aspera*), Northern Iowa Germplasm Purple Prairie Clover (*Dalea purpurea*), Central Iowa Germplasm Switchgrass (*Panicum virgatum*), Northern and Central Iowa Germplasm Junegrass (*Koelaria macanthra*). Refer to the table of contents for a complete list of 2003 PMC releases.

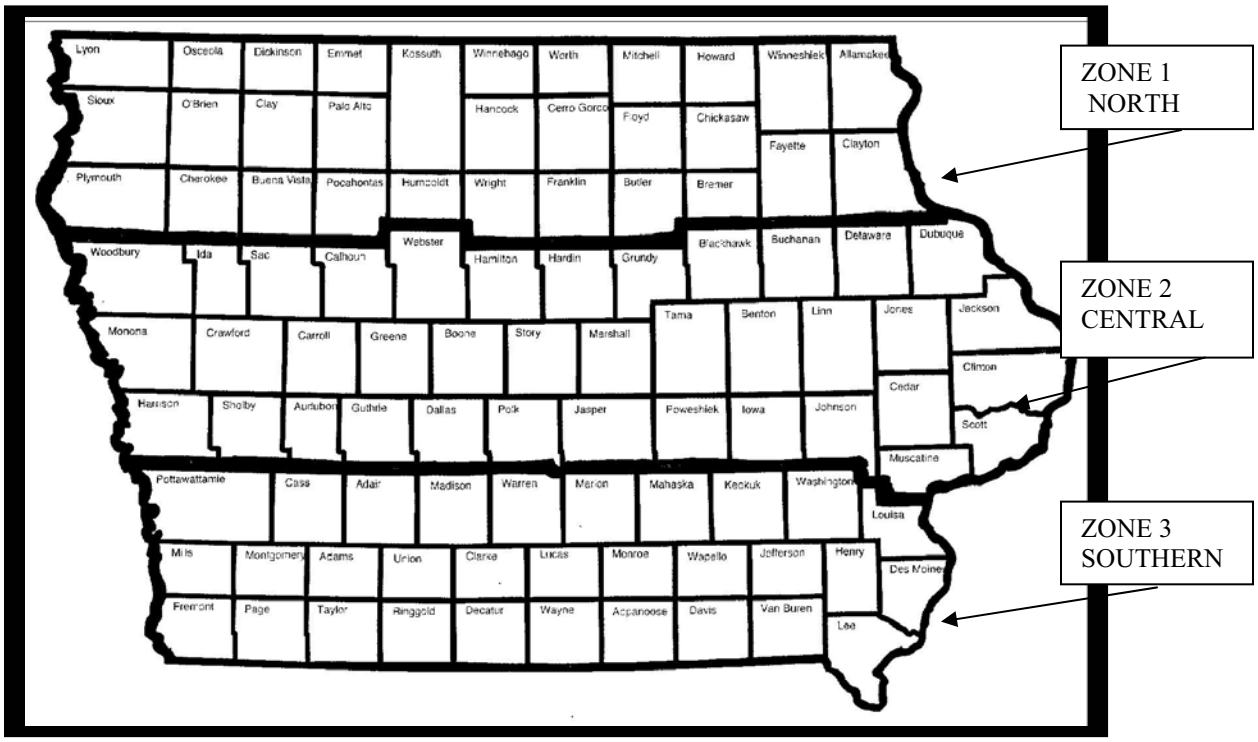
2004

The Iowa Ecotype Program continued to produce seed for the three different zones on the center in 2004. Although there were no new plots established and no plot increases, the PMC plans to introduce five new Iowa releases in 2005. Weed control was very similar to that of 2003, with the use of non-selective herbicide early and manual labor and selective herbicide later in the growing season. There were some plots taken out of production in 2004 (refer to Table #2) because of consistently low seed production.

Study: 29I124G – Native Iowa Ecotypes

TABLE #1

IOWA ECOTYPE ZONE MAP



Study 29I124G-Production of Native Iowa Ecotypes of Grasses and Forbs for Roadside, Critical Areas, and All Other Vegetative Plantings Where Native Grasses and Forbs are Now Being Planted (UNI).					
				Table #2	
Common Name		**Accession**	**Status of**	**Status of**	**Harvested Seed**
Genus/Species	**Zone**	**Number**	**Accession**	**Increase Plot**	**2004 (in pounds)**
Big bluestem	1	9068614	Released in 2000	in production	19.20
Andropogon gerardii	2	9068615	Released in 1998	in production	16.00
	3	9068616	Released in 1999	in production	25.90
Sideoats grama	1	9062278	Released in 1994	in production	1.10
Bouteloua curtipendula	2	9062279	Released in 1994	in production	45.36 grams
	3	9062280	Released in 1994	in production	no 2004 seed
Purple prairie clover	1	9068608	Released in 2003	in production	317.51 grams
Dalea purpurea	2	9068609		in production	362.87 grams
	3	9068610	**Release in 2005**	in production	2.90
Pale purple coneflower	1	9068611	Released in 2002	in production	4.20
Echinacea pallida	2	9068612	**Release in 2005**	in production	4.00
	3	9068613	Released in 2002	in production	3.10
Canada wildrye	1	9062275	Released in 1994	in production	4.00
Elymus canadensis	2	9062276	Released in 1994	in production	no 2004 seed
	3	9062277	Released in 1994	in production	no 2004 seed
Rattlesnake master	1	9068602	Released in 1998	out of production	n/a
Eryngium yuccifolium	2	9068603	Released in 1999	in production	1.80
	3	9068604	Released in 1999	in production	272.15 grams
Oxeye false sunflower	1	9068605	Released in 1997	in production	18.60
Heliopsis helianthoides	2	9068606	Released in 1996	in production	13.70
	3	9068607	Released in 1997	in production	362.87 grams
Junegrass	1	9068620	Released in 2003	out of production	n/a
Koeleria macrantha	2	9068621	Released in 2003	out of production	n/a
	3	9068622	**Release in 2005**	in production	4.40
Round-head bushclover	1	9062281	Released in 1999	out of production	n/a
Lespedeza capitata	2	9062282	Released in 1996	out of production	n/a
	3	9062283	Released in 1997	out of production	n/a
Rough blazing star	1	9068684	Released in 2003	out of production	n/a
Liatris asper	2	9068685	Released in 2003	in production	317.51 grams
	3	9068686	Released in 2003	in production	1.00
Blazing star	1	9068626	Released in 1999	in production	n/a
Liatris pycnostachya	2	9068627	Released in 1999	in production	362.87 grams
	3	9068628	Released in 2000	in production	n/a

Study 29I124G - Native Iowa Ecotypes			Table #2 - continued		
Common Name		**Accession**	**Status of**	**Status of**	**Harvested Seed**
Genus/Species	**Zone**	**Number**	**Accession**	**Increase Plot**	**2004 (in pounds)**
Horsemint	1	9068678	**Release in 2005**	in production	362.87 grams
Monarda fistulosa	2	9068679	**Release in 2005**	in production	1.60
	3	9068680	Released in 2003	in production	2.40
Little bluestem	1	9062319	Released in 1999	in production	
Schizachyrium	2	9062320	Released in 1997	in production	4.90
scoparium	3	9062321	Released in 1999	in production	1.80
Compassplant	1	9068675		out of production	n/a
Silphium laciniatum	2	9068676		out of production	n/a
	3	9068677		out of production	n/a
Stiff goldenrod	1	9068617	Released in 1998	in production	seed did not fill
Solidago rigida	2	9068618	Released in 2002	in production	1.00
	3	9068619	Released in 2002	in production	5.00
Indiangrass	1	9062316	Released in 1997	in production	48.80
Sorghastrum nutans	2	9062317	Released in 1996	in production	45.80
	3	9062318	Released in 1998	in production	2.90
Tall dropseed	1	9062313	Released in 2000	in production	2.30
Sporobolus compositus	2	9062314	Released in 1996	in production	17.80
	3	9062315	Released in 2002	in production	3.00
New England aster	1	9068681	Released in 2002	in production	seed did not fill
Aster novae angliae	2	9068682	Released in 2002	in production	seed did not fill
	3	9068683	Released in 2002	in production	seed did not fill
Butterfly milkweed	1	9068687		out of production	n/a
Asclepias tuberosa	2	9068688		out of production	n/a
	3	9068689		out of production	n/a
Blue lobelia	1	9068696		out of production	n/a
Lobilia siphilitica	2	9068697		out of production	n/a
	3	9068698		out of production	n/a
Switchgrass	1	9068705		out of production	n/a
Panicum virgatum	2	9068706	Released in 2003	out of production	n/a
	3	9068707		out of production	n/a
Golden alexanders	1	9068702		out of production	n/a
Zizia aurea	2	9068703		out of production	n/a
	3	9068703		out of production	n/a

Study: 29A128J

Study Title: *Cornus florida* L.**,** Flowering Dogwood Interagency Study Between Department of Interior, National Parks Service, National Capital Region (NRC) and the Department of Agriculture.

Study Leader: Bruckerhoff, S. B.

Introduction:

Flowering dogwood is probably Missouri's favorite spring flowering tree. It is Missouri's state tree. It is a rather small tree, rarely over 30 feet high and over six to eight inches in diameter; however, in 1867 a dogwood six feet in circumference was reported in Pemiscot County, Missouri. It is commonly an under story tree to many species of oak and hickory in the hardwood forests. Besides being of great value for ornamental purposes, flowering dogwood has special wood characteristic that makes it irreplaceable for certain products. Because of its high resistance to shocks, the wood is being used almost exclusively for weaving shuttles and spool and bobbin heads. It is also being used in golf club and mallet heads and in jeweler's blocks.

Objectives:

A. Clean (depulp) and condition seed collections and keep accession records on individual ecotypes.

B. Establish at Elsberry PMC, an area free of dogwood anthranose, 12 to 15 plants from three specified parks for a period of 30 to 40 years.

C. Provide, upon request, a report on the status of the plants maintained by NRCS.

D. Provide a study coordinator for all activities performed by NRCS under the terms of the Interagency Agreement.

E. Provide seed to the NRCS upon request.

Discussion:

1994 - 1999

As of the date this report was written there has only been one accession of flowering dogwood received at the PMC. This accession was planted in Field #11 May 1993. Five of the ten plants are surviving in good vigor. Height ranges from 4.0 feet to 4.5 feet; spread ranges from three to three and a half feet. Vigor is excellent along with its resistance to insects and diseases. There have been no indications of the anthranose disease affecting these plants.

2000

The five remaining plants of accession 9083225 are surviving in good vigor. Height ranges from 4.8 to 5.0 feet and spread ranges from 3.9 feet to 4.1 feet. There have been no signs of insects or diseases associated with this accession.

2001

Only three plants of a total of ten plants are surviving in good vigor. The reason for the decline in the number of plants surviving was due to severe mechanical damage resulting in death of the plants. Height ranges from 5.0 feet to 5.6 feet and spread ranges from 4.1 feet to 4.7 feet. No apparent signs of insects or diseases have been associated with this accession (9083225).

2002-2004

Two plants are surviving out of a total of ten initially planted. Mechanical damage has caused the decline in the number of surviving plants. Evaluations of the surviving plants were made on June 10 and October 22, 2002. The average height of these plants (accession 9083225) was 5.7 feet with an average spread of 5.0 feet. These two plants were again evaluated on October 6, 2003. The average height was 8.0 feet and the average spread was also 8.0 feet. There were no apparent signs of insect, disease, or fruit production in 2002, 2003 and 2004.

Study: 29I135J

Study Title: Assembly and Evaluation of Hazelnut, *Corylus americana Walt.*

Study Leader: Cordsiemon, R.

Introduction:

American hazelnut is a shrub or very small tree probably native to every county in Missouri. It commonly occurs in dry or moist thickets, woodland, and borders of woodland, in valleys and upland. It ranges from Maine to Saskatchewan, south to Georgia, Arkansas, and Oklahoma. Leaves are borne simply on bristly stalks, the bristles somewhat glandular. Flowers are separate with male and female flowers on the same tree. Male catkins droop and form the season before opening. Female flowers are enclosed in a scaly bud. They have red stigmas that protrude at the tip of the bud. The fruit is a globe-shape nut enclosed in a large, leaf-like covering. This species flowers March-May with fruit ripening July-September.

Problem:

There is a lack of an available cultivar of American hazelnut specifically for this area. A need for developing a selection, source identified, and sources of hazelnut for use as wildlife habitat and for agroforestry in the three states being served by the Center has been identified by NRCS and other conservation and wildlife agencies.

Objective:

The objective is to assemble, comparatively evaluate, select and release an adapted cultivar of source identified or selected hazelnut.

Discussion

1989-1994

Collections of hazelnut were assembled at the PMC between 1989 and 1992. Thirty-six accessions from Illinois and Missouri were stratified and placed in the greenhouse in 1993. Twenty-one accessions germinated and were grown out in two-gallon containers. These accessions were placed in a randomized complete block with eight replications. The planting was established May 3 and 4, 1989, in Field #11E on the PMC.

The summer of 1994 had several significant dry spells and considerable time was spent irrigating. Many plants were stressed, lost leaves, and resprouted. Four plants in the evaluation block failed to survive in 1994.

1995-1998

The assembly was evaluated in 1995, 1996, 1997 and 1998. Of the original 138 plants being evaluated a total of 11 died. The survival was good but the rate of growth seems to be slow, which seems characteristic of hazelnuts.

The following accessions were selected in 1997 for field plantings: 9057168 and 9057169 (Iroquois County, Illinois), 9057188 and 9068528 (Coles County, Illinois), 9068562 (Adams County, Illinois), and 9068573 and 9068574 both from Chariton County, Missouri. The selection criteria for these accessions are as follows: form, growth, height, width and fruit production and resistance to insect and disease.

1999

The selected accessions continue to be utilized in the plant materials field-planting program throughout the PMC service area. The plants' performance data for 1999 were recorded only for nut production. This information can be found in the following tables.

Nut production for the selected accessions for 1998:

9057168	=	1.75 pounds	9057169	=	1.00 pound
9057188	=	1.90 pounds	9068528	=	1.00 pound
9068562	=	1.67 pounds	9068573	=	1.50 pounds
9068574	=	1.30 pounds			

Nut production for the selected accession for 1999.

9057169	=	1.4 pounds	9068528	=	2.2 pounds
9057188	=	0.5 pound	9068573	=	1.9 pounds
9068562	=	2.7 pounds	9057168	=	1.8 pounds
9068574	=	4.3 pounds			

2000

Nut production is being harvested from those accessions selected for field plantings in the service area of the PMC (Iowa, Illinois and Missouri). One-tenth of the nut production for each of the selected accessions was left on the shrubs to determine the dates the fruits would fall to the ground. The following chart reflects the selected accessions, fruit production and dates nuts fell to the ground. There were no plant evaluations on the assembly of plants this year.

Accession Numbers	Nut Production With Husks	Date Nut Dropped
9057188	1.4 Pounds	11/27/00
9068562	10.3 Pounds	11/27/00
9068574	4.6 Pounds	11/27/00
9068528	12.2 Pounds	11/27/00
9068573	3.7 Pounds	11/27/00
9057168	3.2 Pounds	11/16/00

2001 - 2002

The following table reflects the performance of those accessions initially selected and placed in the plant materials field planting program in the PMC service area for years 1997 through 2002. As reflected in the PMC Business Plan, releases from these accessions will be made in 2005. One plant out of the following accessions will be moved to a crossing block in Field #6 on the PMC in the February 2003. The progeny from this crossing block will be assigned a separate accession number and only one release (Tested Class) will be made for the PMC service area. These accessions are: 9057168, 9068562, 9068573, 9068574, 9057188, and 9068528. The remaining plants in the assembly will be left until the area is needed for a new study.

2003

The plants selected (six accessions) out of the initial nursery planting were transplanted in Field #6 on March 21, 2003. These plants will be allowed to cross-pollinate and the progeny will be assigned a new accession number, 9083247. These plants will be placed in the field planting program for continued testing.

2004

The selected plants were moved from Field #11 to Field #6 and used the 2004 growing season to establish their root systems. Seed production was very poor due to the transplanting. The seed, if any produced, was very small in size. The selected material is expected to start producing quality seed in 2005 and production from this material will be grown out in bare root seedlings for field plantings.

Performance Data 1997 – 2002

Table #1

Acc. Number	Criteria	1997	1998	1999	2000	2001	2002	Averages
9057168	Height (Ft.)	4.3	5.4	5.7	6	6.5	6.8	5.8
	Spread (Ft.)	4.2	7	7.3	7.5	8	8.3	7.05
	Ins/Disease	2	2	2	2	2	2	2
	Form	3	3	3	3	3	3	3
	Nut Prod.		1.8 lbs.	1.3 lbs.	2.0 lbs.	2.3 lbs.	1.5 lbs	1.8 lbs.
9068562	Height	5.2	7	7.4	8	8.2	8.5	7.4
	Spread	6.5	7.4	7.6	8	8.5	8.8	7.8
	Ins/Disease	2	3	2	2	2	2	2.9
	Form	2	2	2	1	2	2	1.8
	Nut Prod.		1.67 lbs.	1.60 lbs.	1.7 lbs.	1.9 lbs.	6.2	2.6 lbs.
9068573	Height	4.6	6.3	6.5	6.7	7.1	7.3	6.4
	Spread	5	6	6.3	6.5	7	7.5	6.4
	Ins/Disease	2	2	2	2	2	2	2
	Form	3	3	3	3	3	3	3
	Nut Prod.		1.5 lbs.	1.9 lbs.	2.6 lbs.	4.3 lbs.	2.6 lbs	2.6 lbs.
9068574	Height	6.8	6.9	7	7.3	7.5	7.9	7.2
	Spread	4.5	5.8	6	6.3	6.5	6.8	6.0
	Ins/Disease	2	3	2	2	2	2	2.2
	Form	3	4	3	3	3	4	3.3
	Nut Prod.		1.3 lbs.	1.8 lbs.	1.3 lbs.	2.1 lbs.	3.5	2.0 lbs.
9057188	Height	5.1	6.4	6.7	6.8	7	7.3	6.6
	Spread	3.7	7	7.5	7.8	8	8.2	7.03
	Ins/Disease	2	2	2	2	2	2	2
	Form	3	3	3	3	3	3	3
	Nut Prod.		1.0 lbs.	0.5 lb.	1.4 lbs.	1.9 lbs.	8.2 lbs.	2.6 lbs.
9068528	Height	3.5	4.3	5.0	6.3	6.7	7.0	54.
	Spread	3.0	4.1	5.5	5.8	6.3	6.8	5.3
	Ins/Disease	2	2	2	2	2	2	2
	Form	5	4	3	3	3	3	3.5
	Nut Prod.	0	1.0 lbs.	2.2 lbs.	12.2 lbs.	4.2 lbs.	6.3 lbs.	4.3 lbs.

Study 29I135J Assembly and Evaluation of Hazelnut, *Corylus americana Walt.*

Table #2 reflects accession information **Table #2**

Accession Number	State or Origin	City or County
9057081	Illinois	Coles
9057082	Illinois	Coles
9057087	Illinois	Coles
9057119	Illinois	Whiteside
9057120	Illinois	Carroll
9057167	Illinois	Will
9057168	Illinois	Iroquois
9057169	Illinois	Iroquois
9057184	Illinois	Clark
9057186	Illinois	Coles
9057188	Illinois	Coles
9057192	Illinois	Montgomery
9057195	Illinois	Morgan
9068505	Illinois	Coles
9068507	Illinois	Cumberland
9068508	Illinois	Mercer
9068509	Illinois	Ogle
9068510	Illinois	Iroquois
9068511	Illinois	Effingham
9068512	Illinois	Clay
9068513	Illinois	Pike
9068525	Illinois	Cumberland
9068526	Illinois	Coles
9068527	Illinois	Maultrie
9068528	Illinois	Coles
9068529	Illinois	Vermilion
9068562	Illinois	Adams
9068565	Illinois	Jo Daviess
9068585	Illinois	DeWitt
9068586	Illinois	Vermilion
9068570	Missouri	Lincoln
9068573	Missouri	Chariton
9068574	Missouri	Chariton
9068575	Illinois	Johnson

Tables #3 – #6 reflect the performance data for all accessions included in this study for **1995 – 1999**.

Study 29I135J - Assembly and Evaluation of Hazelnut, *Corylus americana*, Walt.													Table #3											
													Height in Feet											
				1995													1997							
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Tallest**	**Location**		**Accession**	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Tallest**	**Location**
9068562	1.2	2.5	1.4	1.3	1.5	1.7	2.9	4.0	2.1	**4.0**	R8		9068574	4.9	4.3	3.8	3.9	6.8	3.8	3.2	2.2	4.1	**6.8**	R5
9057188	2.6	4.0	1.6	3.1	2.6	2.0	2.3	2.2	2.6	**4.0**	R2		9068562	3.3	5.2	2.7	2.7	3.4	4.6	4.2	4.5	3.8	**5.2**	R2
9068573	3.6	2.7	3.2	1.5	3.0	2.2	2.5	3.2	2.7	**3.6**	R1		9057188	4.0	5.0	2.9	4.2	5.1	3.7	4.7	4.0	4.2	**5.1**	R5
9068508	2.0	3.0	2.2	2.3	1.3	1.0	1.6	1.5	1.9	**3.0**	R2		9057169	5.0	4.1	3.4	3.5	2.3	3.6	3.2	2.8	3.5	**5.0**	R1
9068574	1.7	2.0	1.7	3.0	2.3	2.2	1.3	2.0	2.0	**3.0**	R4		9057168	3.8	1.2	4.6	2.4	4.3	4.1	3.0	2.0	3.2	**4.6**	R3
9057169	2.9	1.6	1.4	1.7	0.8	1.0	1.4	1.6	1.6	**2.9**	R1		9068573	4.2	4.5	4.0	3.4	4.6	3.1	2.5	3.4	3.7	**4.6**	R4
9068507	1.7	1.0	2.6	Dead	Dead	2.0	1.3	1.8	1.7	**2.6**	R 3		9068528	4.5	4.2	Dead	4.0	3.1	3.2	3.0	2.8	3.5	**4.5**	R1
9068565	2.3	2.6	2.5	2.0	2.4	2.2	1.6	Dead	2.2	**2.6**	R2		9068510	3.1	2.0	3.0	4.5	4.3	2.8	2.0	4.0	3.2	**4.5**	R4
9068558	1.5	2.2	1.7	1.3	2.0	1.5	2.5	Dead	1.8	**2.5**	R7		9068558	3.6	Dead	2.4	3.5	2.8	4.3	3.9	Dead	3.4	**4.3**	R6
9057168	1.3	1.3	2.1	1.0	1.9	2.2	1.4	0.9	1.5	**2.2**	R6		9068507	2.3	Dead	3.5	Dead	Dead	4.0	2.0	2.3	2.8	**4.0**	R6
9068510	0.6	1.3	2.1	1.7	1.5	1.4	0.6	2.2	1.4	**2.2**	R8		9068565	2.7	3.3	2.3	3.0	4.0	2.8	1.6	Dead	2.8	**4.0**	R5
9068528	1.3	1.2	Dead	2.1	Dead	1.7	2.0	1.4	1.6	**2.1**	R4		9068525	3.3	2.3	4.0	3.6	Dead	3.1	Dead	3.2	2.8	**4.0**	R3
9068586	Dead	Dead	1.2	1.7	2.0	2.0	1.0	1.3	1.5	**2.0**	R5,6		9068508	3.2	3.6	3.9	3.3	3.4	2.8	3.5	3.3	3.4	**3.9**	R3
9068525	1.3	1.2	1.0	1.0	1.0	1.5	Dead	1.7	1.2	**1.7**	R8		9068586	Dead	Dead	2.9	2.6	3.7	3.0	2.0	3.1	2.9	**3.1**	R8
				1996													1998							
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Tallest**	**Location**		**Accession**	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Tallest**	**Location**
9057188	3.3	4.1	2.6	3.2	4.1	3.2	3.4	2.9	3.4	**4.1**	R2, 5		9068562	4.7	7.0	4.0	4.6	5.1	4.1	4.6	5.4	4.9	**7.0**	R2
9068562	2.0	3.8	1.7	1.0	2.7	2.8	3.2	4.1	2.7	**3.8**	R2		9068558	4.6	Dead	5.0	4.3	4.1	5.0	6.4	Dead	4.9	**6.4**	R7
9068586	Dead	Dead	2.9	2.6	3.7	3.0	2.0	2.0	2.7	**3.7**	R5		9057188	4.0	5.8	6.0	5.0	6.4	5.8	5.0	5.7	5.5	**6.4**	R5
9068573	2.6	3.7	3.4	2.1	3.6	3.0	2.8	3.3	3.1	**3.7**	R2		9068573	6.3	4.9	5.2	5.0	6.3	5.0	6.0	4.0	5.3	**6.3**	R5
9068574	3.2	2.3	2.4	3.7	3.5	2.6	2.7	2.0	2.8	**3.5**	R5		9068574	5.2	5.3	5.0	4.0	6.3	3.2	3.6	3.0	4.5	**6.3**	R5
9068508	2.3	3.4	3.3	2.5	1.7	1.4	2.5	2.3	2.4	**3.4**	R2		9057169	5.9	5.2	5.0	5.0	3.2	4.4	3.2	3.3	4.4	**5.9**	R1
9057168	2.3	1.3	3.3	1.8	3.3	3.0	1.8	1.3	2.3	**3.3**	R3, 5		9057168	5.0	1.8	5.4	3.8	5.4	5.1	4.2	3.0	4.2	**5.4**	R5
9068528	3.0	3.2	Dead	3.3	Dead	2.5	2.5	2.1	2.8	**3.3**	R4		9068528	5.4	4.4	Dead	4.2	4.0	4.0	4.8	3.2	4.3	**5.4**	R1
9068507	2.1	1.3	3.2	Dead	Dead	2.9	2.0	1.5	2.2	**3.2**	R3		9068510	3.9	4.8	4.0	4.6	5.4	3.0	4.0	4.6	4.3	**5.4**	R5
9068558	2.0	Dead	2.1	2.1	2.4	3.2	2.7	Dead	2.4	**3.2**	R6		9068507	2.3	Dead	4.3	Dead	Dead	5.2	2.8	4.0	3.7	**5.2**	R6
9057169	2.9	3.1	2.3	2.7	1.6	2.2	2.1	1.9	2.4	**3.1**	R2		9068525	4.2	3.5	5.2	4.9	Dead	3.4	Dead	4.6	3.7	**5.2**	R3
9068565	2.3	2.9	2.3	2.3	2.6	2.3	1.4	Dead	2.3	**2.9**	R2		9068586	Dead	Dead	4.2	4.0	5.0	4.6	3.5	4.1	4.2	**5.0**	R5
9068510	1.8	2.2	1.7	2.2	2.7	2.3	1.3	2.7	2.1	**2.7**	R5,8		9068508	3.5	3.8	3.2	4.8	4.7	3.8	4.2	4.0	4.0	**4.8**	R4
9068525	2.2	1.6	1.7	2.5	1.6	1.9	Dead	2.5	2.0	**2.5**	R4,8		9068565	2.9	4.8	3.2	Dead	4.4	4.0	3.4	Dead	3.8	**4.8**	R2
Height Measured in Feet																								

Study 29I135J - Assembly and Evaluation of Hazelnut, *Corylus americana*, Walt. **Table #4**

Spread in Feet

1995

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9057188	1.0	0.7	0.6	1.2	1.4	0.9	0.9	2.0	1.1	**2.0**	R8
9068562	0.4	1.4	0.3	0.4	0.4	0.6	0.4	1.5	0.7	**1.5**	R8
9068573	1.5	0.6	0.8	0.8	1.0	0.7	0.9	0.3	0.8	**1.5**	R1
9068574	1.5	0.8	1.0	1.0	0.9	0.9	0.6	0.4	0.9	**1.5**	R1
9068507	0.6	0.3	1.2	Dead	Dead	1.0	0.3	0.3	0.6	**1.2**	R3
9068510	0.2	1.2	0.6	0.4	0.9	0.6	0.2	0.8	0.6	**1.2**	R2
9057168	0.7	0.4	1.1	0.4	1.1	0.8	0.7	0.5	0.7	**1.1**	R3, 5
9068558	0.3	0.3	0.5	0.7	0.9	1.1	0.7	Dead	0.6	**1.1**	R6
9068586	Dead	Dead	0.4	0.6	1.0	0.9	0.1	0.2	0.5	**1.0**	R5
9057169	1.0	0.8	0.6	0.4	0.2	0.5	0.7	0.4	0.6	**1.0**	R1
9068508	0.5	0.4	0.4	0.8	0.6	0.9	0.8	0.8	0.7	**0.9**	R6
9068565	0.6	0.4	0.9	0.8	0.5	0.7	0.7	Dead	0.7	**0.9**	R3
9068528	0.8	0.6	Dead	0.6	Dead	0.5	0.6	0.3	0.6	**0.8**	R1
9068525	0.4	0.4	0.4	0.3	0.3	0.3	Dead	0.6	0.4	**0.6**	R8

1996

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9057188	2.4	2.8	2.4	2.6	2.9	3.3	2.3	3.7	2.8	**3.7**	R8
9068562	1.8	3.6	1.0	0.9	2.2	2.7	1.8	3.3	2.2	**3.6**	R2
9068574	2.8	3.1	2.8	2.3	2.5	1.9	3.4	1.1	2.5	**3.4**	R 7
9068573	3.1	2.7	2.3	2.4	3.0	2.2	2.4	1.2	2.4	**3.1**	R1
9057169	3.1	2.5	3.0	2.4	0.8	2.4	1.3	1.0	2.1	**3.1**	R1
9057168	2.8	1.0	2.9	1.4	2.8	2.1	2.1	1.2	2.0	**2.9**	R3
9068508	2.0	2.5	2.3	2.2	2.4	1.7	2.8	1.8	2.2	**2.8**	R7
9068510	1.6	2.7	2.1	1.8	2.6	1.8	1.0	0.6	1.8	**2.7**	R2
9068586	Dead	Dead	2.6	1.5	1.5	2.0	1.1	1.6	1.7	**2.6**	R3
9068565	1.0	2.4	1.6	2.0	1.7	2.6	1.0	Dead	1.8	**2.6**	R6
9068558	1.7	Dead	2.4	2.5	2.0	2.1	2.5	Dead	2.2	**2.5**	R 4,7
9068528	2.2	2.3	Dead	2.2	1.7	2.4	2.4	1.8	2.1	**2.4**	R6, 7
9068525	1.7	2.2	2.0	2.0	1.4	2.0	Dead	2.3	1.9	**2.3**	R8
9068507	1.4	0.8	2.1	Dead	Dead	2.3	1.4	0.6	1.4	**2.1**	R3

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068562	3.3	6.5	2.3	2.3	3.8	3.7	3.5	4.2	3.7	**6.5**	R2
9068573	4.1	3.5	4.3	5.1	5.0	3.6	2.5	2.9	3.9	**5.1**	R4
9057188	3.6	5.0	4.2	4.7	3.7	4.5	4.0	4.4	4.3	**5.0**	R2
9057169	3.6	5.0	4.2	4.7	3.7	4.5	4.0	4.4	4.3	**5.0**	R2
9068574	4.9	4.4	4.6	3.7	4.5	3.2	3.0	2.0	3.8	**4.9**	R1
9057168	4.4	1.5	4.2	2.0	4.2	3.3	2.5	2.0	3.0	**4.4**	R1
9068528	3.0	4.4	Dead	3.3	2.9	2.0	3.4	2.3	3.0	**4.4**	R2
9068508	4.0	Dead	3.2	3.7	3.9	3.0	3.4	3.4	3.5	**4.0**	R1
9068510	3.0	3.2	3.0	3.3	3.9	2.1	4.0	3.3	3.2	**4.0**	R7
9068525	4.0	3.3	4.0	3.4	Dead	2.0	Dead	4.0	3.0	**4.0**	R1, 3, 8
9068586	Dead	Dead	3.7	2.5	3.1	3.5	1.8	2.8	2.9	**3.7**	R3
9068558	3.2	1.5	3.2	3.0	2.7	3.5	3.3	Dead	2.9	**3.5**	R6
9068565	2.8	3.5	2.2	2.0	3.1	3.0	1.5	Dead	2.6	**3.5**	R2
9068507	2.3	Dead	3.0	Dead	Dead	3.2	1.0	1.8	2.3	**3.0**	R3

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9057188	4.6	7.5	5.4	5.4	7.7	7.0	4.8	6.0	6.1	**4.6**	R1
9068508	4.4	5.8	4.4	5.2	4.8	5.4	4.6	4.9	4.9	**4.4**	R1, 3, 8
9068573	7.0	5.5	5.4	6.0	6.0	5.4	5.7	4.3	5.7	**4.3**	R8
9068558	4.0	Dead	5.0	4.4	4.0	5.0	5.2	Dead	4.6	**4.0**	R1, 5
9068528	4.3	4.6	Dead	4.0	4.4	3.4	3.8	4.0	4.1	**3.4**	R6
9068525	3.4	4.8	5.7	5.2	Dead	3.4	Dead	4.6	3.9	**3.4**	R1,6
9068562	4.2	7.4	4.0	3.3	5.0	5.5	5.1	5.8	5.0	**3.3**	R4
9068510	3.4	3.2	4.0	4.2	4.8	3.5	3.5	4.0	3.8	**3.2**	R2
9057169	4.8	4.6	5.3	5.2	2.8	4.3	3.5	4.0	4.3	**2.8**	R5
9057168	4.0	2.6	6.0	3.4	7.0	5.0	4.6	3.2	4.5	**2.6**	R2
9068574	2.4	5.3	5.2	2.6	5.8	3.8	4.5	3.3	4.1	**2.4**	R1
9068565	4.0	4.6	3.0	Dead	5.0	4.2	2.3	Dead	3.9	**2.3**	R7
9068586	Dead	Dead	4.9	4.0	3.8	3.5	2.1	4.1	3.7	**2.1**	R7
9068507	2.7	Dead	5.0	Dead	Dead	6.0	1.3	4.6	3.9	**1.3**	R7

Width Measured in Feet

Study 29I135J - Assembly and Evaluation of Hazelnut, *Corylus americana*, Walt. **Table #5**

Form

1995

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9057188	3.0	4.0	5.0	5.0	5.0	5.0	5.0	2.0	4.3	**2.0**	R8
9068562	3.0	3.0	3.0	4.0	3.0	5.0	6.0	3.0	3.8	**3.0**	R1,2,3,5,8
9057168	5.0	8.0	3.0	6.0	4.0	5.0	6.0	7.0	5.5	**3.0**	R3
9068558	7.0	8.0	5.0	7.0	3.0	4.0	7.0	Dead	5.9	**3.0**	R5
9068508	5.0	7.0	8.0	5.0	6.0	3.0	5.0	6.0	5.6	**3.0**	R6
9068573	3.0	4.0	5.0	5.0	4.0	5.0	4.0	6.0	4.5	**3.0**	R1
9068507	5.0	7.0	4.0	Dead	Dead	5.0	6.0	6.0	5.5	**4.0**	R3
9057169	4.0	5.0	5.0	8.0	6.0	6.0	6.0	6.0	5.8	**4.0**	R1
9068510	8.0	5.0	4.0	5.0	8.0	8.0	5.0	6.0	6.1	**4.0**	R3,4,6
9068574	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	5.5	**4.0**	R1
9068565	5.0	6.0	7.0	5.0	6.0	5.0	7.0	Dead	5.9	**5.0**	R1,4,6
9068528	5.0	5.0	Dead	5.0	Dead	6.0	6.0	6.0	5.5	**5.0**	R1,2,4
9068525	6.0	6.0	5.0	8.0	6.0	8.0	Dead	6.0	6.4	**5.0**	R3
9068586	Dead	Dead	6.0	6.0	7.0	6.0	9.0	8.0	7.0	**6.0**	R3,4,6

1996

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068573	3.0	4.0	4.0	6.0	4.0	4.0	4.0	5.0	4.3	**3.0**	R1
9057188	3.0	5.0	5.0	4.0	4.0	4.0	4.0	5.0	4.3	**3.0**	R1
9057169	3.0	5.0	6.0	5.0	4.0	5.0	5.0	5.0	4.8	**3.0**	R1
9068507	4.0	5.0	4.0	Dead	Dead	4.0	4.0	5.0	4.3	**4.0**	R1,3,6,7
9068586	Dead	Dead	5.0	7.0	4.0	5.0	5.0	4.0	5.0	**4.0**	R3,8
9068562	5.0	5.0	4.0	7.0	5.0	4.0	5.0	4.0	4.9	**4.0**	R6,8
9057168	6.0	6.0	5.0	6.0	4.0	4.0	6.0	6.0	5.4	**4.0**	R5,6
9068558	4.0	Dead	6.0	5.0	6.0	5.0	5.0	Dead	5.2	**4.0**	R1
9068565	5.0	4.0	6.0	7.0	5.0	6.0	5.0	Dead	5.4	**4.0**	R2
9068528	5.0	4.0	Dead	5.0	5.0	5.0	6.0	5.0	5.0	**4.0**	R2
9068510	5.0	7.0	6.0	4.0	5.0	4.0	4.0	5.0	5.0	**4.0**	R4,6,7
9068574	5.0	7.0	4.0	5.0	4.0	5.0	5.0	5.0	5.0	**4.0**	R3,5
9068508	7.0	5.0	5.0	5.0	5.0	7.0	5.0	5.0	5.5	**5.0**	R2,3,4,5,7,8
9068525	5.0	5.0	5.0	6.0	6.0	6.0	Dead	6.0	5.6	**5.0**	R1,2,3,

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068562	5.0	3.0	5.0	7.0	7.0	4.0	8.0	3.0	5.3	**3.0**	R2,8
9057168	5.0	8.0	4.0	8.0	3.0	5.0	6.0	7.0	5.8	**3.0**	R5
9068558	4.0	Dead	5.0	5.0	6.0	5.0	3.0	Dead	4.7	**3.0**	R7
9068573	7.0	4.0	5.0	5.0	3.0	5.0	5.0	6.0	5.0	**3.0**	R5
9057188	3.0	4.0	4.0	4.0	3.0	5.0	3.0	4.0	3.8	**3.0**	R1,5,7
9068565	7.0	3.0	6.0	8.0	5.0	5.0	7.0	Dead	5.9	**3.0**	R2,8
9068510	7.0	8.0	6.0	5.0	5.0	4.0	6.0	3.0	5.5	**3.0**	R8
9068574	7.0	6.0	4.0	6.0	3.0	6.0	6.0	6.0	5.5	**3.0**	R8
9068507	5.0	Dead	4.0	5.0	Dead	4.0	8.0	6.0	5.3	**4.0**	R3,6
9068586	Dead	Dead	6.0	7.0	4.0	5.0	6.0	5.0	5.5	**4.0**	R4
9068508	7.0	5.0	5.0	5.0	5.0	7.0	6.0	4.0	5.5	**4.0**	R8
9057169	4.0	4.0	6.0	4.0	7.0	5.0	5.0	8.0	5.4	**4.0**	R1,2,4
9068528	4.0	4.0	Dead	5.0	6.0	4.0	6.0	6.0	5.0	**4.0**	R1,3,6
9068525	5.0	6.0	7.0	8.0	Dead	8.0	Dead	5.0	6.4	**5.0**	R1,8

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068586	5.0	Dead	3.0	6.0	5.0	7.0	7.0	2.0	5.0	**2.0**	R8
9068562	5.0	2.0	2.0	5.0	3.0	5.0	6.0	2.0	3.8	**2.0**	R2,3,8
9068558	3.0	5.0	3.0	5.0	3.0	2.0	2.0	Dead	3.3	**2.0**	R6,7
9068574	5.0	2.0	3.0	6.0	5.0	6.0	3.0	5.0	4.4	**2.0**	R2
9057168	5.0	7.0	5.0	5.0	3.0	5.0	5.0	7.0	5.3	**3.0**	R5
9068573	5.0	5.0	5.0	3.0	3.0	3.0	4.0	5.0	4.1	**3.0**	R4,5,6
9057188	6.0	5.0	3.0	6.0	3.0	3.0	5.0	3.0	4.3	**3.0**	R3,5,6,8
9068528	3.0	5.0	3.0	5.0	3.0	7.0	5.0	6.0	4.6	**3.0**	R1,3,5
9068510	5.0	7.0	5.0	3.0	3.0	7.0	7.0	5.0	5.3	**3.0**	R4,5
9068565	5.0	5.0	7.0	Dead	5.0	5.0	4.0	Dead	5.2	**4.0**	R7
9068507	7.0	Dead	5.0	Dead	Dead	5.0	7.0	7.0	6.2	**5.0**	R3,6
9068508	Dead	5.0	7.0	5.0	7.0	5.0	6.0	5.0	5.7	**5.0**	R2,4,6,8
9057169	7.0	5.0	7.0	5.0	7.0	5.0	6.0	5.0	5.9	**5.0**	R2,4,6,8
9068525	5.0	7.0	5.0	7.0	Dead	7.0	Dead	6.0	6.0	**5.0**	R1,3,5

Rating: 1-Excellent, 9=Poor

Study 29I135J - Assembly and Evaluation of Hazelnut, *Corylus americana*, Walt. **Table #6**

Fruit Production

			1997														1998							
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Best**	**Location**		**Accession**	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Best**	**Location**
9057169	2.0	3.0	9.0	9.0	0.0	0.0	0.0	0.0	5.8	**2.0**	R1		9068507	5.0	Dead	5.0	Dead	Dead	2.0	0.0	0.0	4.0	**2.0**	R6
9068562	0.0	7.0	0.0	0.0	0.0	3.0	9.0	7.0	6.5	**3.0**	R6		9068586	Dead	Dead	7.0	7.0	7.0	7.0	5.0	2.0	5.8	**2.0**	R8
9057168	9.0	9.0	3.0	0.0	7.0	9.0	0.0	0.0	7.4	**3.0**	R3		9068562	2.0	2.0	7.0	0.0	7.0	5.0	2.0	2.0	3.9	**2.0**	R1,2,7,8
9057188	3.0	7.0	Dead	9.0	9.0	9.0	7.0	7.0	7.3	**3.0**	R1, R7		9057168	7.0	5.0	2.0	0.0	2.0	5.0	7.0	0.0	4.7	**2.0**	R3,5
9068574	6.0	0.0	0.0	8.0	3.0	0.0	0.0	0.0	5.7	**3.0**	R5		9068558	2.0	Dead	5.0	2.0	0.0	5.0	5.0	Dead	3.8	**2.0**	R2,4
9068573	3.0	6.0	9.0	0.0	6.0	0.0	0.0	0.0	6.0	**6.0**	R2, R5		9068508	5.0	5.0	2.0	5.0	2.0	5.0	2.0	2.0	3.5	**2.0**	R1,2,3,5,7,8
9068528	9.0	6.0	0.0	9.0	0.0	6.0	8.0	0.0	7.6	**6.0**	R2,6		9068573	7.0	2.0	2.0	5.0	2.0	7.0	5.0	7.0	4.6	**2.0**	R2,3,5
9068510	0.0	7.0	0.0	0.0	6.0	0.0	0.0	0.0	6.5	**6.0**	R5		9068565	7.0	7.0	2.0	7.0	0.0	2.0	5.0	0.0	5.0	**2.0**	R3,6
9068507	0.0	Dead	7.0	Dead	Dead	0.0	0.0	0.0	7.0	**7.0**	R3		9057169	7.0	7.0	2.0	7.0	0.0	2.0	5.0	0.0	5.0	**2.0**	R3,6
9068565	8.0	0.0	9.0	7.0	9.0	9.0	0.0	Dead	8.4	**7.0**	R4		9068528	2.0	2.0	Dead	5.0	2.0	5.0	5.0	2.0	3.3	**2.0**	R1,2,5,8
9068508	9.0	Dead	9.0	0.0	9.0	0.0	9.0	8.0	8.8	**8.0**	R8		9068510	7.0	2.0	7.0	7.0	7.0	5.0	0.0	5.0	5.7	**2.0**	R2
9068558	9.0	Dead	0.0	0.0	0.0	0.0	9.0	Dead	9.0	**9.0**	R1, R7		9068574	5.0	7.0	7.0	2.0	2.0	5.0	5.0	0.0	4.7	**2.0**	R4,5
9068525	0.0	0.0	0.0	0.0	0.0	0.0	Dead	9.0	9.0	**9.0**	R8		9068525	5.0	5.0	7.0	7.0	2.0	7.0	Dead	2.0	5.0	**2.0**	R5,8
9068586	Dead	Dead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**-**	-		9057188	7.0	7.0	5.0	7.0	5.0	0.0	0.0	Dead	6.2	**5.0**	R3,5

1=Heavy Fruit Production; 9=Poor Fruit Production

1=Heavy Fruit Production; 9=Poor Fruit Production

Insect/Disease

			1997														1998							
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Best**	**Location**		**Accession**	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Average**	**Best**	**Location**
9068586	Dead	Dead	4.0	3.0	4.0	4.0	5.0	4.0	4.0	**2.0**	R2		9068507	4.0	Dead	6.0	Dead	Dead	2.0	9.0	3.0	4.8	**2.0**	R6
9068562	3.0	2.0	4.0	5.0	4.0	2.0	3.0	2.0	3.1	**2.0**	R2		9068586	Dead	Dead	4.0	3.0	3.0	3.0	4.0	2.0	3.2	**2.0**	R8
9057168	3.0	4.0	3.0	3.0	2.0	3.0	4.0	4.0	3.3	**2.0**	R5		9057168	2.0	4.0	3.0	4.0	2.0	2.0	6.0	3.0	3.3	**2.0**	R1,5,6
9068558	2.0	Dead	3.0	5.0	7.0	3.0	3.0	Dead	3.8	**2.0**	R1,3,6		9068558	3.0	Dead	4.0	3.0	3.0	2.0	2.0	Dead	2.8	**2.0**	R6,7
9068508	3.0	3.0	3.0	3.0	2.0	3.0	4.0	5.0	3.3	**2.0**	R5		9068573	5.0	3.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0	**2.0**	R5
9068573	8.0	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.4	**2.0**	R4, 5		9057188	7.0	3.0	3.0	2.0	3.0	2.0	2.0	4.0	3.3	**2.0**	R4,6,7
9057188	2.0	2.0	2.0	4.0	2.0	6.0	2.0	2.0	2.8	**2.0**	R1,2,3,5,7,8		9057169	2.0	4.0	4.0	3.0	2.0	3.0	2.0	3.0	2.9	**2.0**	R1,5,7
9068565	3.0	2.0	7.0	6.0	3.0	5.0	4.0	5.0	4.4	**2.0**	R2		9068528	3.0	4.0	Dead	3.0	3.0	3.0	2.0	2.0	2.9	**2.0**	R7,8
9057169	2.0	2.0	6.0	2.0	3.0	2.0	3.0	7.0	3.4	**2.0**	R1,2,4,6		9068510	6.0	4.0	3.0	3.0	5.0	3.0	3.0	2.0	3.6	**2.0**	R8
9068510	4.0	4.0	4.0	3.0	4.0	5.0	2.0	2.0	3.5	**2.0**	R7,8		9068574	3.0	6.0	4.0	4.0	3.0	2.0	3.0	3.0	3.5	**2.0**	R6
9068574	3.0	3.0	5.0	4.0	2.0	5.0	3.0	3.0	3.5	**2.0**	R5		9068562	3.0	3.0	5.0	4.0	3.0	4.0	3.0	3.0	3.5	**3.0**	R1,2,5,7,8
9068525	2.0	3.0	2.0	7.0	Dead	3.0	Dead	2.0	3.2	**2.0**	R 1,3,8		9068508	4.0	4.0	3.0	3.0	3.0	4.0	3.0	4.0	3.5	**3.0**	R3,4,5,7
9068507	3.0	Dead	3.0	Dead	Dead	3.0	4.0	4.0	3.4	**3.0**	R1,3,6		9068565	7.0	3.0	4.0	6.0	3.0	4.0	3.0	Dead	4.3	**3.0**	R2,5,7
9068528	3.0	3.0	Dead	3.0	3.0	4.0	4.0	4.0	3.4	**3.0**	R1,2,4,5		9068525	3.0	4.0	3.0	3.0	Dead	3.0	Dead	3.0	3.2	**3.0**	R1,3,4,6,8

1=No Insect/Disease; 9=Severe Insect/Disease

1=No Insect/Disease; 9=Severe Insect/Disease

Study: 29I136J

Study Title - Assembly and Evaluation of Wild Plum, *Prunus americana* Marsh.

Study Leader: Cordsiemon, R.

Introduction:

Wild plum is recognized as an excellent wildlife plant that also has some aesthetic value. It is a shrub or small tree with shaggy bark. Leaves are narrow to wedge-shaped, hairless or nearly so, somewhat long-pointed, sharply and often doubly toothed. Usually no glands are found on leaf-stalks. Twigs are typically hairless. Buds are red-brown, mostly about 1/8 inch in length. Leaf/scars are not abnormally enlarged. Leaves are one to five inches long. Wild plum reaches a height of 15 – 30 feet; with a diameter of five to ten inches. Flowers are white, three - five inch clusters, appearing March - May. Fruits are red and yellow, usually 7/8 - 1 1/4inches, seed are somewhat flattened and ripen June - October. This species occurs from Massachusetts to Manitoba, New Mexico, Central Texas and southwest Florida.

Problem:

There is a lack of an available cultivar of wild plum specifically for this area. A need for developing a local selection or source identified selected sources of wild plum for use as wildlife food and habitat in the three states being served by the center has been identified by NRCS and other conservation and wildlife agencies.

Objective:

The objective is to assemble, comparatively evaluate, select and release an adapted cultivar selection of wild plum.

Discussion

1990-1993

Seed was collected from native stands during 1990, 1991, and 1992. A total of 27 collections were made in Missouri, Iowa, and Illinois. The seed was stratified, germinated in the greenhouse and grown out in open bottom milk-carton type containers. Eighteen of the 27 collections germinated.

1994-1998

The plants were transplanted into a randomized complete block with seven replications and one nonrandomized block. The planting was established May 16, 1994 in Field #11e at the PMC. There were several significant dry periods throughout the summer and the plants were under stress several times. The plants were hand watered several times and only four out of 120 plants under evaluation were lost.

The planting was evaluated in 1995, 1996, 1997 and 1998 with very good survival considering the tough establishment year and a very droughty 1998.

The following accessions were selected in 1998 for field plantings: 9062309 (South Dakota), 9057088 (Moultrie County, Illinois), 9068546 (Dallas County, Missouri), 9068545 (Phelps County, Missouri), and 9068580 from Livingston County, Missouri.

1999

The 1999 evaluations of this study took place at different times of the year to capture the purposes for the evaluations: height, spread, fruit production, and form.

Table #2 lists the different accessions included in this assembly along with the locations and collectors' names.

Tables #5, #6, #7, #8, and #9 reflect the plants' performance from 1995 to 1999. These tables can be found in the 1999 Elsberry Technical Report.

2000

There were no plant performance evaluations done on this study in year 2000 other than fruit production and insect and disease resistance evaluations. On April 28, 2000 an infestation of the caterpillar tent worm, *Malacosoma americanum* was noted in the planting. A closer observation revealed a severe infestation of the caterpillar tent worm affecting every plant in the assembly. The pesticide Malathion 57 EC liquid was used following the label recommendations. The control was very effective.

Tables #2, #5, #6, #7, #8, and #9 reflect the plants' locations, collectors and performance for years 1995 to 1999.

The following information (Table #1) pertains to the fruit production harvested from selected accessions in year 2000.

Table #1

Accession Number	Amount of Clean Seed Produced
9062309	**4.9 ounces**
9068580	**11.5 ounces**
9068485	**5.5 ounces**
9057088	**1.7 ounces**
9068546	**11.0 ounces**

Study 29I136J - Assembly and Evaluation of Wild Plum, *Prunus americana* Marsh.

Table #2 – Accessions, Locations and Collector's Name

Accession Number	Locations Collected	Collector's Name
9062309	PMC, Bismarck, North Dakota	Dwight Tober
9057096	Kendall Co., Illinois	William D. Glass
9057085	Coles Co., Illinois	Robert E. Szafoni
9057088	Moultrie Co., Illinois	Robert E. Szafoni
9057130	Grundy Co., Illinois	William D. Glass
9057139	Iroquois Co., Illinois	William D. Glass
9057146	Will Co., Illinois	William D. Glass
9057163	Ogle Co., Illinois	Jim R. Heim
9057164	Woodbury Co., Iowa	Harry A. Minor
9057165	Kankakee Co., Illinois	William D. Glass
9957166	Woodbury Co., Iowa	Harry A. Minor
9068480	Livingston Co, Illinois	William D. Glass
9068485	Ogle Co., Illinois	Jim R. Heim
9057185	Cooper Co., Missouri	David M. Skaer
9867516	Livingston Co., Illinois	Mark Baron
9068515	Moniteau Co., Missouri	Henry E. Knipker
9068514	Grundy Co., Illinois	William D. Glas
9068546	Dallas Co., Missouri	David L. Wright
9068545	Phelps Co., Missouri	Melodie marshall
9068544	Cooper Co., Missouri	Linda Young
9068543	Kendall Co., Illinois	Dayle Saar
9068580	Livingston Co., Missouri	Mac Ellis
9068581	Lincoln Co., Missouri	Bruce Schuette

2001

A similar infestation of the caterpillar tent worm, *Malacosoma americanum,* occurred this year as it did last year. The infestation affected all accessions to some degree and was noted encroaching into the planting during the last week of April 2001. The pesticide Malathion 57 EC liquid was used following the label recommendation. The control was again very effective.

Evaluations made this year included insect and disease resistance and fruit production.

The following Table #3 is the summary of plant performance of the selected accessions of wild plum out of the initial assembly.

2002-2003

Plant performance evaluations (1995-2002) were documented on those accessions selected for field plantings in the PMC service area (Iowa, Illinois, and Missouri). A light infestation of the caterpillar tent worm, *Malacosoma americanum*, was noted in this assembly in early spring 2002, however no pesticide was applied. No plants were seriously affected as a result of not applying the pesticide Malathoin 57 EC. Table #3 reflects those evaluations. The accessions listed in the following table were allowed to remain and all the rest of the plants will be removed (March 2003). The remaining accessions will be allowed to cross and the progeny will be assigned a separate accession number (9083241) and only one release (Tested Class) will be made for the PMC service area.

Fruit production was harvested from each plant and later combined into a composite of the above mentioned new accession number. Fruit production is reflected from 2000-2002 in Table #4

2004

In 2004, the selected plants (9083241) produced 4.5 pounds of seed. The seed was stratified and will be grown out in the PMC greenhouse in 2005. The material produced will be allocated as bare root material and used in field plantings for further evaluations. Caterpillar tent worms, *Malacosoma americanum,* were present among the selected plants, but no treatment was applied. Damage to the foliage was also present, but not significant.

Seed harvested in 2003 was used to grow seedlings that will be planted in field plantings. More than 150 plants were produced from this seed.

Table #3

Acc. Number	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**Ave.**
9062309									
Height (ft)	2.7	4.7	7.1	8.2	9.4				6.4
Spread (ft)	0.8	3.2	6.9	7.7	10.6				5.8
Ins/Disease	4	4	4	4	4	4	4	4	4.0
Form	4	4	4	4	4	4	4	4	4.0
Fruiting			4	4	5	7	6	9	4.3
9068580									
Height (ft)	3.1	6.1	9.0	9.8	10.4				7.7
Spread (ft)	0.93	4.6	9.3	10.0	11.3				7.3
Ins/Disease	2	2	2	3	3	4	4	4	2.9
Form	4	3	3	3	3	3	3	3	3.1
Fruiting			4	3	4	6	4	6	4.5

Study 29I136J - Assembly and Evaluation of Wild Plum, *Prunus americana* Marsh.

Table #3 continued

Acc. Number	1995	1996	1997	1998	1999	2000	2001	2002	Ave.
9068485									
Height (ft)	2.2	3.9	5.5	6.3	9.1				5.4
Spread (ft)	0.93	4.6	9.2	10.5	11.3				7.3
Ins/Disease	2	2	2	2	2	4	4	4	2.8
Form	4	3	3	2	2	2	2	2	2.5
Fruiting			4	3	4				3.7
9068545									
Height (ft)	2.2	3.9	5.5	6.3	7.8				5.4
Spread (ft)	0.3	3.0	5.6	6.8	8.5				4.8
Ins/Dis	3	3	3	3	3	5	4	4	3.4
Form	5	3	3	3	3	3	3	3	3.3
Fruiting			3	4	4	8	1	1	3.5
9068546									
Height (ft)	2.9	5.2	7.9	16.6	17.3				10.0
Spread (ft)	0.8	4.2	8.1	8.5	10.9				6.5
Ins/Dis	3	2	2	3	3	4	5	5	3.1
Form	4	4	3	3	3	3	3	3	3.3
Fruiting			3	2	2	6	2	3	2.7

Rating for Insect/Disease: 1 = Exc Resistance, 9 = Poor Resistance
Rating for Fruiting: 1 = Heavy Fruit Production, 9 = Poor Fruit Production
Rating for Form: 1 = Excellent, 9 = Poor

Fruit Production Chart for 2000 - 2002

Table #4

Acc. Number	2000 Pound(s)	2001 Pound(s)	2002 Pound(s)	Average
9062309	0.31	0.60	12 Seeds	0.30
9068580	0.72	1.50	0.70	0.97
9068485	0.11	3.45	3.00	2.19
9068546	0.69	3.57	1.90	2.05
9057088	0.00	5.86	0.40	2.09

Study 29I136J Assembly and Evaluation of *Prunus Americana*, Wild Plum													Height in Feet											Table #5	
				1995													1996								
Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location		Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
434240	4.50	5.30	3.80	4.30	2.60	Dead	4.10	-	4.10	**5.30**	R2		9068545	7.70	6.40	6.80	6.20	5.70	Dead	5.40	-	6.37	**7.70**	R1
9068580	3.60	5.00	2.60	4.30	1.50	2.00	2.60	3.00	3.08	**5.00**	R2		434240	7.10	7.30	6.30	6.00	5.10	Dead	6.00	-	6.30	**7.30**	R2
9057088	4.30	3.10	3.10	4.80	2.50	2.50	2.60	3.50	3.30	**4.80**	R4		9057096	5.20	7.00	6.20	Dead	Dead	1.30	Dead	-	4.93	**7.00**	R2
9068545	4.50	3.00	3.00	3.20	2.30	Dead	2.00	-	3.00	**4.50**	R1		9068514	7.00	6.50	5.10	4.50	Dead	4.10	4.50	-	5.28	**7.00**	R1
9068546	3.70	4.30	3.60	2.30	2.60	1.80	2.10	2.40	2.85	**4.30**	R2		9068580	6.90	7.00	6.60	6.80	4.40	4.60	6.00	6.30	6.08	**7.00**	R2
9068516	2.50	2.00	Dead	4.00	2.00	Dead	Dead	-	2.63	**4.00**	R4		9068480	4.70	3.10	5.10	6.80	2.90	Dead	Dead	Dead	4.52	**6.80**	R4
9068515	2.50	0.60	3.80	2.70	1.50	2.50	2.30	2.30	2.28	**3.80**	R3		9057088	6.50	5.70	5.20	4.60	5.60	5.10	5.40	-	5.44	**6.50**	R1
9057096	3.60	2.30	1.40	Dead	Dead	1.10	Dead	-	2.10	**3.60**	R1		9068546	5.50	6.20	6.50	5.60	4.70	3.60	4.40	5.20	5.21	**6.50**	R3
9068485	3.30	2.00	2.30	2.70	1.50	Dead	1.20	-	2.17	**3.30**	R1		9062309	6.30	Dead	3.60	4.80	3.80	4.80	Dead	-	4.66	**6.30**	R1
9068514	3.10	1.90	2.60	2.00	Dead	1.80	2.10	-	2.25	**3.10**	R1		9057165	5.30	5.00	6.20	6.00	5.10	-	-	-	5.52	**6.20**	R3
9068480	2.60	3.10	2.40	3.00	1.60	Dead	Dead	Dead	2.54	**3.10**	R2		9068516	4.90	5.00	Dead	5.10	6.10	Dead	Dead	-	5.28	**6.10**	R5
9068478	2.60	2.40	3.00	2.80	1.60	2.60	1.40	-	2.34	**3.00**	R3		9068543	4.20	6.00	5.30	4.70	Dead	Dead	Dead	-	5.05	**6.00**	R2
9062309	2.80	Dead	2.00	3.00	2.60	2.90	Dead	-	2.66	**3.00**	R4		9068515	5.10	2.40	5.90	5.30	4.30	4.20	4.10	4.80	4.51	**5.90**	R3
9057165	1.90	1.80	2.80	2.00	1.40	-	-	-	1.98	**2.80**	R3		9062308	4.40	5.00	3.10	4.80	Dead	Dead	2.60	Dead	3.98	**5.00**	R2
9068543	2.40	2.70	2.50	2.00	Dead	Dead	Dead	-	2.40	**2.70**	R2		9068478	3.10	4.50	3.40	4.50	4.30	4.30	3.40	-	3.93	**4.50**	R2,4
9062308	2.00	2.20	2.30	1.60	Dead	Dead	1.75	Dead	1.97	**2.30**	R3		9068485	4.10	4.10	4.00	4.50	4.00	Dead	2.60	-	3.88	**4.50**	R4
9057146								1.60	1.60	**1.60**	R8		9057146								4.50	4.50	**4.50**	R8
ND-286								Dead		**0.00**			ND-286								Dead		**0.00**	
				1997													1998								
Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location		Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
9057088	9.50	6.40	7.40	7.30	8.60	7.00	9.00	10.00	8.15	**10.00**	R8		9068545	12.10	10.90	7.70	10.40	9.60	Dead	7.90	-	9.77	**12.10**	R1
9068545	11.00	9.80	6.60	9.10	8.00	Dead	7.00	-	8.58	**10.00**	R1		9068580	11.30	11.00	10.90	11.80	9.00	8.80	9.40	-	10.31	**11.30**	R1
9068580	10.00	10.00	9.60	10.80	7.20	7.00	8.20		8.97	**10.00**	R1,2		9057088	10.20	7.70	8.30	8.20	9.60	8.00	7.30	11.20	8.81	**11.20**	R8
9068546	7.20	9.70	9.00	8.40	7.00	6.00	7.60	8.00	7.86	**9.70**	R2		434240	10.20	10.00	10.70	8.90	8.60	Dead	8.60	-	9.50	**10.70**	R3
434240	9.50	9.00	9.50	7.60	7.30	Dead	8.20	-	8.52	**9.50**	R1,3		9068515	8.90	5.80	10.30	8.10	6.00	7.00	9.90	7.10	7.89	**10.30**	R3
9068515	8.20	4.20	9.10	7.40	5.00	6.00	8.20	6.20	6.79	**9.10**	R3		9068480	8.80	6.80	10.20	7.70	7.00	Dead	Dead	6.90	7.90	**10.20**	R3
9057096	7.30	7.20	8.00	Dead	Dead	2.50	Dead	-	6.25	**8.00**	R3		9068546	8.70	10.20	10.00	9.90	8.20	67.90	8.20	9.80	16.61	**10.20**	R2
9062309	8.00	Dead	7.00	7.20	6.40	7.00	Dead	-	7.12	**8.00**	R1		9057146								8.90	8.90	**8.90**	R8
9068516	7.80	7.20	Dead	6.00	7.20	Dead	Dead	-	7.05	**7.80**	R1		9062309	8.90	Dead	8.10	8.40	7.10	8.30	Dead	-	8.16	**8.90**	R1
9062308	6.40	2.50	5.10	7.60	Dead	Dead	4.00	Dead	5.12	**7.60**	R4		9068514	8.80	7.30	8.10	7.40	Dead	8.10	7.40	-	7.85	**8.80**	R1
9068514	7.60	6.40	7.40	6.30	Dead	7.00	6.60	-	6.88	**7.60**	R1		9057096	7.90	7.70	8.60	Dead	Dead	4.50	Dead	-	7.18	**8.60**	R3
9068543	6.00	5.00	7.20	7.00	Dead	Dead	Dead	-	6.30	**7.20**	R3		9068516	8.10	8.60	Dead	7.20	8.30	Dead	Dead	-	8.05	**8.60**	R2
9057146								7.20	7.20	**7.20**	R8		9068543	7.00	6.00	8.30	8.10	Dead	Dead	Dead	-	7.35	**8.30**	R3
9068480	7.00	5.40	9.00	6.30	6.00	Dead	Dead	6.00	6.62	**7.00**	R1		9062308	7.30	4.90	6.60	8.00	Dead	Dead	5.00	Dead	6.36	**8.00**	R4
9057165	5.30	5.10	6.10	7.00	5.70	-	-	-	5.84	**7.00**	R4		9057165	6.60	6.80	7.40	8.00	6.80	-	-	-	7.12	**8.00**	R4
9068478	3.20	6.50	4.40	6.40	Dead	Dead	4.60	-	5.02	**6.80**	R6		9068478	4.00	6.90	5.40	7.20	Dead	Dead	5.20	-	5.74	**7.20**	R4
9068485	5.70	6.30	5.00	6.80	6.30	Dead	2.70	-	5.47	**6.80**	R4		9068485	6.10	7.20	6.00	7.40	7.10	Dead	3.80	-	6.27	**7.20**	R2
ND-286								Dead		**0.00**			ND-286										**0.00**	
Height measured in feet																									

Study 29I136J Assembly and Evaluation of *Prunus Americana*, Wild Plum

Table #5 - continued

Height in Feet

1999

Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
9057088	11.00	8.00	11.00	10.00	8.50	6.00	13.00	11.00	13.10	**13.00**	R7
9068580	8.00	5.50	0.00	12.00	8.50	11.00	11.00	9.50	8.19	**12.00**	R4
9068515	11.00	11.00	9.50	10.50	6.00	10.00	6.00	0.00	9.14	**11.00**	R1,2
9068485	8.00	8.00	7.00	8.50	9.00	0.00	6.00	0.00	7.75	**11.00**	R2,4
9068545	10.00	11.00	0.00	11.00	8.50	0.00	0.00	0.00	10.13	**11.00**	R2,4
9068516	7.50	9.50	0.00	7.00	11.00	0.00	9.00	0.00	8.80	**11.00**	R5
9068546	9.00	6.00	10.50	10.50	9.00	8.00	9.50	11.00	9.19	**11.00**	R8
9068480	9.00	8.50	0.00	9.00	10.50	0.00	0.00	9.50	9.30	**10.50**	R5
9057096	8.50	10.50	10.50	8.50	0.00	0.00	0.00	0.00	9.50	**10.50**	R2,3
9062308	9.00	0.00	10.00	8.00	0.00	0.00	7.50	0.00	8.63	**10.00**	R3
9068514	9.50	10.00	9.00	8.50	0.00	8.00	8.00	0.00	8.83	**10.00**	R2
9062309	11.50	0.00	8.50	9.00	8.00	10.00	0.00	0.00	9.40	**10.00**	R6
9068543	9.00	8.50	9.50	8.50	0.00	0.00	0.00	0.00	8.88	**9.50**	R3
9068478	8.00	8.00	9.00	0.00	6.50	8.50	8.50	0.00	8.08	**9.00**	R3
434240	0.00	9.00	9.00	0.00	0.00	0.00	0.00	0.00	9.00	**9.00**	R2,3
9057165	8.00	8.00	9.00	8.00	8.50	0.00	0.00	0.00	8.30	**9.00**	R3
9057146								7.50	7.50	**7.50**	R8
ND-286								0.00	0.00	**0.00**	

Height measured in feet

0 = Dead plant

Study 29I136J Assembly and Evaluation of Prunus Americana, Wild Plum													Spread in Feet											Table #6	
				1995													1996								
Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location		Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068480	0.60	1.60	0.60	0.40	0.20	Dead	Dead	Dead	0.68	**1.60**	R2		9068480	3.00	2.60	3.70	3.20	3.50	Dead	Dead	Dead	3.20	**3.70**	R3
9057096	0.70	0.30	0.20	Dead	Dead	0.20	Dead	-	0.35	**0.70**	R1		9057096	3.80	4.00	3.40	Dead	Dead	0.60	Dead	-	2.95	**4.00**	R2
9068478	0.90	0.70	1.00	1.00	0.60	0.80	0.50	-	0.79	**1.00**	R3,4		9068478	2.40	3.80	1.80	4.70	4.50	4.50	2.50	-	3.46	**4.70**	R4
9068515	1.00	0.30	0.80	0.60	0.40	0.60	0.40	0.20	0.54	**1.00**	R1		9068515	3.80	2.60	4.00	4.00	4.50	3.70	3.50	2.60	3.59	**4.50**	R5
9062308	0.60	0.60	0.30	0.40	Dead	Dead	0.50	Dead	0.48	**0.60**	R1,2		9062308	3.80	3.00	1.80	3.30	Dead	Dead	3.20	Dead	3.02	**3.80**	R1
9068485	0.30	0.30	0.50	0.30	0.20	Dead	0.10	-	0.28	**0.50**	R3		9068485	3.00	3.20	3.40	3.60	2.30	Dead	2.00	-	2.92	**3.60**	R4
9057088	2.00	1.60	0.80	0.60	0.40	0.60	0.90	0.90	0.98	**1.60**	R2		9057088	5.50	5.00	5.00	2.80	4.40	4.50	4.30	5.80	4.66	**5.80**	R8
9068545	2.30	1.50	0.80	1.00	1.00	Dead	0.40	-	1.17	**2.30**	R1		9068545	7.00	5.00	5.20	5.80	5.00	Dead	2.60	-	5.10	**7.00**	R1
9068543	0.30	0.20	0.60	0.20	Dead	Dead	Dead	-	0.33	**0.60**	R3		9068543	3.00	3.50	4.40	3.40	Dead	Dead	Dead	-	3.58	**4.40**	R3
9068516	1.30	0.20	Dead	0.80	0.60	Dead	Dead	-	0.73	**0.60**	R3		9068516	3.00	3.00	Dead	3.50	3.50	Dead	1.40	-	2.88	**3.50**	R4,5
9068514	0.80	0.70	1.00	0.30	Dead	0.40	0.30	-	0.58	**1.00**	R3		9068514	4.00	3.40	3.30	2.70	Dead	2.80	5.00	-	3.53	**5.00**	R7
9068580	1.80	2.00	1.10	0.80	0.40	0.50	0.40	0.40	0.93	**2.00**	R2		9068580	5.40	6.00	4.80	5.60	3.30	3.00	4.50	4.00	4.58	**6.00**	R2
9057146								0.20		**0.20**	R8		9057146								3.00	3.00	**3.00**	R8
9068546	1.30	1.30	1.40	0.90	0.20	0.40	0.50	0.50	0.81	**1.40**	R3		9068546	4.20	5.00	5.00	4.80	2.60	4.40	3.40	4.00	4.18	**5.00**	R2,3
434240	2.50	2.50	2.00	1.40	0.60	Dead	1.00	-	1.67	**2.50**	R1,2		434240	6.40	5.00	5.20	4.80	3.70	Dead	4.90	-	5.00	**6.40**	R1
ND-286								Dead		**0.00**			ND-286								Dead	-	**0.00**	
9062309	0.50	Dead	0.30	0.10	0.40	0.20	Dead	-		**0.50**	R1		9062309	3.40	Dead	2.70	3.70	3.00	3.30	Dead	-	3.22	**3.70**	R4
9057165	0.60	0.40	0.50	0.30	0.40	-	-	-	0.44	**0.60**	R1		9057165	3.50	2.80	4.20	3.70	2.80	-	-	-	3.40	**4.20**	R3
				1997													1998								
Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location		Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068480	7.20	6.00	7.40	6.00	6.20	Dead	Dead	4.30	6.18	**7.40**	R3		9068480	7.70	6.50	7.90	6.50	6.50	Dead	Dead	4.75	6.64	**7.90**	R3
9057096	7.60	8.60	7.40	Dead	Dead	3.00	Dead	-	6.65	**8.60**	R2		9057096	8.00	9.10	7.90	Dead	Dead	4.00	Dead	-	7.25	**9.10**	R2
9068478	3.00	6.20	4.00	7.30	Dead	7.80	4.60	-	5.48	**7.80**	R6		9068478	5.00	6.80	5.30	8.10	Dead	8.50	5.70	-	6.57	**8.50**	R6
9068515	8.30	4.00	7.20	7.50	7.80	6.70	7.40	6.80	6.96	**8.30**	R1		9068515	9.10	5.30	8.10	8.50	8.70	7.60	8.10	7.20	7.83	**8.70**	R5
9062308	6.20	2.80	4.30	8.30	Dead	Dead	4.60	Dead	5.24	**8.30**	R4		9062308	7.70	4.90	5.90	9.20	Dead	Dead	5.90	Dead	6.72	**9.20**	R4
9068485	5.00	6.20	5.50	7.50	6.00	Dead	3.20	-	5.57	**7.50**	R4		9068485	6.10	6.90	6.50	8.30	7.10	Dead	5.70	-	6.77	**8.30**	R4
9057088	10.00	6.50	8.30	8.30	8.50	7.50	8.00	11.00	8.51	**11.00**	R8		9057088	11.10	7.30	9.20	8.90	9.10	8.20	8.90	11.80	9.31	**11.80**	R8
9068545	12.80	9.00	9.00	9.30	9.00	Dead	3.90	-	8.83	**12.80**	R1		9068545	13.20	10.10	10.00	10.80	10.00	Dead	5.30	-	9.90	**13.20**	R1
9068543	6.60	9.00	6.40	7.70	Dead	Dead	Dead	-	7.43	**9.00**	R2		9068543	7.40	10.00	7.20	8.10	Dead	Dead	Dead	-	2.03	**10.00**	R2
9068516	6.80	7.00	Dead	7.40	7.50	Dead	3.60	-	6.46	**7.50**	R5		9068516	7.20	8.10	Dead	8.80	8.30	Dead	5.10	-	4.44	**8.80**	R4
9068514	7.20	6.50	7.10	6.50	Dead	6.40	6.50	-	6.70	**7.20**	R1		9068514	8.10	7.30	8.30	7.00	Dead	7.40	7.40	-	3.63	**8.30**	R3
9068580	12.00	10.60	10.10	11.30	7.70	6.20	8.00	8.00	9.24	**12.00**	R1		9068580	13.00	11.90	11.00	12.60	8.60	7.90	9.50	9.40	6.00	**13.10**	R1
9057146								8.10	8.10	**8.10**	R8		9057146								9.30	9.30	**9.30**	R8
9068546	6.00	11.00	8.00	10.00	7.60	6.20	8.00	7.70	8.06	**11.00**	R2		9068546	7.20	12.10	9.30	11.30	8.70	7.40	9.20	8.50	5.64	**11.30**	R4
434240	10.30	7.60	10.00	7.40	7.80	Dead	8.00	-	8.52	**10.30**	R1		434240	10.90	8.30	11.20	8.70	8.90	Dead	9.10	-	4.45	**11.20**	R3
ND-286								Dead	-	**0.00**			ND-286								Dead	Dead	**0.00**	
9062309	8.20	Dead	6.60	7.00	6.40	6.50	Dead	-	6.94	**8.20**	R1		9062309	8.90	Dead	7.30	7.90	7.00	7.20	Dead	-	4.42	**8.90**	R1
9057165	6.20	6.40	7.10	7.30	6.00	-	-	-	6.60	**7.10**	R4		9057165	7.10	7.20	8.30	8.30	7.40	-	-	-	3.14	**8.30**	R3,4
Width measured in feet.																									

Study 29I136J Assembly and Evaluation of Prunus Americana, Wild Plum

Table #6 - continued

Spread in Feet

Accession	Rep 1	Rep 2	Rep 3	1999 Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068480	9.00	8.50	10.50	5.00	8.50	0.00	0.00	9.00	8.42	**10.50**	R3
9057096	8.50	9.50	10.50	0.00	0.00	0.00	0.00	0.00	9.50	**10.50**	R3
9068478	5.00	8.00	8.00	0.00	8.00	11.50	11.00	0.00	8.58	**11.50**	R6
9068515	10.00	7.50	7.00	12.00	9.00	11.00	9.00	0.00	9.36	**12.00**	R4
9062308	9.00	0.00	7.00	10.00	0.00	0.00	10.00	0.00	9.00	**10.00**	R4
9068485	8.30	8.50	7.00	12.00	10.00	0.00	5.00	0.00	8.47	**12.00**	R4
9057088	12.50	10.00	12.50	11.00	14.00	9.00	13.00	13.00	11.88	**14.00**	R5
9068545	14.50	12.00	0.00	11.00	14.00	0.00	0.00	0.00	12.88	**14.50**	R1
9068543	8.50	10.00	12.00	10.00	0.00	0.00	0.00	0.00	10.13	**12.00**	R3
9068516	10.00	11.00	0.00	11.00	11.00	0.00	9.00	0.00	10.40	**11.00**	R2,4,5
9068514	9.50	9.00	9.00	9.00	0.00	10.00	8.00	0.00	9.08	**10.00**	R6
9068580	11.00	10.00	0.00	13.00	11.00	11.00	10.00	13.00	11.29	**13.00**	R4,8
9057146								10.00	10.00	**10.00**	R8
9068546	10.00	5.00	13.00	11.50	11.00	12.00	14.00	11.00	10.94	**14.00**	R7
434240	0.00	11.00	11.00	11.00	0.00	0.00	0.00	0.00	0.00	**11.00**	R2,3,4
ND-286								0.00	0.00	**0.00**	
9062309	11.50	0.00	8.50	11.00	11.00	11.00	0.00	0.00	10.60	**11.50**	R1
9057165	8.00	9.00	11.00	10.00	8.50	0.00	0.00	0.00	9.30	**11.00**	R3

Spread Measured in Feet

0 = Dead plant

Study 29I136J Assembly and Evaluation of *Prunus Americana*, Wild Plum												Form											Table #7	
				1995													1996							
Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location		Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								Dead	-	**0.00**			ND-286								Dead	-	**0.00**	
434240	1.00	2.00	2.00	2.00	4.00	Dead	5.00	-	2.67	**1.00**	R1		9068478	3.00	4.00	2.00	6.00	6.00	4.00	3.00	-	4.00	**2.00**	R3
9057088	2.00	4.00	5.00	4.00	4.00	4.00	2.00	4.00	3.63	**2.00**	R1, 7		9068515	2.00	5.00	3.00	3.00	4.00	6.00	3.00	6.00	4.00	**2.00**	R1
9068545	2.00	3.00	3.00	5.00	2.00	Dead	6.00	-	3.50	**2.00**	R1, 5		9068514	2.00	5.00	4.00	5.00	Dead	5.00	8.00	-	4.83	**2.00**	R1
9068516	2.00	8.00	Dead	7.00	2.00	Dead	Dead	-	4.75	**2.00**	R1 ,5		9068546	2.00	6.00	2.00	3.00	4.00	5.00	7.00	3.00	4.00	**2.00**	R1, 3
9068478	4.00	7.00	4.00	3.00	5.00	4.00	4.00	-	4.43	**3.00**	R3		9068480	8.00	4.00	5.00	3.00	6.00	Dead	Dead	Dead	5.20	**3.00**	R4
9068515	4.00	6.00	5.00	5.00	7.00	3.00	5.00	6.00	5.13	**3.00**	R6		9057096	4.00	3.00	3.00	Dead	Dead	6.00	Dead	-	4.00	**3.00**	R2, 3
9062308	5.00	3.00	6.00	6.00	Dead	Dead	6.00	Dead	5.20	**3.00**	R2		9062308	3.00	5.00	3.00	5.00	Dead	Dead	6.00	Dead	4.40	**3.00**	R1, 3
9068580	5.00	3.00	5.00	3.00	5.00	5.00	5.00	5.00	4.50	**3.00**	R2, 4		9068485	5.00	3.00	3.00	3.00	4.00	Dead	3.00	-	3.50	**3.00**	R2,3,4,7
9068546	4.00	5.00	3.00	5.00	7.00	5.00	5.00	5.00	4.88	**3.00**	R3		9057088	3.00	6.00	4.00	6.00	4.00	4.00	3.00	4.00	4.25	**3.00**	R1, 7
9068480	4.00	8.00	5.00	7.00	6.00	Dead	Dead	Dead	6.00	**4.00**	R1		9068545	5.00	4.00	3.00	5.00	4.00	Dead	7.00	-	4.67	**3.00**	R3
9068514	4.00	7.00	7.00	8.00	Dead	4.00	5.00	-	5.83	**4.00**	R1, 6		9068516	4.00	4.00	Dead	5.00	3.00	Dead	5.00	-	4.20	**3.00**	R5
9057165	4.00	5.00	8.00	8.00	8.00	-	-	-	6.60	**4.00**	R1		9068580	5.00	5.00	3.00	3.00	3.00	3.00	4.00	3.00	3.63	**3.00**	R3,4,5,6,8
9068485	7.00	7.00	8.00	7.00	5.00	Dead	8.00	-	7.00	**5.00**	R5		9057146								3.00	3.00	**3.00**	R8
9068543	5.00	8.00	5.00	8.00	Dead	Dead	Dead	-	6.50	**5.00**	R1, 3		434240	3.00	3.00	4.00	7.00	4.00	Dead	3.00	-	4.00	**3.00**	R1,2, 7
9062309	5.00	Dead	6.00	6.00	6.00	7.00	Dead	-	6.00	**5.00**	R1		9062309	3.00	Dead	5.00	3.00	4.00	4.00	Dead	-	3.80	**3.00**	R1, 4
9057096	6.00	7.00	6.00	Dead	Dead	8.00	Dead	-	6.75	**6.00**	R1, 3		9068543	5.00	4.00	5.00	4.00	Dead	Dead	Dead	-	4.50	**4.00**	R2, 4
9057146								7.00	7.00	**7.00**	R8		9057165	5.00	4.00	5.00	5.00	6.00	-	-	-	5.00	**4.00**	R2
				1997								Form					1998							
Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location		Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								Dead		**0.00**			ND-286								Dead	-	**0.00**	
9068545	1.00	3.00	8.00	7.00	7.00	Dead	5.00	-	5.17	**1.00**	R1		9057088	1.00	6.00	5.00	7.00	5.00	Dead	4.00	-	4.67	**1.00**	R1
9068580	1.00	3.00	7.00	2.00	5.00	6.00	2.00	2.00	3.50	**1.00**	R1		9068580	1.00	3.00	5.00	2.00	5.00	5.00	2.00	2.00	3.13	**1.00**	R1
434240	1.00	5.00	6.00	8.00	5.00	Dead	3.00	-	4.67	**1.00**	R1		434240	1.00	4.00	6.00	8.00	4.00	Dead	3.00	-	4.33	**1.00**	R1
9057088	1.00	7.00	6.00	8.00	5.00	4.00	3.00	2.00	4.50	**2.00**	R8		9068545	1.00	2.00	6.00	5.00	6.00	3.00	3.00	-	3.71	**2.00**	R8
9068546	5.00	3.00	2.00	2.00	5.00	5.00	3.00	5.00	3.75	**2.00**	R3,4		9068514	6.00	8.00	5.00	Dead	6.00	7.00	2.00	-	5.67	**2.00**	R7
9068515	3.00	6.00	5.00	5.00	7.00	5.00	3.00	5.00	4.88	**3.00**	R1, 7		9068546	5.00	3.00	2.00	2.00	4.00	4.00	3.00	4.00	3.38	**2.00**	R3,4,8
9068516	3.00	7.00	Dead	8.00	5.00	Dead	4.00	-	5.40	**3.00**	R1		9068515	3.00	5.00	4.00	4.00	7.00	5.00	3.00	4.00	4.38	**3.00**	R1,7
9068514	6.00	8.00	5.00	Dead	6.00	8.00	3.00	-	6.00	**3.00**	R1		9068516	3.00	6.00	Dead	8.00	5.00	Dead	4.00	-	5.20	**3.00**	R1
9068480	4.00	5.00	8.00	5.00	6.00	Dead	3.00	6.00	5.29	**4.00**	R1		9068480	4.00	6.00	7.00	4.00	6.00	Dead	3.00	6.00	5.14	**4.00**	R1,4
9062308	4.00	9.00	7.00	8.00	Dead	Dead	7.00	-	5.83	**4.00**	R4		9068478	8.00	6.00	7.00	6.00	Dead	4.00	6.00	-	6.17	**4.00**	R6
9057096	6.00	7.00	7.00	5.00	Dead	8.00	Dead	-	6.60	**5.00**	R4		9062308	4.00	8.00	7.00	8.00	Dead	Dead	7.00	-	6.80	**4.00**	R1
9068478	8.00	6.00	7.00	7.00	Dead	5.00	6.00	-	6.50	**5.00**	R6		9057096	5.00	6.00	6.00	5.00	Dead	8.00	Dead	-	6.00	**5.00**	R1,4
9068485	6.00	6.00	6.00	7.00	5.00	Dead	6.00	-	6.00	**5.00**	R5		9068485	6.00	6.00	5.00	6.00	5.00	Dead	6.00	-	5.67	**5.00**	R3,5
9068543	6.00	7.00	5.00	5.00	Dead	Dead	Dead	-	5.75	**5.00**	R3,4		9068543	6.00	6.00	5.00	5.00	Dead	Dead	Dead	-	5.50	**5.00**	R3,4
9057146								5.00	5.00	**5.00**	R8		9057146								5.00	5.00	**5.00**	R8
9062309	5.00	Dead	6.00	5.00	8.00	6.00	Dead	-	6.00	**5.00**	R1,4		9062309	5.00	Dead	5.00	5.00	7.00	6.00	Dead	-	5.60	**5.00**	R1,3,4
9057165	7.00	7.00	6.00	6.00	6.00	-	-	-	6.40	**6.00**	R4,5,6		9057165	7.00	6.00	6.00	5.00	6.00	-	-	-	6.00	**5.00**	R4
Rating: 1= Excellent, 9=Poor				**0=Dead Plant**																				

Study 29I136J Assembly and Evaluation of *Prunus Americana*, Wild Plum

Table #7 - continued

												Form
				1999								
Accssion	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Ave.**	**Best**	**Location**	
ND-286								0.00	0.00	**0.00**		
9057088	1.00	4.00	4.00	6.00	5.00	3.00	4.00	3.00	3.75	**1.00**	R1	
9068545	1.00	2.00	0.00	5.00	5.00	0.00	0.00	0.00	3.25	**1.00**	R1	
9068580	1.00	3.00	0.00	2.00	3.00	3.00	3.00	2.00	2.43	**1.00**	R1	
9068514	6.00	8.00	5.00	4.00	0.00	6.00	2.00	0.00	5.17	**2.00**	R7	
9068546	5.00	3.00	2.00	2.00	4.00	4.00	3.00	4.00	3.38	**2.00**	R3,4	
9068478	8.00	6.00	6.00	0.00	7.00	5.00	3.00	0.00	5.83	**3.00**	R7	
9068515	3.00	5.00	4.00	4.00	7.00	5.00	3.00	0.00	4.43	**3.00**	R1,7	
9062308	3.00	0.00	7.00	7.00	0.00	0.00	7.00	0.00	6.00	**3.00**	R1	
9068516	3.00	6.00	0.00	8.00	5.00	0.00	4.00	0.00	5.20	**3.00**	R1	
9062309	3.00	0.00	4.00	4.00	5.00	5.00	0.00	0.00	4.20	**3.00**	R1	
9068480	4.00	7.00	4.00	5.00	7.00	0.00	0.00	7.00	5.67	**4.00**	R1	
434240	0.00	4.00	6.00	0.00	0.00	0.00	0.00	0.00	5.00	**4.00**	R2	
9057096	5.00	6.00	6.00	0.00	0.00	0.00	0.00	0.00	5.67	**5.00**	R1	
9068485	6.00	6.00	5.00	6.00	5.00	0.00	6.00	0.00	5.67	**5.00**	R3,5	
9068543	6.00	6.00	5.00	5.00	0.00	0.00	0.00	0.00	5.50	**5.00**	R3,4	
9057146								5.00	5.00	**5.00**	R8	
9057165	7.00	6.00	6.00	5.00	6.00	0.00	0.00	0.00	6.00	**5.00**	R4	

Rating: 1= Excellent, 9=Poor **0=Dead Plant**

Study 29I136J Assembly and Evaluation of *Prunus Americana*, Wild Plum — **Table #8**

Fruit Production

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								Dead		**0.00**	
9068515	4.00	6.00	6.00	0.00	5.00	1.00	6.00	1.00	3.63	**1.00**	R6,8
9057088	0.00	6.00	5.00	0.00	0.00	1.00	7.00	1.00	2.50	**1.00**	R6,8
9068545	2.00	2.00	2.00	4.00	1.00	Dead	0.00	-	1.83	**1.00**	R5
9057165	2.00	7.00	7.00	1.00	7.00	-	-	-	4.80	**1.00**	R4
9068516	2.00	7.00	Dead	5.00	6.00	Dead	0.00	-	4.00	**2.00**	R1
9068580	6.00	5.00	4.00	2.00	7.00	2.00	4.00	-	4.29	**2.00**	R4,6
9068546	3.00	2.00	2.00	3.00	4.00	5.00	2.00	4.00	3.13	**2.00**	R2,3,7
434240	0.00	0.00	0.00	8.00	0.00	Dead	0.00	-	8.00	**3.00**	R4
9068485	4.00	4.00	5.00	4.00	4.00	Dead	0.00	-	3.50	**4.00**	R1,2,4,5
9062309	4.00	Dead	5.00	4.00	6.00	4.00	Dead	-	4.60	**4.00**	R1,4,6
9068480	0.00	6.00	6.00	6.00	5.00	Dead	Dead	7.00	5.00	**5.00**	R5
9057096	3.00	7.00	0.00	Dead	Dead	7.00	Dead	-	4.25	**5.00**	R1
9068543	5.00	5.00	0.00	5.00	Dead	Dead	Dead	-	3.75	**5.00**	R1,2,4
9068478	0.00	6.00	0.00	6.00	Dead	Dead	0.00	-	2.40	**6.00**	R2,4
9062308	0.00	0.00	5.00	6.00	Dead	Dead	0.00	Dead	2.20	**6.00**	R3
9068514	6.00	7.00	6.00	7.00	Dead	7.00	7.00	-	6.67	**6.00**	R1, 3
9057146								8.00	8.00	**8.00**	R8

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								Dead	Dead	**0.00**	
9068515	5.00	7.00	0.00	7.00	1.00	6.00	1.00	7.00	4.86	**1.00**	R5,7
9057088	0.00	6.00	6.00	0.00	0.00	1.00	Dead	1.00	3.50	**1.00**	R6,8
9068545	1.00	1.00	1.00	4.00	1.00	Dead	Dead	-	1.60	**1.00**	R1,2,3,5
9068516	1.00	6.00	Dead	4.00	6.00	Dead	0.00	-	4.25	**1.00**	R1
9068580	5.00	4.00	4.00	1.00	6.00	1.00	4.00	-	3.57	**1.00**	R4,6
9068546	3.00	1.00	1.00	3.00	4.00	4.00	1.00	Dead	2.43	**1.00**	R2,3,7
9057165	1.00	6.00	7.00	1.00	6.00	-	-	-	4.20	**1.00**	R1,4
9057096	2.00	7.00	0.00	Dead	Dead	Dead	Dead	-	4.50	**2.00**	R1
9068485	4.00	5.00	5.00	3.00	4.00	Dead	0.00	-	4.20	**3.00**	R4
9062309	3.00	Dead	5.00	5.00	6.00	3.00	Dead	-	4.40	**3.00**	R1,6
9068543	4.00	6.00	0.00	6.00	Dead	Dead	Dead	-	5.33	**4.00**	R1
9068514	6.00	7.00	6.00	6.00	Dead	4.00	4.00	-	5.50	**4.00**	R6,7
9062308	0.00	0.00	6.00	7.00	Dead	Dead	0.00	Dead	6.50	**6.00**	R3
9068480	0.00	7.00	7.00	7.00	7.00	Dead	Dead	7.00	7.00	**7.00**	R2,3,4,5,8
9068478	0.00	7.00	0.00	7.00	0.00	0.00	0.00	-	7.00	**7.00**	R2,4
9057146								7.00	7.00	**7.00**	R8
434240	0.00	0.00	0.00	7.00	0.00	Dead	0.00	-	7.00	**7.00**	R4

1999

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								0.00	0.00	**0.00**	
9068480	7.00	0.00	4.00	0.00	2.00	0.00	0.00	7.00	5.00	**1.00**	R5
9068515	1.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	4.00	**1.00**	R1
9062308	7.00	0.00	5.00	1.00	0.00	0.00	7.00	0.00	5.00	**1.00**	R4
9068485	7.00	1.00	7.00	1.00	4.00	0.00	0.00	0.00	4.00	**1.00**	R2,4
9057088	0.00	7.00	0.00	7.00	1.00	1.00	0.00	7.00	4.60	**1.00**	R5,6
9068545	1.00	1.00	0.00	1.00	1.00	1.00	7.00	0.00	2.00	**1.00**	R1,2,4,5,6
9068543	7.00	1.00	0.00	7.00	0.00	0.00	0.00	0.00	5.00	**1.00**	R2
9068516	5.00	7.00	0.00	1.00	7.00	0.00	0.00	0.00	5.00	**1.00**	R4
9068580	7.00	0.00	0.00	1.00	6.00	1.00	6.00	0.00	4.20	**1.00**	R4,6
9057146								1.00	1.00	**1.00**	R8
9068546	4.00	0.00	1.00	2.00	4.00	1.00	1.00	0.00	2.17	**1.00**	R3,4,6,7
9057165	6.00	4.00	0.00	1.00	0.00	0.00	0.00	0.00	3.67	**1.00**	R4
434240	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	2.00	**2.00**	R4
9062309	6.00	0.00	7.00	2.00	7.00	6.00	0.00	0.00	5.60	**2.00**	R4
9068514	6.00	7.00	7.00	4.00	0.00	5.00	0.00	0.00	5.80	**5.00**	R4,6
9057096	7.00	7.00	7.00	0.00	0.00	0.00	0.00	0.00	7.00	**7.00**	R1,2,3
9068478	0.00	7.00	0.00	0.00	0.00	0.00	9.00	0.00	8.00	**7.00**	R2

Rating: 1=Exc, 9=Poor, 0=No production or dead plant.

Study 29I136J Assembly and Evaluation of *Prunus Americana* , Wild Plum **Table #9**

Insect/Disease Resistance

				1999								
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Ave.**	**Best**	**Location**	
ND-286	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**		
9068480	4.00	4.50	4.50	1.00	4.50	0.00	0.00	1.50	3.33	**1.00**	R4, 8	
9068478	4.00	2.50	1.50	0.00	1.00	1.00	1.00	0.00	1.69	**1.00**	R3,5,6,7	
9068515	2.50	3.50	5.50	1.00	4.50	3.00	3.00	0.00	3.29	**1.00**	R4	
9057088	1.50	2.00	1.50	1.00	1.50	1.00	1.00	1.00	1.31	**1.00**	R1,3,4,5,6,7,8	
9068545	2.00	1.00	0.00	2.00	1.50	0.00	0.00	0.00	1.63	**1.00**	R1,2,5	
9068580	2.50	1.00	0.00	1.00	3.00	1.00	1.50	1.50	1.64	**1.00**	R2,4,6,7,8	
9068546	6.00	1.00	1.00	1.00	1.00	1.00	1.00	1.50	1.69	**1.00**	R2,7,8	
9057096	5.50	3.00	1.50	0.00	0.00	0.00	0.00	0.00	3.33	**1.50**	R3	
9062308	6.00	0.00	3.50	1.50	0.00	0.00	2.00	1.50	2.90	**1.50**	R4,7,8	
9068485	5.50	5.50	4.00	1.50	1.50	0.00	3.00	0.00	3.50	**1.50**	R4,5	
9068516	2.50	4.00	0.00	2.50	3.50	0.00	2.00	0.50	2.73	**1.50**	R4,7,8	
9057146	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.50	**1.50**	R8	
9062309	3.50	0.00	3.50	1.50	3.50	2.50	0.00	0.00	2.90	**1.50**	R4,6,7,8	
9068543	2.50	4.50	2.00	2.50	0.00	0.00	0.00	0.00	2.88	**2.00**	R1,3,4	
9068514	3.00	3.00	2.00	2.00	0.00	2.50	2.00	0.00	2.42	**2.00**	R3,4,6,7	
9057165	6.00	4.50	2.50	3.00	3.00	0.00	0.00	0.00	3.80	**2.00**	R3,5	
434240	0.00	5.50	5.00	0.00	0.00	0.00	0.00	0.00	5.25	**3.00**	R2,5	

Disease Resistance Rating:
1-Excellent resistance
9-Poor resistance
0=Dead plant

Study: 29A1370

Study Title: Wetland/Riparian Propagation, Establishment, and Demonstration

Study Leader: Cordsiemon, R.; J. Kaiser

Introduction:

There is a growing interest in wetland restoration throughout the conservation community. Government programs, such as USDA-Wetland Reserve Program, the USFWS Partners for Wildlife, Wetland Restoration Program, the Missouri Department of Conservation (MDC) Private Lands Wetland Program, and private programs sponsored by Ducks Unlimited and Waterfowl USA have all focused on the need for a suitable supply of plants in wetland restoration efforts.

The increasing use of wetlands as filters in agricultural waste management and the control of non-point source pollution also indicate the need for a greater knowledge base for proper plant selection.

Understanding wetland ecosystems will require improved and increased quality of information on wetland plants and ecosystems. Innovative approaches to field management and additional training of personnel in wetland conservation and management will also be needed. Intra- and interagency coordination and information exchange among state and federal agencies will help standardize monitoring and management strategies.

Problem:

Information is largely unavailable related to the propagation, adaptation, and potential use of many of the wetland species found in the Midwest. Wetland plants of interest often have multi-use potential providing wildlife benefits, shoreline stabilization, water quality improvement, and/or aesthetic benefits. They are also needed to fulfill conservation needs resulting from increased demands in wetland development and water treatment. The ability to document this information or to observe the interaction of selected species is restricted by the availability of plants and plant communities especially under controlled conditions. Proper use of species to address conservation problems is limited by specific knowledge and technology for using these plants.

Objectives:

The objectives of the Elsberry PMC wetland study are to:

1. Provide a demonstration of various plant materials for wetland conservation and aesthetic values.
2. Provide an area for interagency research on the biology of selected wetland plants.

Discussion:

1994 – 1999

A large wetland was constructed in Field #4 on the Plant Materials Center in July 1994. Selected plant materials were planted with the intent of evaluating these plants for flood tolerance. The PMC has been working with a flood tolerant switchgrass since 1991. As a result, it was placed

in this wetland for further testing along with six accessions of eastern gamagrass which were found growing in wet conditions: accessions 9078842, 9078844 and 9078843 were collected in Atchison County, Missouri, 9078845 collected in Holt County, Missouri, 9078840 collected in Chariton County, Missouri and 9078846 was collected in Clinton County, Missouri. Local collections of bermudagrass and swamp milkweed were planted in the spring of 1998. Two collections of prairie cordgrass (Cuivre Island and Lost Creek) were also planted in this wetland. The switchgrass, eastern gamagrass and the prairie cordgrass were planted in 1997. All plants in this wetland were given time to establish prior to the beginning of the flooding operation which took place in October 1999. The wetland was flooded to a depth of 40 inches. This water remained in the wetland until early spring of 2000. Once the water is drained out of the wetland and enough time elapses for plant regrowth, evaluations on survival will take place.

The following Tables #1, #2, #3 and #4 reflect the plants' performance.

2000

Water was drained out of the wetland in segments because the drainpipe was not functioning properly. This operation started on March 21, 2000 and ended on March 30, 2000. The prairie cordgrass were the first plants to begin green up (March 30) followed by the bermudagrass planting. 'Cave-In-Rock' switchgrass sod (23 plugs) was planted on the west side of the flood tolerant switchgrass (sod) for comparison with other plant species in the wetland. On June 1, 2000, flood tolerant switchgrass was seeded in a plot 50 feet long and three feet wide. On August 9 an evaluation of the seeded flood tolerant switchgrass revealed no germination had taken place in the plot seeded on June 1. Poor germination has been experienced with this selection since 1998. There was no flooding of the wetland this fall to allow the Cave-In-Rock to get fully established. The following is a listing of percent survival of plants included in this study. The best performing plants in this study are Cuivre Island and Lost Creek collection of *Spartina pectinata*, *Tripsacum dactyloides* accessions 9078843, 9078845, and 'Pete'; and *Cynodon dactylon.* The following tables reflect the different plants' performance before and after a flooding event.

2001

The objective of the flooding was to parallel flood events that were occurring on the Mississippi River during that same time event. Began pumping turbid water into wetland on April 24, 2001 to flood the wetland to a depth of approximately 32 inches of water, which was achieved by April 27, 2001. The water was allowed to remain in the wetland for seven days. Water was then allowed to drain out of the wetland starting on April 30, 2001. All the water was drained out of the wetland by May 1, 2001. On May 8 evaluations were conducted to document re-growth after flooding. Again on June 11 a quick flooding scenario was conducted in the wetland to simulate a flash flooding event, similar to what was occurring on the Mississippi River. Thirty-four inches of turbid water was pumped into the wetland. The PMC began draining the water out of the wetland on June 15. The process of draining the water out of the wetland was completed on June 19.

The following is a listing of plant vigor ratings for each accession/variety included in this study. Plant evaluations for vigor were taken on June 21 and 26, 2001.

2002-2003

Plant performance evaluations were performed on April 24, 2002 and May 27, 2003. The wetland was not burned in 2002; however it was burned in 2003 and in previous years to remove accumulated vegetation. Flooding of the wetland began on April 29, 2002 and June 10, 2003. A total of 45 inches of water was pumped into the wetland (2002) and 42 inches in 2003 before the de-watering process began. All water was drained out of the wetland by May 17, 2002 and July 7, 2003. The plants were under water for 17 days in 2002 and 22 days in 2003. Once all the water was drained out of the wetland, follow-up evaluations took place on June 2002 and August 2003. The flood event in 2003 was to inundate the site for more than 20 days to test the switchgrass, *Panicum virgatum.* Table #4 reflects the plant performances during 2003 before and after the flood event. Previous years' plant performances can be found on Tables #1 - #3.

2003-2004

Switchgrass, *Panicum virgatum,* accessions 9062193, 9062235, 9083170 were compared to Cave-In-Rock. The percent was 76%, 77%, and 78% survival compared to Cave-In-Rock at 65%. The composite 9083170 Flood Tolerant switchgrass is the next generation of the three accessions 9062193, 9062235, and 9083170 which did perform from seed that was planted in 2000. Vigor was slow with only 20% stand the first growing season. Flood events occurred in 2001, 2002, and 2003 with the stand increasing in density to 85% by spring of 2004.

Prairie cordgrass, *Spartina pectina,* accessions 9083166 Cuivre Island and 9083167 Lost Creek planted on the 3'X 3' grid was a solid block in two growing seasons. The cordgrass planted on the 10'x 10' grid was a solid block in six growing seasons. The vegetative spread averaged 1.5 feet during a growing season. The flooding events did enhance the plants' ability to flourish and produce seed that spread seedlings in the wetland cell.

Virginia wildrye, *Elymus virginicus,* accession 9083169 Cuivre River was vegetatively transplanted in 2001. In the flood event of early spring 2002 there was 100% survival of the plants; however the flood event of 2003 late spring to early summer did result in a decline in the plants with 47% survival by spring 2004. Many seedlings were observed that came from seed in the soil that developed fall 2003 and spring 2004.

2004

The wetland cell was not burned and there was no flooding in 2004. A new block was added to the wetland for evaluation. The block contained 16 plants of low growing switchgrass, *Panicum virgatum*, erect big bluestem, and short growing big bluestem, *Andropogon gerardii*. 'Cave-In-Rock' switchgrass was added to the block as a check. The plants were transplanted from plugs grown in the greenhouse in order to get good established plants. They were evaluated for survival in October and only the low growing and 'Cave-in-Rock' switchgrasses were needed; three and four plants respectfully. The block will be flooded in late April to June of 2005 and the entire wetland planting will be evaluated.

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC							Table #1
Plugs Planted 5-2-97 (Eastern Gamagrass)							
2002 Data	**Began Flooding on 4/24/02**						
2003 Data	**Began Flooding on 6-10-03**						
	Total #	**Active**	**Weed**	**Disease/**	**Developed**		
	Planted	**Growing**	**Comp.**	**Insect**	**Seed Head**	**Vigor**	**Ave. Ht.**
Eastern Gamagrass 9078840 Chariton, Missouri. 5' spacing, planted 5/2/97.							
						25 plants planted	
Dates Evaluated							
7/9/1998	20	20	severe	moderate	yes	good	2'5"
9/29/1999	20	20	moderate	light rust	yes	good/exc	3'5"
5/11/2000	19	17	moderate	moderate	none	poor	6"
9/19/2000	13	13	mod/sev	light rust	none	good	2'5"
6/26/2001	20	20	light	none	yes	good	3'4"
4/24/02 (BFE)	18	18	light	none	none	good	8"
6/17/02 (AFE)	15	15	light	none	yes	exc	2'
5/27/03 (BFE)	**15**	**15**	**light**	**none**	**yes**	**exc.**	**2'**
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 75%							
Eastern Gamagrass 9078844 Atchison, Missouri. 7' spacing, planted 5/2/97.							
						18 plants planted	
Dates Evaluated							
7/9/1998	12	12	severe	moderate rust	yes	poor	2'5"
9/29/1999	12	12	moderate	moderate rust	yes	fair	2'5"
5/11/2000	12	10	moderate	moderate	none	poor	6"
9/19/2000	12	13	severe	light rust	Yes	fair	2'
6/26/2001	12	9	light	light rust	yes	fair	2'10"
4/24/02 (BFE)	9	9	light	none	none	fair	7"
6/17/02 (AFE)	9	9	light	none	none	exc.	2'
5/27/03 (BFE)	*						
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 75%							
Eastern Gamagrass 9078842 Atchison, Missouri. 15' spacing, planted 5/2/97.							
						9 plants planted	
Dates Evaluated							
7/9/1998	5	5	severe	none	yes	fair	2'
9/29/1999	5	5	severe	none	yes	fair	2'5"
5/11/2000	5	3		none	0	poor	6"
9/19/2000	5	4	severe	none	none	fair	1'8"
6/26/2001	3	3	light	none	yes	fair	2'2"
4/24/02 (BFE)	4	4	light	none	none	fair	7"
6/17/02 (AFE)	4	4	light	none	none	exc.	2'
5/27/03 (BFE)	*						
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 44%							
Rating for Vigor: 1=Excellent; 9=Poor							
Rating for Weed Competition and Dis/Insect: 1=Excellent; 9=Severe							
*** = Cannot determine rows of plants**							

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #1-continued	
	Total #	Active	Weed	Disease/	Developed		
	Planted	Growing	Comp.	Insect	Seed Head	Vigor	Ave. Ht.
Eastern Gamagrass 9078846 Clinton, Missouri. 8' spacing, total planted 5/2/97.							
						16 plants planted	
Dates Evaluated							
7/9/1998	11	11	severe	none	yes	good	2'
9/29/1999	11	11	moderate	none	yes	good	2'5"
5/11/2000	8	8	moderate	none	none	poor	7"
9/19/2000	10	10	severe	light rust	none	fair	2'
6/26/2001	8	8	light	light rust	yes	good	3'2"
4/24/02 (BFE)	10	10	light	none	none	good	8"
6/17/02 (AFE)	10	10	light	none	yes	exc.	2'6"
5/27/03 (BFE)	*						
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 63%							
Eastern Gamagrass 9078843 Atchison, Missouri. 15' spacing, planted 5/2/97.							
						9 plants planted	
Dates Evaluated							
7/9/1998	13	13	severe	none	yes	poor	2'5"
9/29/1999	13	13	moderate	none	yes	moderate	3'
5/11/2000	5	5		none	none	poor	7"
9/19/2000	10	10	severe	slight rust	none	fair	2'
6/26/2001	4	4	light	light	none	fair	2'6"
4/24/02 (BFE)	4	4	light	light	none	fair	8"
6/17/02 (AFE)	4	4	light	light	none	good	2'
5/27/03 (BFE)	*						
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 44%							
Eastern Gamagrass 9078845 Holt, Missouri. 8' spacing, planted 5/2/97.							
						16 plants planted	
Dates Evaluated							
7/9/1998	12	12	severe	none	yes	good	3'5"
9/29/1999	12	12	severe	none	yes	good	3'
5/22/2000	12	9	severe	none	none		8"
9/19/2000	16	16	severe	slight rust	yes	good	2'5"
6/26/2001	10	10	light	none	yes	good	3'2"
4/24/02 (BFE)	10	10	light	none	none	good	8"
6/17/02 (AFE)	10	10	light	none	none	exc.	2'6"
5/27/03 (BFE)	*						
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 63%							
Rating for Vigor: 1=Excellent; 9=Poor							
Rating for Weed Competition and Dis/Insect: 1=Excellent; 9=Severe							
BFE - Before Flooding Event							
AFE - After Flooding Event							
*** = Cannot determine rows of plants**							

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #1-continued	
Eastern Gamagrass 9078845 Holt, Missouri 8' spacing, planted 5/2/97							
	Total	**Active**	**Weed**	**Disease/**	**Developed**		
	Plant #	**Growing**	**Comp.**	**Insect**	**Seed Head**	**Vigor**	**Ave. Ht.**
Pete Eastern Gamagrass 5' spacing, 25 total planted 5/2/97.							
						25 plants planted	
Dates Evaluated							
7/9/1998	21	21	severe	light	21/21	good	3' 5"
9/29/1999	21	21	severe	light	21/21	good	3'
5/11/2000	21	20		light		fair	10"
9/19/2000	21	21	severe	light rust	17/21	exc.	3'
6/26/2001	19	19	light	none	none	exc.	4'4"
4/24/02 (BFE)	19	19	light	none	none	exc.	8"
6/17/02 (AFE)	14	14	light	none	yes	exc.	2'
5/27/03 (BFE)	*						
8/5/03 (AFE)	*						
Percent surviving as of 6/17/02 was 56%							
BFE - Before Flooding Event							
AFE - After Flooding Event							
Rating for Vigor: 1=Excellent; 9=Poor							
Rating for Weed Competition and Dis/Insect: 1=Excellent; 9=Severe							
*** = Cannot determine rows of plants**							
.							

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC							Table #2		
Plugs Planted 6-24-97 (Flood Tolerant Switchgrass)									
2002 Data: Flood Event from 4/29/02 to 5/17/02									
2003 Data: Flooding began 6/10/03									
	% Cover/	Active	Weed	Disease/	Developed				
	Plant #	Growing	Comp.	Insect	Seed Head	Vigor	Ave. Ht.		
Switchgrass 9062213 3' spacing, 41 total planted (plugs) 6/24/97.									
Dates Evaluated									
7/9/1998		35 plants	moderate	none	all plants	poor/fair	2'		
9/29/1999		35 plants	moderate	none	all plants	fair	2' 5"		
4/26/2000		35 plants	moderate	none	none	exc.	5" regrowth		
9/19/2000	85% row	35 plants	moderate	none	all plants	exc.	4'5"		
6/26/2001		33 plants	light	none	none	exc.	3' 4"		
4/24/02 (BFE)		31 plants	light	none	none	good	6"		
6/17/02 (AFE)		31plants	light	none	none	exc.	2' 6"		
5/27/03 (BFE)		**32 plants**	**light**	**none**	**none**	**exc.**	**1' 7"**		
8/5/03 (AFE		**32 plants**	**light**	**none**	**none**	**good**	**2' 5"**		
Percent surviving as of 6/17/02 was 76%									
Switchgrass 9062235 4' spacing, 31 total planted (plugs) 6/24/97.									
Dates Evaluated									
7/9/1998		22 plants	moderate	none	all plants	poor/fair	5' 5"		
9/29/1999		22 plants	moderate	none	all plants	fair	5'		
4/26/2000		26 plants	moderate	none	none	exc.	6' 5"		
9/19/2000		26 plants	moderate	none	All plants	exc.	4' 5"		
6/26/2001		24 plants	light	none	none	exc.	2' 9"		
4/24/02 (BFE)		20 plants	light	none	none	good	6"		
6/17/02 (AFE)		20 plants	light	none	none	good	2'		
5/27/03 (BFE)		**23 plants**	**light**	**none**	**none**	**exc.**	**1' 8"**		
8/5/03 (AFE)		**23 plants**	**light**	**none**	**none**	**good**	**2' 9"**		
Percent surviving as of 6/17/02 was 65%									
Switchgrass 9062193 5' spacing; 25 total planted (plugs) 6/24/97.									
Dates Evaluated									
7/9/1998		17 plants	moderate	none	all plants	fair	3' 5"		
9/29/1999		17 plants	moderate	none	all plants	good	4' 5"		
4/26/2000		21 plants	moderate	none	all plants	exc.	6' 5"		
9/19/2000		21 plants	moderate	none	all plants	exc.	5'		
6/26/2001		20 plants	light	none	none	exc.	3' 6"		
4/24/02 (BFE)		16 plants	light	none	none	good	5"		
6/17/02 (AFE)		14 plants	light	none	none	exc.	2' 6"		
5/27/03 (BFE)		**19 plants**	**light**	**none**	**none**	**exc.**	**1' 5"**		
8/5/03 (AFE)		**19 plants**	**light**	**none**	**none**	**good**	**2' 8"**		
Percent surviving as of 6/17/02 was 56%									
BFE - Before Flooding Event									
AFE - After Flooding Event									
* = Cannot determine rows of plants									

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #2 - continued			
	% Cover/	Active	Weed	Disease/	Developed				
	Plant #	Growing	Comp.	Insect	Seed Head	Vigor	Ave. Ht.		
Evaluation Dates:		4/24/02 & 6/17/02							
Cave-In-Rock Switchgrass 23 plants planted.									
Dates Evaluation									
4/18/2000	23	23	severe	none	none	good	5"		
9/19/2000	9	growing	severe	none	yes	poor	2'		
		weak							
6/21/2001	21	21	light	light	none	good	2' 6"		
4/24/02 (BFE)	10	10	light	none	none	good	8"		
6/17/02 (AFE)	12	12	light	light	none	good	2' 6"		
5/27/03 (BFE)	**16**	**16**	**light**	**light**	**none**	**good**	**1' 5"**		
8/5/03 (AFE)	**16**	**16**	**light**	**light**	**none**	**fair**	**2' 6"**		
Percent surviving as of 6/17/02 was 52%									
Flood Tolerant Switchgrass, seeded 50' row plus 3' wide.									
Dates Evaluated									
Seeded 6/1/00 50' x 40" plot - .0038 ac. Rate 6# PLS/ac.									
9/19/2000	15%-	fair	moderate	none	6/5 5%	good	8"		
	20% of								
	50' row								
6/21/2001	22	22	light	none	none	exc.	3'		
4/24/02 (BFE)	16	16	light	none	none	good	5"		
6/17/02 (AFE)	33	33	light	none	none	good	1' 6"		
5/27/03 (BFE)	**45%**	**45%**	**light**	**none**	**none**	**good**	**1' 6"**		
8/5/03 (AFE)	**45%**	**45%**	**light**	**none**	**none**	**good**	**2' 5"**		
Flood tolerant switchgrass plugs block, 63 plants planted 5/25/99.									
Dates Evaluated									
4/26/2000	92%	58 plants	none	none	6/5 100%	exc.	6' 5"		
9/19/2000	95%	95%	none	none	6/5 100%	exc.	4' 5"		
6/21/2001	80%	66 plants	light	none	none	exc.	3'		
4/24/02 (BFE)	85%	66 plants	light	none	none	good	6"		
6/17/02 (AFE)	85%	66 plants	light	none	none	good	2'		
5/27/03 (BFE)	**85%**	**66 plants**	**light**	**none**	**none**	**good**	**1' 3"**		
8/5/03 (AFE)	**85%**	**66 plants**	**light**	**none**	**none**	**fair**	**2' 2"**		
Bermudagrass block plugs, planted 5/25/99.									
Dates Evaluated									
9/28/1999	35%	100%	light	none	50%	exc.	3"		
4/26/2000		100%	light	none	none	exc.	3-5"		
9/19/2000	100%	100%	light	none	100%	exc.	9"		
6/21/2001	100%	100%	none	none	none	exc.	6"		
4/24/02 (BFE)	100%	50%	none	none	none	good	2"		
6/17/02 (AFE)	90%	90%	none	none	none	good	3"		
5/27/03 (BFE)	**100%**	**100%**	**none**	**none**	**none**	**fair**	**1"**		
8/5/03 (AFE)	**100%**	**100%**	**none**	**none**	**none**	**fair**	**1"**		
BFE = Before Flood Event									
AFE = After Flood Event									

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #2 - continued			
	% Cover/	Active	Weed	Disease/	Developed				
	Plant #	Growing	Comp.	Insect	Seed Head	Vigor	Ave. Ht.		
Swamp milkweed block 8 rows plugs, 1' center planted 5/25/99.									
Dates Evaluated									
9/28/99	8 plants		severe foxtail	none	none	poor	9"		
5/11/2000	46 plants		moderate	none	none	poor	8"		
9/19/2000	30%	30%	moderate	none	30%	fair	1' 2"		
6/26/2001	54	54	light	none	none	good	2' 2"		
4/24/02 (BFE)	No plants observed; heavy mulch cover of weeds								
6/17/02 (AFE)	41	41	light	none	none	good	1'		
5/27/03 (BFE)	**50**	**50**	**light**	**none**	**none**	**good**	**1' 3"**		
8/5/03 (AFE)	**50**	**50**	**light**	**none**	**none**	**fair**	**1' 7"**		
Cardinal flower, planted 8 plants on 4/17/01 and on 5/1/01									
4/24/2001	BFE		8	none	8	good	2"		
5/8/2001	AFE		8	none	8	good	3"		
6/11/2001	BFE		16	none	16	good	10"		
6/26/2001		7	moderate	none	none	poor	10"		
4/24/02 (BFE)		19	none	none	none	exc.	1' 1"		
6/17/02 (AFE)		19	none	none	none	good	2'		
5/27/03 (BFE)		**11**	**light**	**none**	**none**	**good**	**7"**		
8/5/03 (AFE)		**8**	**light**	**none**	**none**	**poor**	**1' 6"**		
BFE - Before Flooding Event									
AFE - After Flooding Event									

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC							**Table #3**		
Prairie Cordgrass									
2002 Data: Flood Event from 4/29/02 to 5/17/02									
2003 Data: Flooding Began 6/10/03									
		Active					**Ave. Ht.**	**Average**	
	Total #	**Growing**	**Weed**	**Disease/**	**Developed**		**Seed**	**Forage**	
	Planted	**Spreading**	**Comp.**	**Insect**	**Seed Head**	**Vigor**	**Head**	**Height**	
							10' x 10'		
Prairie Cordgrass Collection, planted 9/29/97							3 | 2 | 1		
East →							6 | 5 | 4		
							9 | 8 | 7		
7/9/1998	9	6" average	severe	none	NA	exc.	-	-	
8/1/1999	9	30" average	moderate	none	9/9	good	-	-	
9/19/2000	9	4'.5" ave.	none	none	9/9	exc.	6'.5"	5'.0 forage	
6/21/2001	9	6'	light	none	none	exc.	6'	45"	
4/24/02 (BFE)	9	7.5'	light	none	none	exc.	none	17"	
6/17/02 (AFE)	9	8'	light	none	none	exc.	none	36"	
5/27/03 (BFE)	**9**	**8.5'**	**light**	**none**	**none**	**exc.**	**none**	**30"**	
8/5/03 (AFE)	**9**	**8.5'**	**light**	**none**	**none**	**exc.**	**6.5'**	**40"**	
Percent surviving as of 6/17/02 was 100%									
Cuivre Island Prairie Cordgrass Collection, planted 5/15/98						↑	3' x 3'		
					North		4 |3 | 2| 1		
							8 | 7| 6| 5		
7/9/1998	8	5.'5"	severe	none	6 plants	good/exc.	4'.0"	4'.0"	
5/25/1999	8	1'.5" each	moderate	none	none	exc.	none		
		direction							
Lost Creek Prairie Cordgrass Collection, planted 5/15/98							3'x3'		
							12|11|10|9		
							16|15|14|13		
7/9/1998	8	6"	severe	none	4 plants	good/exc.	4'.0"	4'.0"	
5/25/1999	8	1'.5" each	moderate	none	none	exc.	none		
		direction							
9/19/2000									
Total block for both collections			none	none	35%	exc.	6' 0"	5' 0"	
								More lodging Cuivre	
								Island collection	
9/19/2000									
14' x 13'5" total spread of blocks			none	none	35%	exc.	6'.0"	More lodging Cuivre	
								Island collection	
9/19/2000									
3' x 3' block is filled in total									
prairie cordgrass			none	none	35%	exc.	6'.0"	More lodging Cuivre	
								Island collection	
6/26/2001		solid	none	none	none	exc.	6',0"	50"	
4/24/02 (BFE)		80%	none	none	none	exc,	15"		
6/17/02 (AFE)		solid block	none	none	none	exc.	48"		
5/27/03 (BFE)		**solid block**	**none**	**none**	**none**	**exc.**	**none**	**29"**	
8/5/03 (AFE)		**solid block**	**none**	**none**	**none**	**exc.**	**6.5'**	**42"**	
BFE - Before Flooding Event									
AFE - After Flooding Event									

Study: 29A1370 - Wetland/Riparian Propagation, Establishment, and Demonstration

Table #4

Genus/Species	Common Name	Accession No.	Vigor Rating BFE	Vigor Rating AFE	Date of Rating BFE	Date of Rating AFE
Tripsacum dactyloides	Eastern gamagrass	9098840	*	*	5/27/03	8/5/03
Tripsacum dactyloides	Eastern gamagrass	9078844	*	*	5/27/03	8/5/03
Tripsacum dactyloides	Eastern gamagrass	9078842	*	*	5/27/03	8/5/03
Tripsacum dactyloides	Eastern gamagrass	9078846	*	*	5/27/03	8/5/03
Tripsacum dactyloides	Eastern gamagrass	9078843	*	*	5/27/03	8/5/03
Tripsacum dactyloides	Eastern gamagrass	9078845	*	*	5/27/03	8/5/03
Tripsacum dactyloides	Eastern gamagrass	Pete	*	*	5/27/03	8/5/03
Panicum virgatum	Switchgrass	9062193	Exc.	Good	5/27/03	8/5/03
Panicum virgatum	Switchgrass	9062235	Exc.	Good	5/27/03	8/5/03
Panicum virgatum	Switchgrass	9062213	Exc.	Good	5/27/03	8/5/03
Panicum virgatum	Switchgrass	C-I-R	Good	Fair	5/27/03	8/5/03
Panicum virgatum	Switchgrass Direct Seeded 2001	9083170 Flood-Tolerant	Exc.	Good	5/27/03	8/5/03
Spartina pectinata	Prairie cordgrass	Cuivre Island	Exc.	Exc.	5/27/03	7/5/03
Spartina pectinata	Prairie cordgrass	Lost Creek	Exc.	Exc.	5/27/03	7/5/03
Cynondon dactylon	Bermuda grass	Elsberry	Fair	Fair	5/27/03	7/5/03
Asclepias incarnata	Swamp milkweed	Iowa	Good	Fair	5/27/03	7/5/03
Lobelia cardinalis	Cardinal flower	Forrest Keeling	Good	Poor		7/5/03
Carex scoparia	Broomsedge	MDC	Died			7/5/03
Elymus virginicus	Virginia Wildrye	Cuivre River	Fair	Top Growth Died	5/27/03	7/5/03
Spartina pectinata	Prairie cordgrass Seedlings		Exc.	Exc.	5/27/03	7/5/03
Panicum virgatum	Plugs of switchgrass	9062213 9062235 9062193	Good	Fair	5/27/03	7/5/03

BFE = Before Flood Event **AFE = After Flood Event**

***** = **Cannot determine rows from plants/seed that germinated**

Study: 29I141G

Study Title: Assembly and Evaluation of Little Bluestem, *Schizachyrium scoparium*, Nichx.

Study Leader: Bruckerhoff, S. B.

Introduction:

Little bluestem is a native warm season prairie grass. It was a major component making up as much as 50 percent of the tall grass prairie that was native to much of the Elsberry PMC service area. It can also be a major component of glade areas and mixed grass prairies. Little bluestem can be found in prairies, open woods, dry hills, and fields, from Quebec and Maine to Alberta and Idaho, south to Florida and Arizona.

Problem:

There are no current varieties of little bluestem on the market that have an origin within the three-state service area. Available varieties do not always perform as well as expected. There is a need for an adapted and improved variety of little bluestem for pasture and range seedings, surface mine reclamation, critical area planting, wildlife plantings, recreational area development and other conservation uses in Missouri, Iowa, and Illinois.

Objective:

The objective is to assemble, evaluate, develop and cooperatively release an adapted variety and/or varieties of tested class of little bluestem for conservation use in Missouri, Iowa, and Illinois.

Procedure:

Vegetative material from native ecotypes was collected throughout the states of Missouri, Iowa, and Illinois. A minimum of three collections per Major Land Resource Area/state was requested. (Approximately 60 collections total.) Field selection of collected plant material was based on forage quantity and plant vigor.

Each collection (accession) was one individual plant. A collection was made up of more than one plant if they were in the same immediate area (within five feet) and appeared to be clones of each other.

Discussion:

1996

The study was approved in July 1996. Collection instructions were sent out and plants were dug in October and November. The samples were picked up shortly after collection and stored in the packing shed at the Plant Materials Center. At this time we received 113 collections from the three-state area. There are a few additional collections expected.

1997 - 1998

The collections were vegetatively propagated in containers in January and grown out in the greenhouse until April. These plants were then transplanted in Field #1 on the PMC from April 22-24, 1997 in a randomized complete block with four replications (see Table #2 for map of plot layout). Thirteen additional collections were made in the summer of 1997 and planted into the replications August 14-15, 1997. This brought the total accessions represented to 130: 79 from Missouri, 20 from Illinois, 27 from Iowa, and four standards of comparison. A list of collectors can be seen in Table #1. First year evaluation consisted of survival. The second year evaluations consisted of survival, height, late dormancy, and form.

1999

The assembly was evaluated in 1999 for forage amount and vigor (Tables #3 and #4). The higher rated plants will have forage quality samples taken in 2000.

2000

The assembly was evaluated for mid season forage production, quality and vigor on June 27, 2000. The entire planting was then clipped to a height of six inches on June 28, 2000. The assembly was evaluated for amount of regrowth and vigor on July 25, 2000 and forage quality samples were taken on August 1, 2000. The assembly was clipped the second time on August 2, 2000 and evaluations for regrowth amount and vigor were taken October 24, 2000.

2001

Evaluations from previous years were correlated and the best plants from the top 10-20 percent of the total accessions were propagated in the greenhouse from clonal material from each individual plant. Plants were then isolated in two locations. A northern region was established containing plants from Iowa, northern Missouri, and northern Illinois. A southern region was established containing plants from southern Missouri and central and southern Illinois. These isolation blocks will receive additional evaluation to remove unwanted plants and the remaining plants will be allowed to produce seed. Plants from this seed will be selected for the next evaluation nursery. After further evaluation, plants from the nursery planted in 2003 will be used as a breeder's block for improved selections. Plants selected for each region can be found in Table #5.

2002

The south region crossing block did very well in 2002. Very few plants were rouged out and seed was harvested from each accession in the block. This seed will be used to establish the next evaluation nursery scheduled for 2003.

The north region crossing block did not do well in 2002. Weed control became a problem and many of the plants were reestablished and did not make seed. Filling in additional plants is scheduled for 2002 and also seed production from this crossing block.

2003

Seed from the south region crossing block was evaluated for quick establishment and plants were grown in the greenhouse for establishment of the recurrent selection evaluation nursery. Approximately 500 plants were transplanted on three foot centers in this evaluation block.

The plants will be allowed to develop and be evaluated for forage. Plants in the north region crossing block were not all equally matured and no seed was harvested from this block.

2004

The plants in the southern region evaluation block were given 2004 to develop and mature. Evaluation of this block will begin in 2005.

Seed was harvested from the northern region crossing block, cleaned, and planted in the greenhouse. These plants were evaluated for quick establishment and seedling vigor. Selected plants will be transplanted into an evaluation nursery.

Study 29I141G - Assembly and Evaulation of Little Bluestem, *Schizachyrium*					
scoparium **, Nichx.**					
Little Bluestem					**Table #1**
	REFERENCE				
ACCESSION	**NUMBER**	**COLLECTOR**	**MLRA**	**COUNTY**	**STATE**
9078894	MO-1	Robert S. Crowder	M115	Chariton	Missouri
9078951	MO-2	Robert J. Crowder/	109	Chariton	Missouri
		George L. Pollard			
9078895	MO-3	Joe Tousignant	N116B	Cape Girardeau	Missouri
9078896	MO-4	Douglas Rainey	M115	Clark	Missouri
9078897	MO-5	David S. Mackey	113	Knox	Missouri
9078898	MO-6	Larry R. Brewer	M109	Putnam	Missouri
9078899	MO-7	Tommy Robins/	116	Ripley	Missouri
		Jim Hoefer			
9078900	MO-8	Grant P. Butler	N116B	Jefferson	Missouri
9078901	MO-9			Iron	Missouri
9078902	MO-10	Tommy Robins/	116	Carter	Missouri
		Jim Hoefer			
9078903	MO-11	Arch J. Mueller	M115	Ste. Genevieve	Missouri
9078904	MO-12			St. Francois	Missouri
9078905	MO-13	J. Mark Mitchell		Butler	Missouri
9078906	MO-14	Randy C. Miller	N116A	Shannon	Missouri
9078907	MO-15	Tom Johnson	N116B	Bollinger	Missouri
9078908	MO-16	Tom Johnson	N116A	Bollinger	Missouri
9078909	MO-17	Randy C. Miller	N116B	Reynolds	Missouri
9078910	MO-18			Franklin	Missouri
9078911	MO-19	Tom Johnson	N116A	Wayne	Missouri
9078912	MO-20	Mark E.Nussbaum	N116B	Cape Girardeau	Missouri
9078913	MO-21	Frank Oberle	115	Adair	Missouri
9078914	MO-22	David S. Mackey	113	Knox	Missouri
9078915	MO-23	Claude F. Peifer	116B	Perry	Missouri
9078916	MO-24	Grant P. Butler/	N116A	Washington	Missouri
		Bryan L. Westfall			
9078917	MO-25	John E. Turner	113/115	Monroe	Missouri
9078918	MO-26	David S. Mackey	113	Knox	Missouri
9078919	MO-27	Douglas Rainey	M115	Clark	Missouri
9078920	MO-28	Frank Oberle	115	Adair	Missouri
9078921	MO-29		M115	Montgomery	Missouri
9078922	MO-30	David S. Mackey	113	Knox	Missouri
9078923	MO-31	Curtis W. Walker	109	Clinton	Missouri
9078924	MO-32	James A. Mayberry	109	Carroll	Missouri
9078925	MO-33	Gary J. Barker	M109	Gentry	Missouri
9078926	MO-34			Vernon	Missouri
9078927	MO-35	Louis Byford		Atchison	Missouri
9078928	MO-36	Todd E. Mason	M109	Worth	Missouri
9078929	MO-37	Louis Byford		Atchison	Missouri
9078930	MO-38	Louis Byford		Atchison	Missouri
9078931	MO-39	Ronald L. Musick	M109	Harrison	Missouri

Study 29I141G - Little Bluestem				Table #1 - continued	
	REFERENCE				
ACCESSION	NUMBER	COLLECTOR	MLRA	COUNTY	STATE
9078932	MO-40	Gary J. Barker	M109	Gentry	Missouri
9078933	MO-41	Curtis Walker	109	Gentry	Missouri
9078934	MO-42	Curtis Walker	107	Buchanan	Missouri
9078935	MO-43	Louis Byford		Atchison	Missouri
9078936	MO-44	Ronald L. Musick	M109	Harrison	Missouri
9078937	MO-45	Louis Byford		Atchison	Missouri
9078938	MO-46	Louis Byford		Atchison	Missouri
9078939	MO-47	Bob Sipec		Holt	Missouri
9078940	MO-48	Bib Sipec		Holt	Missouri
9078941	MO-49	Bob Sipec		Holt	Missouri
9078942	MO-50	Ian S. Kurtz	116A	Taney	Missouri
9078943	MO-52	Dennis Shirk/	115	Gasconade	Missouri
		Ed Gillmore			
9078944	MO-53	Dennis Shirk/	116	Osage	Missouri
		Ed Gillmore			
9078945	MO-54	Raleigh Redman	112	Henry	Missouri
9078946	MO-55	Dennis Shirk/	116	Maries	Missouri
		Ed Gillmore			
9078947	MO-56	Jerry Cloyed	M112	Barton	Missouri
9078948	MO-57	Ian S. Kurtz	116A	Taney	Missouri
9078949	MO-58	Ben A. Reed	M112	Barton	Missouri
9078950	MO-59	Jerry Cloyed	M112	Barton	Missouri
9078952	MO-60	M. Denise Brown	N116A	Miller	Missouri
9078953	MO-61	M. Denise Brown	N116B	Miller	Missouri
9078954	MO-62	Howard L. Coambes	N116B	Cedar	Missouri
9078955	MO-63	Howard L. Coambes	N116B	Cedar	Missouri
9078956	MO-64	Douglas G. Newman		Shannon	Missouri
9078957	MO-65	Tom E. Toney		Wayne	Missouri
9078958	MO-66	Rod Doolen		Wayne	Missouri
9078959	MO-67	Rod Doolen		Wayne	Missouri
9078960	MO-68	Kenneth L. Dalrymple		Pike	Missouri
9078963	MO-69	Maurice Davis/		Pettis	Missouri
		Steve Clubine			
	MO-70	Maurice Davis/		Benton	Missouri
		Steve Clubine			
	MO-71	Maurice Davis/		St. Clair	Missouri
		Steve Clubine			
	MO-72	Maurice Davis/		Benton	Missouri
		Steve Clubine			
9078964	MO-73	Maurice Davis/		Pettis	Missouri
		Steve Clubine			
9078965	MO-74	Maurice Davis/		Pettis	Missouri
		Steve Clubine			

Study 29I141G - Little Bluestem				Table #1 - continued	
	REFERENCE				
ACCESSION	NUMBER	COLLECTOR	MLRA	COUNTY	STATE
	MO-75	Maurice Davis/		Pettis	Missouri
		Steve Clubine			
	MO-76	Maurice Davis/		Benton	Missouri
		Steve Clubine			
9078966	MO-77	Maurice Davis/		Maries	Missouri
		Steve Clubine			
9078967	MO-78	Dennis Shirk		Maries	Missouri
9078968	MO-79	Steve Clubine		Maries	Missouri
9078969	MO-80	Maurice Davis		Maries	Missouri
9078970	MO-81			Lawrence	Missouri
9078961	IA-27	Robert R. Bryant/	108	Scott	Iowa
		Shawn Dettman			
9078847	IA-1	Curt Donohue	109	Clarke	Iowa
9078848	IA-2	Curt Donohue	109	Clarke	Iowa
9078849	IA-3	Janet M. Thomas/	107	Cherokee	Iowa
		John P. Vogel			
9078850	IA-4	John P. Vogel	107	Woodbury	Iowa
9078851	IA-5	Henry D. Tordoff	107	West	Iowa
				Pottawattamie	Iowa
9078852	IA-6	Henry D. Tordoff/	107	West	Iowa
		Galen Barrett		Pottawattamie	Iowa
9078853	IA-7	John P. Vogel	107	Woodbury	Iowa
9078854	IA-8	Henry D. Tordoff	107	West	Iowa
				Pottawattamie	Iowa
9078855	IA-9	John P. Vogel	107	Plymouth	Iowa
9078856	IA-10	Henry D. Tordoff	107	West	Iowa
				Pottawattamie	Iowa
9078857	IA-11	Julie K. Watkins/	108	Franklin	Iowa
		Charlie E. Kiepe			
9078858	IA-12	Brad Harrison	103	Dallas	Iowa
9078859	IA-13	Shawn A. Dettman	108	Muscatine	Iowa
9078860	IA-14	Jim Ranum	105	Allamakee	Iowa
9078861	IA-15	Rick Cordes	104	Howard	Iowa
9078862	IA-16	James Ranum	105	Allamakee	Iowa
9078863	IA-17	Jay E. Ford	107	Crawford	Iowa
9078864	IA-18	Steve Maternack	103	Polk	Iowa
9078865	IA-19	Jay E. Ford	107	Crawford	Iowa
9078866	IA-20	Jay E. Ford	107	Crawford	Iowa
9078867	IA-21	Al Ehley	104	Cerro Gordo	Iowa
9078868	IA-22	Al Ehley	104	Cerro Gordo	Iowa
9078869	IA-23	John P. Vogel	102	Lyon	Iowa
9078870	IA-24	Jay E. Ford	107	Crawford	Iowa

Study 29I141G - Little Bluestem				Table #1 - continued	
	REFERENCE				
ACCESSION	NUMBER	COLLECTOR	MLRA	COUNTY	STATE
9078871	IA-25	Jay E. Ford	107	Crawford	Iowa
9078872	IA-26	John Vogel	102	Lyon	Iowa
9078962	IA-28		105		Minnesota
9078873	IL-1	Barbara Sheffer	95B	Kane	Illinois
9078874	IL-2	David J. Harrison/	105	Whiteside	Illinois
		Mark Kaiser			
9078875	IL-3	Barbara Sheffer	95B	Kane	Illinois
9078876	IL-4	Timothy Dring	115	Pike	Illinois
9078877	IL-5	Jim Ritterbusch		Stephenson	Illinois
9078878	IL-6	Jim Ritterbusch		Stephenson	Illinois
9078879	IL-7	Dennis D. Clancy	113	Jasper	Illinois
9078880	IL-8	Bob Jankowski/	110	Will	Illinois
		Steve Hollister			
9078881	IL-9	Barbara Sheffer	95B	Kane	Illinois
9078882	IL-10	Timothy P. Dring	108	Henderson	Illinois
9078883	IL-11	John D. Lundquist	105	Carroll	Illinois
9078884	IL-12	Bill Kleiman		Lee	Illinois
9078885	IL-13	Laura S. Dufford	105	Jo Daviess	Illinois
9078886	IL-14	David J. Harrison/	108	Whiteside	Illinois
		Mark Kaiser			
9078887	IL-15	Timothy P. Dring	108	Mason	Illinois
9078888	IL-16	W. Burke Davies	113	Marion	Illinois
9078889	IL-17	Michael Stanfill/	115	Monroe	Illinois
		Marty Kemper			
9078890	IL-18	Kenton L. Macy	114	Cumberland	Illinois
9078891	IL-19	Martha E. Sheppard	115	Calhoun	Illinois
9078892	IL-20	Michael Stanfill/	113	Washington	Illinois
		Marty Kemper			
9078893	IL-21	Remington T. Irwin	114	Wayne	Illinois
					.

Study 29I141G																		
Little Bluestem																**Table #2**		
								Plot Layout Map										
								Randomized Complete Block										
								Four Replications										
					↑				**Field #1**									
					North													
PLT #	1	2 3 4	5 - 28	29 30 31	32 33 34	35 - 58	59 60 61	62 63 64	65 -76	77		78	79 - 90	91 92 93	94 95 96	97 - 120	121 122 123	124
TIER #																		
I																		
II											R							
III											O							
IV											A							
V											D							
VI			**REP 1**			**REP 2**			**REP 3**		W		**REP 3**			REP 4		
VII											A							
VIII											Y							
IX																		
X																		
XI																		
XII																		
XIII																		
XIV																		
XV																		
									Highway JJ									
																		.

Study 29I141G						Forage Rating: 8/9/99									Table #3	
Little Bluestem																
			1 = High			9 = Low										
														Ave.		
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
MO-7	2	3	1	3	3	2	2	1	2	5	1	3	100	2.33	1	P 1, 8, 11
MO-12	1	2	1	3	2	2	3	2	2	1	1	1	100	1.75	1	P 1, 3, 12, 11, 12
MO-21	1	2	2	6	2	3	4	3	3	4	4	5	100	3.25	1	P 1
MO-74	3	3	5	4	4	4	5	5	4	1	2	1	100	3.42	1	P 10, 12
MO-80	3	3	x	4	5	5	4	4	2	1	4	3	92	3.45	1	P 10
MO-4	x	5	5	4	8	2	3	4	4	6	x	x	83	4.10	2	P 6
MO-9	4	4	4	3	4	4	3	4	3	2	3	3	100	3.42	2	P 10
MO-14	4	4	3	4	4	4	5	2	2	4	4	3	100	3.58	2	P 8, 9
MO-15	3	2	3	5	4	3	6	4	5	4	3	5	100	3.92	2	P 2
MO-22	4	5	5	3	4	2	5	5	6	x	8	x	83	4.70	2	P 6
MO-23	3	5	6	2	6	8	5	4	5	8	8	3	100	5.73	2	P 4
MO-24	3	x	2	x	4	4	3	4	3	3	4	5	83	3.18	2	P 3
MO-32	4	x	8	6	7	3	3	4	5	2	5	6	92	4.82	2	P 10
MO-34	4	4	4	3	4	3	x	x	4	2	x	5	75	3.00	2	P 10
MO-37	2	4	3	7	5	4	x	5	4	3	4	3	92	3.67	2	P 1
MO-42	5	5	6	4	5	2	4	4	4	5	5	7	100	4.67	2	P 6
MO-50	3	3	4	2	2	2	3	4	6	2	3	4	100	3.17	2	P 4, 5, 6, 10
MO-51	3	3	3	3	4	4	4	6	3	4	3	2	100	3.50	2	P 12
MO-53	4	4	5	5	5	5	2	4	5	5	6	7	100	4.75	2	P 7
MO-56	3	3	2	2	5	4	5	3	3	3	3	3	100	3.25	2	P 3, 4
MO-58	3	3	3	5	4	5	5	5	5	2	2	4	100	3.83	2	P 10, 11
MO-59	2	3	4	4	4	5	3	3	3	3	4	4	100	3.50	2	P 1
MO-66	3	3	x	3	3	3	3	2	4	4	5	5	92	3.45	2	P 8
MO-73	7	4	4	3	3	2	4	5	5	7	8	6	100	4.83	2	P 6
MO-79	2	3	2	5	3	5	3	8	5	4	4	3	100	3.92	2	P 1, 3
MO-2	4	5	3	5	5	5	5	3	3	3	4	3	100	4.00	3	P 3, 8, 9, 10, 12
MO-5	7	3	3	5	5	5	6	8	4	4	5	4	100	4.92	3	P 2, 3
MO-8	6	x	5	5	4	5	7	4	8	3	3	4	92	4.91	3	P 10, 11
MO-10	4	5	5	3	3	5	5	5	5	7	5	4	100	4.67	3	P 4, 12
MO-11	x	7	x	4	5	6	6	6	5	3	3	6	83	4.25	3	P 10, 11
MO-13	5	8	5	5	x	5	4	4	3	6	4	6	100	4.58	3	P 9
MO-16	4	3	8	6	6	54	5	6	4	4	5	100	75	3.00	3	P 2
MO-17	4	4	3	4	3	7	8	6	5	4	5	5	100	4.83	3	P 3, 5
MO-18	3	4	3	7	7	8	x	x	x	5	5	5	75	3.92	3	P 1, 3
MO-19	3	5	5	3	4	3	4	6	5	3	5	4	100	4.17	3	P 1, 4, 6, 10
MO-20	8	7	6	7	6	5	3	4	5	4	8	3	100	6.60	3	P 7, 12
MO-25	3	3	x	5	5	5	5	4	6	5	5	6	92	4.33	3	P 1, 2
MO-26	3	4	4	5	x	4	3	4	4	3	4	5	92	4.30	3	P 1, 7, 10
MO-27	5	6	3	4	5	4	6	5	4	5	5	7	100	5.36	3	P 3
MO-29	4	3	x	4	5	4	4	6	3	3	5	8	92	4.45	3	P 2, 9, 10
MO-30	3	4	5	7	7	x	4	4	7	4	3	4	92	4.73	3	P 1, 11
MO-31	7	3	4	4	4	6	7	8	x	5	5	5	92	5.27	3	P 2

Study 29I141G						Forage Rating: 8/9/99									Table #3 - continued	
Little Bluestem																
			1 = High			9 = Low										
														Ave.		
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
MO-33	3	x	3	5	5	3	4	5	5	8	8	4	92	5.89	3	P 1, 3, 6
MO-35	4	7	8	5	6	7	5	3	6	5	4	x	92	5.45	3	P 8
MO-38	6	6	5	3	3	4	4	6	7	3	3	4	100	5.40	3	P 4, 5, 10 ,11
MO-41	5	6	5	4	4	7	6	x	4	3	x	5	83	4.90	3	P 10
MO-43	4	4	x	5	5	5	5	6	5	4	3	4	92	4.55	3	P 11
MO-46	4	x	4	4	3	3	3	5	5	4	4	4	92	3.91	3	P 5, 6, 7
MO-47	5	6	6	6	5	4	3	4	5	5	8	4	100	5.08	3	P 7
MO-48	3	7	8	5	5	6	4	4	6	4	5	5	100	5.17	3	P 1
MO-52	3	3	3	4	3	3	4	5	4	4	3	4	100	3.58	3	P 1, 2, 3, 5, 6, 11
MO-54	x	x	x	5	5	5	4	5	5	6	4	3	75	4.67	3	P 12
MO-57	4	4	x	3	5	x	4	4	x	5	4	3	92	3.27	3	P 4, 12
MO-60	7	4	6	4	6	3	6	4	6	5	5	4	100	5.00	3	P 6
MO-61	5	8	6	x	4	5	x	8	8	3	7	5	83	5.90	3	P 10
MO-65	4	5	6	7	x	x	4	5	3	4	6	6	83	5.00	3	P 9
MO-67	3	3	3	3	3	3	6	5	x	3	3	3	92	3.45	3	P 1, 2, 3, 4, 5, 6, 10, 11, 12
MO-69	4	5	4	3	3	5	4	5	4	7	4	5	100	4.42	3	P 3, 4
MO-71	x	5	5	4	3	5	4	4	5	4	5	3	92	4.27	3	P 5, 12
MO-77	6	x	6	4	6	4	3	4	5	6	6	5	92	5.00	3	P 7
MO-78	5	6	5	5	3	5	3	5	6	4	3	3	100	4.42	3	P 5, 7, 11, 12
MO-1	4	5	4	4	4	6	4	7	5	4	5	5	100	4.75	4	
MO-3	4	7	4	5	4	4	4	4	4	5	4	5	100	4.50	4	
MO-6	7	7	7	7	7	5	x	8	7	4	4	4	92	6.09	4	
MO-28	6	5	6	6	7	5	4	7	7	4	x	x	83	4.75	4	
MO-36	4	4	5	6	6	6	x	5	5	5	6	5	92	5.18	4	
MO-39	4	6	7	4	6	4	6	5	x	6	5	x	83	5.89	4	
MO-40	7	6	7	5	4	4	x	6	5	5	5	5	92	5.36	4	
MO-44	7	4	5	5	6	7	7	x	6	5	4	6	92	5.64	4	
MO-45	4	4	4	5	6	6	5	6	5	4	4	4	100	4.75	4	
MO-49	6	5	6	6	5	x	5	5	4	7	5	6	92	5.45	4	
MO-55	x	6	x	4	4	5	4	5	x	8	x	5	67	5.13	4	
MO-62	4	4	5	5	4	5	5	7	6	5	5	6	100	5.08	4	
MO-63	5	6	5	5	4	4	8	4	6	4	5	5	100	5.08	4	
MO-68	7	6	6	6	8	4	5	6	5	4	4	4	100	5.42	4	
MO-72	5	6	5	5	6	5	4	6	6	5	4	4	100	5.08	4	
MO-81	x	4	5	5	4	6	x	x	x	6	x	8	58	5.43	4	
MO-64	x	7	6	7	6	6	6	5	8	x	7	5	92	5.73	5	
MO-70																
MO-75																
MO-76																

Study 29I141G						Forage Rating: 8/9/99									Table #3 - continued	
Little Bluestem																
			1 = High			9 = Low										
														Ave.		
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
IA-16	x	x	4	3	6	5	3	x	1	x	5	5	75	3.56	1	P 9
IA-27	1	1	3	3	4	5	5	5	4	5	4	2	100	3.50	1	P 1, 2
IA-6	4	5	6	5	2	4	3	4	3	7	4	5	100	4.33	2	P 5, 6
IA-8	5	6	3	5	3	5	5	5	5	5	3	2	100	4.33	2	P 12
IA-12	7	5	7	x	4	5	4	3	2	4	5	5	92	4.64	2	P 9
IA-15	5	4	5	x	x	x	2	x	5	5	5	6	67	4.63	2	P 7
IA-23	6	5	5	8	8	6	5	4	x	2	4	6	92	5.36	2	P 10
IA-1	8	5	5	5	4	4	4	5	x	3	7	3	92	4.82	3	P 10, 12
IA-2	4	4	4	3	4	4	6	5	5	4	x	6	92	4.45	3	P 4
IA-3	x	x	8	x	3	3	4	5	4	4	5	4	75	4.44	3	P 5, 6
IA-4	5	8	4	3	x	3	4	7	5	4	7	5	92	5.00	3	P 4, 6
IA-5	4	5	4	3	6	8	6	4	4	3	5	x	92	4.73	3	P 4, 10
IA-7	5	3	3	5	5	5	4	4	6	5	5	5	100	4.58	3	P 2, 3
IA-9	4	6	7	6	6	6	8	6	6	4	3	4	100	5.50	3	P 11
IA-11	6	5	6	5	7	3	5	5	6	4	x	5	92	5.18	3	P 6
IA-13	4	4	6	4	7	x	5	4	x	3	4	3	83	4.40	3	P 10, 12
IA-17	3	7	4	5	x	4	6	x	6	4	6	5	83	5.00	3	P 1
IA-19	6	x	x	6	3	3	x	4	4	x	x	x	50	4.33	3	P 5, 6
IA-20	x	4	x	7	5	5	4	x	4	6	7	3	75	5.00	3	P 12
IA-24	4	5	3	5	4	4	4	4	5	5	5	4	100	4.33	3	P 3
IA-25	4	5	6	6	5	6	6	4	5	3	5	3	100	4.83	3	P 10, 12
IA-26	x	3	4	3	3	6	x	x	4	5	6	x	67	4.25	3	P 2, 4, 5
IA-10	6	7	7	4	5	5	5	6	7	6	4	x	92	5.64	4	
IA-14	4	6	4	5	5	6	4	5	5	5	7	5	100	5.08	4	
IA-18	5	6	5	6	5	6	5	4	5	4	5	5	100	5.08	4	
IA-21	4	5	4	4	x	6	x	x	6	-	4	5	67	4.75	4	
IA-22	x	x	x	7	x	x	7	6	6	5	8	8	58	6.71	5	
IL-12	8	7	5	3	8	4	5	5	4	4	2	x	92	5.00	2	P 11
IL-17	3	4	3	2	3	5	3	4	2	2	3	3	100	3.08	2	P 4, 9, 10
IL-18	5	4	6	3	3	3	5	6	4	3	2	4	100	4.00	2	P 11
IL-2	6	6	6	4	5	6	5	3	5	4	5	3	100		3	P 8
IL-5	6	5	7	4	8	3	4	5	5	5	4	5	100	5.08	3	P 6
IL-7	4	4	3	4	7	6	8	6	8	6	8	8	100	6.00	3	P 3
IL-8	x	x	5	4	x	8	x	6	4	x	4	3	58	4.86	3	P 12
IL-11	x	x	3	x	4	x	5	x	6	x	x	x	33	4.50	3	P 3
IL-14	4	5	x	3	5	x	6	4	7	6	5	6	83	5.10	3	P 4
IL-16	5	5	4	4	3	3	4	x	3	7	6	4	92	4.36	3	P 5, 6, 9
IL-19	5	6	7	3	3	3	4	3	4	3	4	3	100	4.00	3	P 4, 5, 6, 8, 12

Study 29I141G						Forage Rating: 8/9/99									Table #3 - continued	
Little Bluestem																
			1 = High			9 = Low										
														Ave.		
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
IL-20	5	3	3	x	6	5	4	4	4	3	5	3	92	4.09	3	P 2, 3, 10, 12
IL-21	5	5	4	3	4	4	5	4	4	5	4	4	100	4.25	3	P 4
IL-1	4	x	4	6	7	6	4	7	7	5	6	5	92	5.55	4	
IL-6	7	7	4	6	5	7	x	x	x	6	5	5	75	5.78	4	
IL-9	6	x	6	x	5	7	6	5	4	4	4	7	83	5.40	4	
IL-10	x	x	x	4	6	7	x	x	7	x	5	7	50	6.00	4	
IL-13	x	7	x	5	7	4	6	6	7	x	8	6	83	5.60	4	
IL-15	8	8	x	x	7	6	4	5	5	5	4	5	83	5.70	4	
IL-3	5	4	x	7	x	x	8	7	6	5	x	x	58	6.00	5	
IL-4	6	7	4	4	6	5	6	5	5	5	5	5	100	5.25	5	
IL-22																
Aldous	2	3	3	3	3	3	5	4	5	3	2	2	100	3.17	2	P 1, 11, 12
Cimmeron	2	3	2	4	2	3	3	2	5	3	5	3	100	3.08	2	P 1, 3, 5, 8
Camper	3	4	5	4	5	6	5	4	5	x	3	5	92	4.45	3	P 1, 11, 12
Pastura	x	x	5	6	x	6	6	6	x	3	3	x	58	5.00	3	P 10, 11
																.

Study 29l141G					Vigor Rating: 8/9/99										Table #4	
Little Bluestem																
			1 = High		9 = Low											
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
														Ave.		
MO-4	x	3	4	4	6	2	4	5	5	3	x	x	75	4.00	2	P 6
MO-7	2	3	2	3	3	3	5	2	2	5	2	2	100	2.83	2	P 1, 3, 8, 9, 11, 12
MO-12	3	3	3	4	2	2	4	4	3	3	3	3	100	3.08	2	P 5, 6
MO-16	3	2	6	6	4	3	4	5	6	4	5	3	100	4.25	2	P 2
MO-24	5	x	5	x	5	3	5	5	5	2	4	6	83	4.50	2	P 10
MO-25	2	3	x	5	4	3	5	4	4	5	6	6	92	4.27	2	P 1
MO-32	3	x	6	5	5	3	4	6	4	2	4	6	92	4.36	2	P 10
MO-35	2	6	7	2	4	5	6	6	3	5	4	x	92	4.55	2	P 1, 4
MO-42	5	4	5	3	4	2	4	4	6	4	5	6	100	4.33	2	P 6
MO-47	4	5	6	4	5	4	2	2	3	4	6	3	100	4.00	2	P 7, 8
MO-56	3	4	3	3	3	2	4	4	4	4	3	3	100	3.33	2	P 6
MO-61	5	5	4	x	3	4	x	7	7	2	5	4	83	4.60	2	P 10
MO-67	3	3	3	2	3	3	5	4	x	4	5	5	92	3.64	2	P 4
MO-69	4	5	6	3	3	4	2	3	5	8	4	5	100	4.33	2	P 7
MO-79	2	3	3	3	3	4	5	6	4	5	4	3	100	3.75	2	P 1
MO-1	3	4	3	4	3	5	5	5	5	3	5	4	100	4.08	3	P 1, 3, 5, 10
MO-3	3	4	4	5	4	3	4	5	5	4	3	4	100	4.00	3	P 1, 6, 11
MO-5	5	3	3	5	4	6	5	7	4	5	6	4	100	4.75	3	P 2, 3
MO-6	3	7	6	6	5	5	x	5	5	5	5	3	92	5.00	3	P 1, 12
MO-8	5	x	4	6	3	3	6	6	5	6	5	7	92	5.09	3	P 5, 6
MO-9	5	5	6	3	3	3	4	4	4	5	5	5	100	4.33	3	P 3, 4, 5
MO-11	x	5	x	5	6	6	7	5	3	5	4	6	83	5.20	3	P 9
MO-13	5	7	6	6	x	5	5	6	3	6	5	7	92	5.55	3	P 9
MO-14	4	4	3	5	5	5	4	6	6	4	5	4	100	4.58	3	P 3
MO-15	3	3	3	4	3	3	5	4	4	4	4	4	100	3.67	3	P 1, 2, 3, 5, 6
MO-17	5	5	5	4	4	7	7	5	4	3	4	5	100	4.83	3	P 10
MO-19	3	3	3	4	4	4	4	5	5	4	4	4	100	3.92	3	P 1, 2, 3, 5, 6
MO-21	3	3	3	6	4	4	5	4	4	6	6	6	100	4.50	3	P 1, 2, 3
MO-22	4	3	3	3	3	3	5	5	4	x	7	x	83	4.00	3	P 2, 3, 4, 5, 6
MO-23	5	5	3	4	5	7	5	5	6	5	7	5	100	5.17	3	P 3
MO-26	4	4	4	3	x	3	6	5	5	4	5	5	92	4.36	3	P 4, 6
MO-27	3	5	3	3	4	3	6	6	5	3	4	6	100	4.25	3	P 1, 3, 4, 6, 10
MO-29	4	3	x	6	5	5	5	5	3	5	5	6	92	4.73	3	P 2, 9
MO-31	6	3	3	3	3	4	5	5	x	6	4	5	92	4.27	3	P 2, 3, 4, 5
MO-33	4	x	6	4	4	3	4	4	4	6	6	5	92	4.55	3	P 6
MO-34	4	3	3	3	3	4	x	x	4	4	x	3	75	3.44	3	P 2, 3, 4, 5, 12
MO-36	4	3	3	6	5	5	x	4	5	3	5	5	92	4.36	3	P 2, 3, 10
MO-37	3	3	3	4	3	4	x	5	5	4	4	4	92	3.82	3	P 1, 2, 3, 5
MO-38	4	4	3	5	4	4	3	5	5	3	3	4	100	3.92	3	P 7, 10, 11
MO-39	5	6	7	4	3	3	5	3	x	5	7	x	83	4.80	3	P 5, 6, 8
MO-40	3	8	8	4	5	3	x	5	4	8	8	7	100	5.25	3	P 1, 6, 11

Study 29I141G					Vigor Rating: 8/9/99										Table #4 - continued	
Little Bluestem																
			1 = High			9 = Low										
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
MO-43	6	3	4	4	4	4	5	6	5	4	5	3	100	4.42	3	P 2, 12
MO-45	4	4	3	3	4	3	4	5	3	3	4	4	100	3.67	3	P 3, 4, 6, 9, 10
MO-46	3	x	3	3	3	4	5	5	3	5	3	4	92	3.73	3	P 1, 3, 4, 5, 9, 11
MO-48	4	5	5	3	4	4	5	3	5	4	6	6	100	4.50	3	P 4, 8
MO-51	4	5	4	3	3	3	4	5	4	4	4	4	100	3.92	3	P 3, 4, 5
MO-52	5	4	5	5	3	4	5	6	5	5	4	5	100	4.67	3	P 5
MO-53	5	5	6	4	5	6	3	4	4	5	5	6	100	4.83	3	P 7
MO-54	x	x	x	5	7	3	6	7	7	6	3	4	75	5.33	3	P 11
MO-60	4	4	4	3	4	3	5	3	5	5	6	6	100	4.33	3	P 4, 6, 8
MO-62	4	4	4	3	4	5	4	4	4	5	6	7	100	4.50	3	P 4
MO-63	4	4	4	3	3	3	5	5	4	4	6	4	100	4.08	3	P 4, 5, 6
MO-65	3	4	4	6	x	x	5	6	5	5	7	6	83	5.10	3	P 1
MO-66	5	5	x	4	3	3	6	6	5	6	7	7	92	5.18	3	P 5, 6
MO-71	x	3	5	5	3	4	5	4	5	3	4	4	92	4.09	3	P 2, 5, 10
MO-72	3	3	3	3	5	4	3	4	5	5	4	3	100	3.75	3	P 1, 2, 3, 4, 7, 12
MO-73	6	5	3	3	3	3	5	7	4	6	7	6	100	4.83	3	P 3, 4, 5, 6
MO-77	6	x	6	5	3	5	3	4	5	6	6	6	92	5.00	3	P 5, 7
MO-78	6	4	4	4	6	4	4	5	3	4	4	3	100	4.25	3	P 9, 12
MO-80	4	3	x	3	3	3	6	6	5	3	6	6	92	4.36	3	P 2, 4, 5, 6, 10
MO-81	x	3	5	5	4	4	x	x	x	6	x	5	58	4.57	3	P 2
MO-2	4	5	5	4	5	6	4	4	5	4	4	4	100	4.50	4	
MO-18	4	6	4	4	5	7	x	x	x	6	4	6	75	5.11	4	P 1, 3, 4, 11
MO-20	4	6	6	6	5	5	6	5	5	4	6	4	100	5.17	4	
MO-28	6	4	5	4	6	5	5	6	5	4	x	x	83	5.00	4	
MO-30	4	5	5	4	4	x	5	5	6	5	4	4	92	4.64	4	
MO-41	4	7	4	5	5	4	6	x	5	4	x	4	83	4.80	4	
MO-44	6	4	4	5	5	5	7	x	6	5	4	6	92	5.18	4	
MO-49	8	8	8	8	8	x	7	7	6	6	4	4	92	6.73	4	
MO-50	5	5	5	4	4	4	6	6	4	5	5	5	100	4.83	4	
MO-55	x	5	x	4	6	5	5	4	x	6	x	4	67	4.88	4	
MO-57	4	5	x	5	4	x	6	5	x	5	6	5	75	3.75	4	
MO-58	6	5	4	6	5	6	7	7	7	4	4	5	100	5.50	4	
MO-59	7	6	5	5	4	4	7	6	7	6	6	5	100	5.67	4	
MO-68	5	5	5	4	5	5	5	4	4	6	4	5	100	4.75	4	
MO-74	5	6	6	4	4	5	5	5	5	5	5	4	100	4.92	4	
MO-10	6	7	7	5	5	5	5	6	6	7	6	4	100	5.75	5	
MO-64	x	7	7	5	7	7	6	6	6	x	7	5	83	6.30	5	
MO-70																
MO-75																
MO-76																

Study 29I141G						Vigor Rating: 8/9/99										Table #4 - continued
Little Bluestem																
			1 = High			9 = Low										
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best	
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s
IA-3	x	x	5	x	3	2	6	6	7	7	5	5	75	5.11	2	P 6
IA-4	4	5	3	4	x	3	4	6	4	2	5	5	92	4.09	2	P 10
IA-5	6	6	6	4	5	6	6	5	6	2	5	x	92	5.18	2	P 10
IA-9	4	4	4	4	4	5	6	5	5	3	2	5	100	4.25	2	P 11
IA-10	3	4	5	3	4	4	5	5	5	6	2	x	92	4.18	2	P 11
IA-13	2	3	4	3	5	x	5	4	x	4	5	3	92	3.45	2	P 1
IA-15	5	4	4	x	x	x	2	x	6	4	4	5	67	4.25	2	P 7
IA-27	2	2	2	2	3	3	5	6	5	4	3	3	100	3.33	2	P 1, 2, 3, 4
IA-1	6	3	3	5	5	4	4	4	x	4	7	4	92	4.45	3	P 2, 3
IA-2	3	3	3	4	5	5	6	5	5	5	x	6	92	4.55	3	P 1, 2, 3
IA-6	6	4	4	4	3	3	5	4	4	7	3	5	100	4.33	3	P 5, 6, 11
IA-7	3	3	4	3	3	3	3	4	6	4	4	4	100	3.67	3	P 1, 2, 4, 5, 6, 7
IA-8	5	6	3	3	3	4	5	6	5	4	3	4	100	4.25	3	P 3, 4, 5, 11
IA-12	4	5	6	x	5	4	3	5	4	3	3	3	92	4.09	3	P 7, 10, 11, 12
IA-14	6	5	5	3	3	3	5	7	7	4	6	5	100	4.92	3	P 4, 5, 6
IA-16	x	x	4	3	5	4	3	x	5	x	5	6	67	4.38	3	P 4, 7
IA-17	4	6	5	4	x	4	5	x	4	3	5	3	83	4.30	3	P 10, 12
IA-18	5	6	5	5	4	5	4	4	5	3	3	4	100	4.42	3	P 10, 11
IA-23	4	4	4	5	6	6	5	5	x	3	3	4	100	4.08	3	P 10
IA-25	5	5	5	5	4	4	4	5	5	4	4	3	100	4.42	3	P 12
IA-26	x	6	4	3	4	5	x	x	4	4	6	x	67	4.50	3	P 4
IA-11	7	6	7	4	5	4	6	6	7	5	x	5	92	5.64	4	
IA-19	6	x	x	5	4	4	x	4	4	x	x	x	50	4.50	4	
IA-20	x	4	x	7	5	5	5	x	6	5	6	5	75	5.33	4	
IA-21	4	4	5	4	x	5	x	x	4	x	5	4	67	4.38	4	
IA-22	x	x	x	5	x	x	5	4	4	6	8	8	58	5.71	4	
IA-24	5	5	4	6	6	6	7	7	7	6	5	5	100	5.75	5	
IL-8	x	x	6	4	x	5	x	2	3	x	5	3	58	4.00	2	P 8
IL-12	6	6	2	3	5	3	4	4	3	3	2	x	92	3.73	2	P 3, 11
IL-1	7	x	3	5	7	6	5	6	8	6	5	5	92	5.73	3	P 3
IL-2	3	3	4	4	5	3	4	5	5	5	4	4	100	4.08	3	P 1, 2, 6
IL-3	3	7	3	5	x	x	6	7	6	5	x	x	67	5.25	3	P 1, 3
IL-5	5	5	6	5	3	4	5	6	5	5	4	5	100	4.83	3	P 5
IL-6	7	5	4	8	3	5	x	x	x	5	4	7	75	5.33	3	P 5
IL-9	5	x	3	x	4	5	5	3	3	5	4	6	92	3.91	3	P 3, 8, 9
IL-10	4	4	5	5	4	3	x	x	8	x	6	6	100	3.75	3	P 6
IL-11	x	x	3	x	4	x	3	x	5	x	x	x	33	3.75	3	P 3, 7
IL-13	x	5	x	4	5	5	6	6	7	x	6	3	75	5.22	3	P 12
IL-14	5	4	x	3	4	x	5	3	5	5	4	5	83	4.30	3	P 4, 8
IL-15	5	7	x	x	5	4	6	6	5	4	4	3	83	4.90	3	P 12

Study 29l141G					Vigor Rating: 8/9/99									Table #4 - continued				
Little Bluestem																		
			1 = High			9 = Low												
Local	Rep 1			Rep 2			Rep 3			Rep 4			Percent	Living	Best		
Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	Survival	Plants	Plant	Location/s		
IL-16	3	3	4	4	4	5	5	x	6	7	5	4	92	4.55	3	P 1, 2, 6		
IL-17	4	4	3	3	3	3	3	3	3	3	3	3	100	3.17	3	P 3, 4, 5, 6, 7, 8, 9, 10,,11, 12		
IL-18	4	3	5	4	4	3	5	6	4	4	5	4	100	4.25	3	P 2, 6		
IL-19	4	4	6	3	3	3	5	3	4	4	3	4	100	3.83	3	P 4, 5, 6, 8, 11		
IL-20	4	5	4	x	3	4	4	3	4	4	6	3	92	4.00	3	P 5, 8, 12		
IL-21	7	7	7	3	5	4	6	5	5	5	5	5	100	5.33	3	P 4		
IL-4	6	5	5	4	4	4	5	5	5	6	6	5	100	5.00	4			
IL-7	4	4	5	4	5	6	6	5	6	6	7	6	100	5.33	4			
IL-22																		
Cimmeron	2	2	2	2	3	2	3	5	4	3	4	3	100	2.92	2	P 1, 2, 3, 4, 6		
Aldous	4	3	4	3	3	3	5	5	4	3	3	3	100	3.58	3	P 2, 4, 5, 6, 10, 11, 12		
Camper	3	3	3	4	5	5	5	5	6	x	5	5	92	4.45	3	P 1, 2, 3		
Pastura	x	x	5	5	x	7	5	7	x	3	4	x	58	5.14	3	P 10		
																		.

Study 29I141G - Assembly and Evaluation of Little Bluestem, *Schizachyrium scoparium* Michx.					
Selected accessions for each region					**Table #5**
		Northern Region			
		IA - All			
		MO - North of Missouri River			
		IL - Northern 2/3rds of the state			
	REFERENCE				
ACCESSION	**NUMBER**	**COLLECTOR**	**MLRA**	**COUNTY**	**STATE**
9078896	MO-4	Douglas Rainey	115	Clark	Missouri
9078913	MO-21	Frank Oberle	115	Adair	Missouri
9078914	MO-22	David S. Mackey	113	Knox	Missouri
9078924	MO-32	James A. Mayberry	109	Carroll	Missouri
9078934	MO-42	Curtis Walker	107	Buchanan	Missouri
9078849	IA-3	Janet M. Thomas/	107	Cherokee	Iowa
		John P. Vogel			
9078854	IA-8	Henry D. Tordoff	107	West	Iowa
				Pottawattamie	Iowa
9078861	IA-15	Rick Cordes	104	Howard	Iowa
9078862	IA-16	James Ranum	105	Allamakee	Iowa
9078884	IL-12	Bill Kleiman		Lee	Illinois
9078891	IL-19	Martha E. Sheppard	115	Calhoun	Illinois
		Southern Region			
		MO - South of Missouri River			
		IL - Southern 1/3 of state			
	REFERENCE				
ACCESSION	**NUMBER**	**COLLECTOR**	**MLRA**	**COUNTY**	**STATE**
9078895	MO-3	Joe Tousignant	N116B	Cape Girardeau	Missouri
9078899	MO-7	Tommy Robins/	116	Ripley	Missouri
		Jim Hoefer			
9078915	MO-23	Claude F. Peifer	116B	Perry	Missouri
9078942	MO-51	Ian S. Kurtz	116A	Taney	Missouri
9078950	MO-59	Jerry Cloyed	M112	Barton	Missouri
9078952	MO-60	M. Denise Brown	N116A	Miller	Missouri
9078964	MO-73	Maurice Davis/		Pettis	Missouri
		Steve Clubine			
9078965	MO-74	Maurice Davis/		Pettis	Missouri
		Steve Clubine			
9078968	MO-79	Steve Clubine		Marries	Missouri
9078969	MO-80	Maurice Davis/			Missouri
9078893	IL-21	Remington T. Irwin	114	Wayne	Illinois
					.

Study 29I141G									**Rep #1**		**Table #2 - continued**			
Little Bluestem														
Field #1						**North** ↑								
PLT #	1	2 3 4	5 6 7	8 9 10	11 12 13	14 15 16	17 18 19	20 21 22	23 24 25	26 27 28	29 30 31			
TIER #														
I	j	V V X	X j X	X X X	j X X	j X X	X j X	X W W	W W W	W W W	W W W	I		
II	V	MO-9	IA-11	MO-30	MO-45	MO-31	MO-78	MO-47	IL-8	IA-25	MO-63	II		
III	V	MO-55	IL-21	MO-10	IL-13	MO-6	MO-60	MO-28	MO-36	MO-24	IL-15	III		
IV	V	IA-12	MO-74	MO-51	MO-40	MO-27	MO-57	MO-58	MO-15	IA-17	MO-1	IV		
V	V	MO-42	IA-26	IL-3	MO-77	MO-67	ALDOUS	IA-15	MO-28	MO-50	IA-19	V		
VI	V	IA-7	MO-52	MO-39	MO-35	IL-4	IA-5	MO-23	IA-16	MO-21	MO-33	VI		
VII	i	MO-14	IL-17	MO-13	IA-3	IA-23	MO-65	IA-18	MO-61	IA-24	MO-48	VII		
VIII	V	MO-56	MO-26	MO-69	IL-5	MO-46	IL-20	MO-80	MO-5	MO-7	IL-10	VIII		
IX	i	MO-34	PASTURA	IL-11	MO-4	IL-16	MO-16	MO-37	MO-32	MO-59	IA-22	IX		
X	V	IL-2	MO-8	MO-29	MO-49	MO-81	IA-1	IL-7	IA-27	MO-25	CAMPER	X		
XI	i	IA-10	MO-64	MO-20	MO-66	IA-4	MO-12	MO-22	IL-1	IA-2	MO-54	XI		
XII	V	MO-71	MO-17	IL-14	MO-73	MO-44	CIMMERON	MO-18	MO-53	MO-79	MO-72	XII		
XIII	V	IL-12	MO-41	IA-8	IL-19	IA-20	MO-62	IA-6	MO-68	MO-11	IA-21	XIII		
XIV	T	MO-38	IA-13	MO-43	IA-9	IL-9	IL-6	MO-19	MO-3	IA-14	IL-18	XIV		
XV	T	T T j	j T T	T T T	T j j	T T Y	Y Y Y	Y Y Y	Y Y Y	Y Y Y	Y Y Y	XV		
MO-57 ONLY ONE PLANT					3 PLANTS/PLOT (MO-9)									
IL-8 ONLY ONE PLANT					LETTERS (V, j, ETC.,) ARE SINGLE PLANT BORDER ROWS									
														.

Study 29I141G						**Rep #2**			**Table #2 - continued**			
Little Bluestem												
				North ↑								
PLT #	32 33 34	35 36 37	38 39 40	41 42 43	44 45 46	47 48 49	50 51 52	53 54 55	56 57 58	59 60 61		
TIER #												
I	? ? ?	W W W	W W W	W W b	b b b	b b b	b b b	b b b	b R R	R R R	I	
II	MO-34	IL-18	IA-7	MO-31	MO-6	MO-53	MO-2	IA-18	MO-22	MO-48	II	
III	MO-71	MO-24	MO-35	IA-14	IA-23	IA-2	MO-74	MO-28	CAMPER	MO-57	III	
IV	MO-8	MO-42	MO-67	IL-1	MO-60	MO-33	MO-37	MO-26	IL-21	IL-7	III	
V	IA-13	IA-3	MO-9	MO-39	IL-16	IA-8	MO-15	MO-69	MO-14	MO-25	IV	
VI	MO-50	CIMMERON	IL-4	MO-59	MO-52	MO-40	MO-51	IA-27	MO-81	IA-16	VI	
VII	IA-17	MO-63	MO-66	IL-20	MO-72	IL-19	MO-19	MO-23	IL-11	IL-10	VII	
VIII	MO-32	IA-6	MO-4	IA-11	IL-2	MO-54	IA-26	IL-8	MO-41	IA-4	VIII	
IX	IA-10	MO-77	IL-5	MO-46	MO-56	MO-64	MO-1	MO-21	MO-65	MO-10	IX	
X	IL-14	MO-38	MO-49	MO-27	IL-12	MO-79	IA-19	MO-68	IA-1	ALDOUS	X	
XI	MO-61	IA-9	MO-55	IL-15	IA-25	MO-17	MO-7	IA-5	IL-9	IL-3	XI	
XII	IA-24	MO-47	MO-78	MO-43	PASTURA	MO-20	MO-73	MO-12	IA-20	MO-13	XII	
XIII	MO-30	MO-18	MO-11	IL-6	MO-3	IL-13	IA-12	IA-22	MO-29	MO-44	XIII	
XIV	MO-45	MO-62	MO-58	MO-5	IL-17	IA-21	MO-80	MO-16	MO-36	IA-15	XIV	
XV	Y Y S	i S S	S S S	S S S	S S S	S S S	h S S	Y h Y	Y Y Y	h J J	XV	
												.

Study 29I141G									**Rep #3**				**Table #2 - continued**			
Little Bluestem																
					North ↑											
PLT #	62 63 64	65 66 67	68 69 70	71 72 73	74 75 76		77		78		79 80 81	82 83 84	85 86 87	88 89 90	91 92 93	
TIER #																
I	R R R	R R R	R c c	c c c	c c c		c		a		a a a	a b b	j b b	j j j	R R R	I
II	MO-45	IL-6	MO-71	IA-13	MO-31		B		a		IL-4	MO-63	MO-11	IL-8	IL-11	II
III	MO-61	MO-19	MO-43	MO-50	MO-40		B	***R***	a		IA-21	IL-13	IL-17	MO-68	MO-29	III
IV	IA-9	MO-51	MO-58	IA-17	MO-55		E	***O***	a		MO-47	MO-56	MO-2	MO-13	IL-11	IV
V	MO-35	MO-1	MO-23	IA-24	MO-24		E	***A***	a		IL-5	CAMPER	MO-69	IL-12	MO-25	V
VI	MO-39	MO-28	MO-36	MO-42	MO-53		E	***D***	a		MO-54	IA-26	IA-14	IA-5	IA-15	VI
VII	MO-77	IA-19	CIMMERON	IA-18	MO-64		C	***W***	a		MO-6	MO-33	MO-73	MO-16	IL-3	VII
VIII	MO-9	MO-7	IA-23	IL-20	IA-4		C	***A***	i		MO-32	IA-26	MO-52	MO-22	MO-44	VIII
IX	IA-6	MO-80	IL-2	IA-10	MO-5		G	***Y***	a		IA-7	MO-20	IL-16	MO-48	IA-16	IX
X	MO-8	IA-12	MO-78	MO-30	IA-25		G		a		MO-79	MO-17	MO-59	MO-14	IL-7	X
XI	MO-34	MO-12	MO-46	IA-8	MO-18		I		a		IA-11	IL-21	MO-72	IA-22	PASTURA	XI
XII	IL-14	MO-26	MO-4	IL-19	MO-38		I		a		MO-74	MO-33	MO-21	MO-65	IL-9	XII
XIII	IL-18	IA-27	MO-66	ALDOUS	MO-67		O		a		IA-3	MO-27	MO-81	MO-41	IA-20	XIII
XIV	MO-60	MO-10	MO-37	MO-15	MO-62		O		a		MO-49	IL-15	MO-57	IA-1	IL-10	XIV
XV																
	H H A	A K K	F F D	D L L	M M N		N		a		a c c	c c c	c c c	c c c	h c c	XV
IL-8 only one planted																
																.

Study 29I141G							Rep #4			Table #2 - continued				
Little Bluestem														
					North									
PLT #	94 95 96	97 98 99	100 101102	103 104 105	106 107 108	109 110 111	112 113 114	115 116 117	118 119 120	121 122 123		124		
TIER #														
I	R i R	a a a	X X X	X X U	i U U	U U U	U U U	W W W	W W W	W W W		d	I	
II	IA-9	IL-18	MO-8	MO-74	MO-40	IA-25	MO-5	MO-42	IA-4	IA-20		d	II	
III	MO-58	IA-19	MO-28	IL-17	MO-53	IL-8	PASTURA	MO-37	IL-10	MO-77		d	III	
IV	ALDOUS	MO-80	IA-21	MO-2	IA-8	MO-26	IA-26	MO-68	MO-14	MO-52		d	IV	
V	MO-51	IA-18	MO-20	MO-46	IL-1	MO-1	MO-62	MO-44	MO-9	MO-34		d	V	
VI	IA-17	IA-10	MO-33	IA-24	MO-43	IL-12	IA-5	MO-81	CIMMERON	MO-19		d	VI	
VII	MO-64	IA-10	CAMPER	MO-3	MO-69	MO-61	IA-16	IL-4	MO-35	MO-21		d	VII	
VIII	IA-27	MO-39	IL-19	MO-57	IL-6	MO-38	MO-67	MO-25	MO-48	IL-14		e	VIII	
IX	MO-60	MO-15	MO-63	IA-7	MO-36	IL-15	MO-49	IA-13	MO-29	MO-30		e	IX	
X	MO-12	MO-41	MO-32	MO-55	IA-12	MO-47	IA-26	IL-21	MO-65	IL-9		e	X	
XI	IL-20	IA-23	IA-11	MO-46	MO-17	IL-2	IL-13	MO-45	IL-11	IA-22		f	XI	
XII	MO-50	MO-6	MO-59	IA-14	MO-31	MO-54	MO-79	IA-3	MO-16	IL-7		f	XII	
XIII	MO-71	MO-78	MO-27	MO-73	MO-18	IA-15	MO-66	MO-72	MO-22	MO-10		f	XIII	
XIV	MO-7	MO-11	IL-16	MO-23	IA-1	IL-5	IA-6	MO-13	IL-3	MO-56		f	XIV	
XV	c R R	MO-24	R h R	R S h	h S S	S S T	h h h	T V V	V h g	g g g		g	XV	
														.

Study No. 29I142G

Study Title: Production of Native Missouri Ecotypes of Grasses, Legumes and Forbs for Roadsides, Critical Areas, and All Other Vegetative Plantings Where Native Plants are Now Being Planted.

Study Leader: Cordsiemon, R.C.

Study Coordinator: Erickson, R., Missouri Department of Conservation

Introduction:

Well-adapted native grass, legume and forb plantings offer many advantages as a low cost sustainable vegetative cover for management of soil and water resources. Native plant communities resist noxious weed invasion, provide excellent erosion control, and generally require relatively low maintenance.

These characteristics make native plants an excellent selection for use in roadside plantings, wildlife habitat enhancement, long-term land retirement programs, public land and all other vegetative plantings where mono-cultures of grasses are presently being planted. This is especially true along public transportation corridors that constitute a major land resource and management problem in the state of Missouri. Based on 1987 National Resource Inventory (NRI) data, over one million acres of Missouri land are devoted to rural transportation. Other federal and state agencies also own a significant land base in Missouri.

Proper vegetation management along these corridors is an important element in controlling soil loss and unwanted weedy plant species. Many of these acres are now seeded to introduce cool-season grass and legume species which are often invaded by noxious weeds requiring extensive mowing or herbicide treatment programs. These management techniques are expensive and can also result in additional water quality problems where herbicides are used extensively.

Managing or reseeding these acres to promote native grasses and forbs offers a low cost environmentally sound approach to roadside vegetation management. Herbicide use, soil erosion, and most mowing can be reduced significantly where a vigorous native grass and forb mixture dominates a roadside right-of-way. In addition, these goals are consistent with on-going NRCS programs designed to improve ground and surface water quality, reduce soil loss and increase wildlife habitat.

Problem:

Many adapted forb, legume and grass species of native origin are either currently not commercially available or available only in very limited quantities, which makes them very expensive. Species that are available are often varietal releases that have undergone an evaluation and selection process or a plant-breeding program. Most varieties are designed for high forage production and are highly vigorous plants. They are generally excellent for pasture and hay production but can be too domineering for diversified mixtures. Their origins are often not from within the state in which they are being planted. There is a need for additional native species for use on public lands and other types of conservation plantings with origins close to where they are being planted.

Objective:

The objective of this study is to accelerate the availability of selected native grass, legume and forb species.

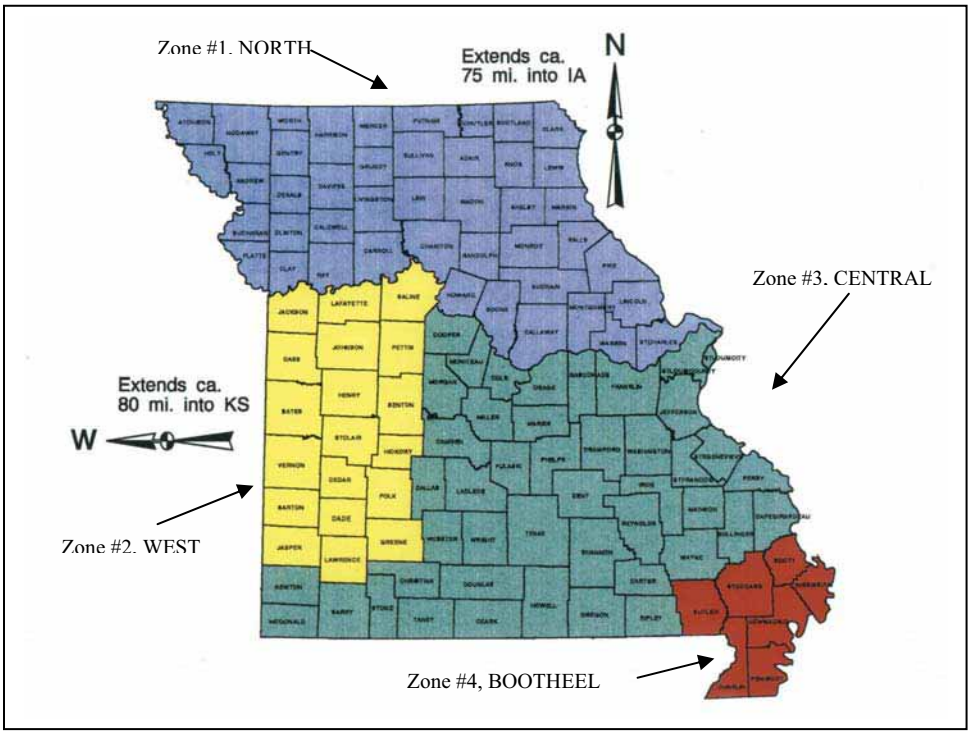
Cooperators:

The Missouri Department of Conservation (MDC), USDA Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), the University of Missouri at Columbia, Missouri (UMC), and the National Audubon Society-Audubon Missouri (NAS).

Procedures:

The state of Missouri was divided into four zones: Northern Glaciated Plains, Zone #1; Western Prairie, Zone #2; Ozarks, Zone #3; and the Bootheel Region, Zone #4 (See Table #1). Plant materials were collected as seed by the study coordinator, selected personnel from USDA-NRCS, MDC, UMC, and other knowledgeable interested persons. Collections were made from prairie remnants throughout each zone striving for a relatively equal and representative sample. Large collections from one site were not allowed to dominate the mixture from throughout the zone. Seed from each collection site was inventoried by location. Seed collected from within each zone was kept separate from the other zones. Increase plots were and will be established, as seed becomes available. Each species will be released as 'Source Identified' germplasm from the zone in which it was collected. Evaluation and selection or plant breeding procedures has not improved 'Source Identified' seed.

Table #1



Discussion:

1997

The Missouri Ecotype Enhancement Program was officially started as a plant materials study with the signing of the study plan in December of 1997. This plan is an agreement between cooperators and funded by a grant from the MDC. Several meetings preceded the document signing that included MDC, NRCS, UMC, Department of Transportation, Missouri Department of Natural Resources, and other interested individuals.

The initial grant from MDC to UMC was received July 1997 and a program coordinator was hired by UMC in September 1997 to work at the Elsberry Plant Materials Center.

1998

A grant was given to UMC once again by MDC that would fund the program through August of 1999. Goals were established for 1998 collections. Some species from 1997 were recollected and new species were added. See Table #2 for listing of species collected and status of collections.

1999

The Missouri Ecotype program continued during 1999 and the species released listed in Table #3. Beginning in September, the Lincoln County Soil and Water Conservation District took over as the administrator for the Missouri Ecotype Program replacing UMC. MDC funded the program for the 1999-2000 fiscal year.

2000

The Missouri Ecotype program continued through August until funding was depleted. The program was continued under direction of Missouri Audubon Society and MDC in cooperation with the NRCS Plant Materials Center.

2001

The Missouri Ecotype program is growing increase plots at Elsberry and also at the Charles Green Conservation area near Ashland, Missouri. A list of species in production at both sites is in Table #2 and plants released through the program in Table #3.

2002

MDC took over as administrator of this study and is currently still funding the program with the aid of grants. The Missouri Ecotype program is continuing to increase plots at the Elsberry PMC and Green Conservation Area. New collections are being made of both old and new species.

2003

MDC is continuing to administrate the Missouri Ecotype program. All plots are still in production and seed is being allocated. The PMC is planning to increase plots for seed production in 2004.

2004

In the spring of 2004, the plots of zones 1 and 2 sideoats gramma, *Bouteloua curtipendula*, and zone 1 river oats, *Chasmanthium latifolium*, were increased for seed production. There were no new releases from the Missouri Ecotype Program in 2004 and there are no releases scheduled for 2005. Plans are to increase river oats-zone 1 again in 2005. Becky Erickson, Missouri Ecotype Program Coordinator, has several production plots located at the Green Conservation Area in Ashland, Missouri. The number of plots on the Green Area has increased over the past year and now sustains almost 35 different ecotypes. Plans for both the Plant Materials Center and the plots at the Green Conservation Area are to sustain the plots already established and increase the plots that display good seed production and survival. This will allow for potential releases as early as 2006. Refer to Tables #2 and #3 for plots in production and past releases.

Study No. 29I142G - Production of Native Missouri Ecotypes of Grasses, Legumes					Table #2	
and Forbs for Roadsides, Critical Areas, and All Other Vegetative Plantings Where						
Native Plants are Now Being Planted.						
Project Status						
Common Name		**Accession**	**Collection**	**Status of Increase Plot**	**Status of**	
Genus/Species	**Zone**	**Number**	**Date**	**Planting (Where/When)**	**Accession**	
Aromatic Aster	1		2001	In production		
Aster oblongfolius				Green CA/2002		
	2		2004	In production		
				Green CA/2004		
Big Bluestem	1	9079000	1997	In production	Released in 1999	
Andropogon gerardii				PMC/1998		
Butterfly Milkweed	1	9079024	1997	In production		
Asclepias tuberosa				PMC/1998		
	2	9079025	2001	In production		
				Green CA/2002		
Creamy Wild Indigo	1	9079088	2000	In production		
Baptisia bracteata				Green CA/2001		
Foxglove Beardstongue	1	9079064	1999	In production		
Penstemon digitalis				PMC/2000		
	1	9079064		In production		
				Green CA		
	2	9079065	2001	In production		
				Green CA/2002		
Grayhead Coneflower	1	9079060	1999 & 2000	In production		
Ratibida pinnata				PMC/2000, increased in 2001		
	2	9079061	2000	In production		
				Green CA/2001		
Gravelweed	2	9079081	2001	In production		
Verbesina helianthoides				Green CA/2002		
Green Milkweed	2		2004	In production		
Asclepias hirtella				Green CA/2004		
Horsemint	1	9079056	1999	In production		
Monarda fistulosa				PMC/2000		
	1	9079056	1999 & 2000	In production		
				Green CA/2001(increase)		
	2	9079057	2000	In production		
				Green CA/2001		
Indiangrass	1	9079036	n/a	Not in production on PMC	Released in 1999	
Sorghastrum nutans				Commercial production only		
	2	9079037	n/a	Not in production on PMC	Released in 1999	
				Commercial production only		

Study 29I142G - Missouri Ecotype					Table #2 cont.	
Common Name		**Accession**	**Collection**	**Status of Increase Plot**	**Status of**	
Genus/Species	**Zone**	**Number**	**Date**	**Planting (Where/When)**	**Accession**	
Largeleaf Wild Indigo	2	9079093	2000	In production		
Baptisia alba				Green CA/2001		
Little Bluestem	1	9079004	1996 & 1997	In production	Released in 1999	
Schizachrium scoparium				PMC/1997 (increase 1998)		
	2	9079005	1996 & 1997	In production		
				PMC/1997		
	3	9079006	1996 & 1997	In production		
				PMC/1997		
Maryland Senna	2		2004	In production		
Senna marylandica				Green CA/2004		
Pale Purple Coneflower	1	9079032	1997	In production	Released in 2001	
Echinacea pallida				PMC/1998		
	2	9079033	1998	In production	Released in 2001	
				PMC/1999		
Prairie Blazing Star	1	9079020	1998	In production		
Liatris pycnostachya				PMC/1999		
	2	9079021	2001	In production		
				Green CA/2002		
Prairie Coreopsis	1	9079028	1997	In production	Released in 2001	
Coreopsis palmata				PMC/1998		
	2	9079029	1998	In production	Released in 2001	
				PMC/1999		
Prairie Sage	2		2004	In production		
Salvia azurea				Green CA/2004		
Purple Milkweed	1	9079114	2001	In production		
Asclepias purpurascens				Green CA/2002		
Purple Prairie Clover	1	9079048	2000	In production		
Dalea purpurea				PMC/2001		
	1	9079048	2000	In production		
				Green CA/2001		
	2	9079049	2000	In production		
				PMC/2001		
New England Aster	1	9079103	2001	In production		
				Green CA/2001		
Rosin Weed	1		2004	In production		
Siphium integrifolium				Green CA/2004		

Study 29I142G - Missouri Ecotype					Table #2 cont.	
Common Name		**Accession**	**Collection**	**Status of Increase Plot**	**Status of**	
Genus/Species	**Zone**	**Number**	**Date**	**Planting (Where/When)**	**Accession**	
Rough Blazing Star	1	9079068	1999	In production		
Liatris aspera				PMC/2000		
	2	9079069	2000	In production		
				Green CA/2001		
Roundhead Bushclover	1	9079008	1999	In production		
Lespedeza capitata				PMC/2000		
Showy Goldenrod	1	9079110	2001	In production		
Solidago speciosa				Green CA/2002		
	2	9079111	2003	In production		
				Green CA/2003		
Sideoats	1	9079072	2001	In production		
Bouteloua curtipendula				PMC/2002		
	2	9079073	2001	In production		
				PMC/2002		
Stiff Goldenrod	1	9079107	2001	In production		
Solidago rigida				Green CA/2002		
	2	9079107	2001	In production		
				Green CA/2002		
Sweet Black-eyed Susan	1		2004	In production		
Rudbeckia subtomentosa				Green CA/2004		
	2		2004	In production		
				Green CA/2004		
Swamp Milkweed	2		2004	In production		
Asclepias incarnata				Green CA/2004		
Tall Dropseed	1	9079040	1998	In production	Released in 2001	
Sprorbolus compositus				PMC/1999		
	2	9079041	2001	In production		
				PMC/2002		
Tall Tickseed	1	9079076	2000	In production		
Coreopsis tripteris				Green CA/2001		
Tick Trefoil	1	9079012	1997	In production		
Desmodium canadense				PMC/1998		
Virginia Wild Rye	1	9079044	1998	In production	Released in 1999	
Elymus virginicus				PMC/1999		
White Prairie Clover	1	9079052	2000	In production		
Dalea candida				PMC/2001		
	1	9079052	2000	In production		
				Green CA/2001		
	2	9079053	2000	In production		
				Green CA/2001		

Study 29I142G - Missouri Ecotype					Table #2 cont.	
Common Name		**Accession**	**Collection**	**Status of Increase Plot**	**Status of**	
Genus/Species	**Zone**	**Number**	**Date**	**Planting (Where/When)**	**Accession**	
White Wand Beardtongue	2	9079101	2001	In production		
Penstemon tubifloris				Green CA/2002		
Wild Quinine	1		2004	In production		
Parthnium integrifolium				Green CA/2004		
Whorled Milkweed	2		2004	In production		
Asclepias verticellata				Green CA/2004		
Wild Quinine	2		2004	In production		
Parthnium integrifolium				Green CA/2004		
					.	

Study 29I142G - Missouri Ecotype Releases						Table #3
	Releases from the Elsberry Plant Materials Center					
			Accession	**Cooperating**	**Type of**	**Year of**
Scientific Name	**Release Name**	**Common Name**	**Number**	**Agency(ies)**	**Release**	**Release**
Elymus virginicus L.	Northern MO	Virginia wildrye	9079044	MOPMC,UMC,MDC,MODOT	N	1999
Sorghastrum nutans (L) Nash.	Northern MO	indiangrass	9079036	MOPMC,UMC,MDC,MODOT	N	1999
Andropogon gerardii Vitman	Northern MO	big bluestem	9079000	MOPMC,UMC,MDC,MODOT	N	1999
Sorghastrum nutans (L) Nash.	Western MO	indiangrass	9079037	MOPMC,UMC,MDC,MODOT	N	1999
Schizachyrium scoparium, Michx.	Northern MO	little bluestem	9079004	MOPMC,UMC,MDC,MODOT	N	1999
Sporobolus compositus var.	Northern MO	tall dropseed	9079040	MOPMC, MDC, NAS	N	2001
compositus						
Coreopsis palmata	Northern MO	prairie coreopsis	9079028	MOPMC, MDC, NAS	N	2001
Coreopsis palmata	Western MO	prairie coreopsis	9079029	MOPMC, MDC, NAS	N	2001
Echinacea pallida	Northern MO	pale purple	9079032	MOPMC, MDC, NAS	N	2001
		coneflower				
Echinacea pallida	Western MO	pale purple	9079033	MOPMC, MDC, NAS	N	2001
		coneflower				
Cooperating Agencies: MOPMC=Missouri Plant Materials Center; UMC=University of Missouri at Columbia; MDC=Missouri						
Department of Conservation; MODOT=Missouri Department of Transportation; NAS=National Audubon Society-Audubon Missouri;.						
Grow Native.						
N=native releases; collected within the USA, occurring naturally in the USA. Generally refers to a plant which occurs naturally						
in a particular region, state ecosystem or habitat without direct or indirect human activity.						
Nat.=naturalized releases; collected from a population within the USA, but were originally introduced to the USA sometime in the past.						
I=introduced; means that the original collection from which the release was made was not from within the USA.						
						.

Study ID Code: MOPMC-P-0001-WO, WL, WE

Study Title: Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa* Michx.

Study Leader: Cordsiemon, R.

Description:

Bur oak is a large-size tree 60-80 feet tall and 2-3 feet in diameter (max. 170 by 7 feet); crown rounded with large, heavy branches. Leaves are deciduous, oblong to ovate; 6-12 inches long; characteristically 5-9 lobed, with rounded lobes. Fruit matures in one year; acorns are 3/5-2 inches long, ellipsoidal, brown, enclosed for 1/3 to all of its length in a characteristic fringe-margined cup. Twigs are stout; yellow-brown to gray, often with characteristic corky wings. Winter buds; 1/8-1/4 inch long, hairy. Bur oak is one of the largest American Oaks. Commonly distributed throughout Missouri, Iowa and Illinois, bur oak are is important bottomland tree, frequently found in moist flats, wetlands, and undulating flood plains. Important associates of bur oak include red maple, American elm, silver maple, swamp white oak, sycamore and eastern cottonwood.

Objective:

The objective of this study is to select a local source, fast growing, and high nut producing bur oak.

Materials and Methods:

Field collections were assembled, accessioned, and held in storage until the collection period was ended. The assemblage of collections began at the PMC in October 2000 and ended mid-December 2000. After the collection period was over the seed was stratified and planted in the greenhouse using the Root Pruning Method (RPM) containers. The plants will be transplanted in Field #7 on the PMC in mid to late April 2002. The design will be a randomized complete block with one plant per plot: one block for the Iowa collections, one for the Illinois collections and one block for the Missouri collections.

Discussion

2000

A total of 24 collections were made from the PMC three state service area: seven from Iowa, two from Illinois and 15 from Missouri. As these collections arrived at the PMC they were given accession numbers and placed in stratification for 120 days (cool moist storage 38 degrees Fahrenheit). At the time this report was being developed, these collections were being germinated in the greenhouse.

2001

The 24 collections of bur oaks were taken out of the germination trays and placed in containers (3 5/8" x 6") and allowed to grow to approximately one foot tall. These plants were later transplanted into one-gallon size containers and placed in the portable greenhouse. In early December 2001 the plants were transported to the root cellar for over wintering. The scheduled planting date is April 2002. The plantings will be randomized complete block designs with one block for Iowa's collections, one block for Illinois' collections and one block for Missouri's collections.

Refer to Table #1 for collection information.

2002

Three assemblies of bur oaks were planted in April 2002 representing each state's collections, Iowa, Illinois and Missouri. Iowa's collections were planted in Field #6 on April 18, 2002, Illinois' collections were planted in Field #12 on April 17, 2002, and Missouri's collections were planted in Field #7 on April 18 – 19, 2002. These collections were evaluated for height, spread, vigor, and insect and disease resistance. The evaluation data was not documented in this year's report but will be in the 2003 Annual Technical Report. Table #1 reflects collection information.

2003

The three assemblies of bur oak representing the Missouri, Illinois, and Iowa collections were evaluated in October 2003. Performance characteristics evaluated were height, spread, vigor, and insect/disease resistance. The plant performance summaries can be found in Tables #2 to #4 and plot layout maps are Tables #8 to #10.

2004

All three plantings, Missouri, Iowa, and Illinois, were evaluated again for height, spread, vigor, and insect/disease resistance. Evaluation data for 2004 can be found in Tables #5, #6, and #7. The Iowa and Missouri plantings originally were planted with two trees of each collection in each replication. Not all collections had enough material to allow for two trees in each replication, but most did. In 2004, the lesser dominant tree was removed to allow the dominant tree to grow without competition. There are some replications that had trees die and the extra (non-dominant) trees were, in some cases, used to replace trees that died. The 2005 evaluations will reflect the replacement trees. Fertilizer, 13-13-13, was added to the three plantings to encourage growth and healthier plants.

Table # 1

Study Title: Assembly, Evaluation and Selection of Bur Oak *Quercus macrocarpa* Michx.

Temporary No.	State	County	MLRA	Collector
MO-1	Missouri	Calloway	115	Thomas L. Wekenborg
MO-2	Missouri	Chariton	NA	Charles Lewis
MO-3	Missouri	Shannon	053	Randy Misser
MO-4	Missouri	Lincoln	115	Jimmy Henry
MO-5	Missouri	Lincoln	115	Jimmy Henry
MO-6	Missouri	Lincoln		Wayne Lovelace
MO-7	Missouri			
MO-8	Missouri	Pike		Keith Jackson
MO-9	Missouri	Pike		Keith Jackson
MO-10	Missouri	Pike		Keith Jackson
MO-11	Missouri	Pike		Keith Jackson
MO-12	Missouri	Howard	N/A	Robert D. Dewitt
MO-13	Missouri	Boone	N/A	Robert D. Dewitt
MO-14	Missouri	St. Charles	115	Dan Crigler
MO-15	Missouri	Moniteau	115	Douglas Wallace
IL-1	Illinois	Clark	N/a	David E. Hiatt
IL-1	Illinois	Jasper	113	Dennis D. Clency
IA-1	Iowa	Dickinson	103	Tim K. Moran
IA-2	Iowa	Dickinson	103	Tim K. Moran
IA-3	Iowa	Dickinson	103	Tim K. Moran
IA-4	Iowa	Wayne	N/A	Duane Bedford
IA-5	Iowa	Decatur	109	Kevin Reynolds
IA-6	Iowa	Bremer	104	Richard J. Cornes
IA-7	Iowa	Black	104	Rick Cordes

Study MOPMC-P-0001-WE, WL

Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa* , Michx. **Table #2**

Summary of Iowa Collections, Located in Field #6

Summary of Height (Inches)

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Rep 11	Rep 12	Average	Best	Location
IA-1	13 w	4.5 e	10 w	13 e	16 e	7 e	10 e	12 e	9.5 w	12 e	14 w	14 e	11.21	15.5	Rep 5
IA-2	8 w	10 w	9 e	9 e	15 e	12.5 e	15 e	10 e	10 w	10 w	13 e	16 w	11.42	16	Rep 12
IA-3	9 w	8 e	9.5 w	13 e	11 e	8 e	7 w	9 e	11 e	12 w	10.5 e	9 w	9.75	13	Rep 4
IA-4	16 e	15.5 w	14.5 w	9.5 e	10 e	11.5 e		11 w	16 e	13 e	11 w		12.80	16	Rep 9
IA-5	13 w	15 w	15.5 w	8 w	16 w	14 w	24.5 e	23 e	12 w	17 e	20 w	10 e	15.63	24.5	Rep 7
IA-6	10 w	8.5 w	12 e	13 e	13 e	12.5 e	5 e	3 e	6.5 e	13 w	7 e	8 e	9.25	12.5	Reps 5, 6
IA-7	13 w	16 w	9.5 e	12 e	21 e	12.5 e	10 w	5.5 w	6 w	20 w	11 w	19 w	12.96	20	Rep 10

Summary of Spread (Inches)

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Rep 11	Rep 12	Average	Best	Location
IA-1	-	3.5 e	2.5 w	2 e	0.5 e	-	-	1 e	2 w	1 e	2.5 w	3 e	2.00	3.5	Rep 2
IA-2	-	3 w	-	1.5 e	2.5 e	2.5 e	1 e	2.5 e	1.5 w	0.5 w	0.5 e	2 w	1.75	3	Rep 2
IA-3	-	-	1.5 w	2.5 e	1 e	0.5 w	0.5 w	0.5 w	0.5 e	1 w	1.5 e	0.5	1.00	2.5	Rep 4
IA-4	-	2.5 w	1 e	1.5 e	1.5 e	-		1.5 w	1 e	2.5 e	2 w	-	1.69	2.5	Reps 2,10
IA-5	-	3 e	1.5 e	1.5 w	3 w	1 w	1 w	3.5 e	0.5 w	0.5 e	0.5 w	1.5 w	1.59	3	Reps 2, 5
IA-6	-	-	-	2.5 e	2.5 e	1.5 e	-	0.5 e	1 e	2 w	0.5 e	2 e	1.56	2.5	Reps 4, 5
IA-7	2 w	3 w	1.5 e	-	1 w	1 e	1.5 w	0.5 w	1 w	1.5 w	0.5 w	0.5 w	1.27	3	Rep 2

Summary of Vigor		- = No Spread on Plant										Table #2 - continued		
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Rep 9**	**Rep 10**	**Rep 11**	**Rep 12**	**Average**	**Best**	**Location**
IA-1	4	5	4	3	4	6	4	4	6	4	4	4	4.33	3	Rep 4
IA-2	4	4	4	4	3	4	6	4	5	5	4	3	4.17	3	Reps 5,12
IA-3	dead	4	3	3	4	4	6	6	4	4	5	6	4.45	3	Reps 3, 4
IA-4	3	3	3	4	4	4	-	4	3	4	4	-	3.60	3	Reps 2,3,9
IA-5	3	3	3	4	3	3	2	2	6	3	3	3	3.17	2	Reps 7, 8
IA-6	4	4	3	3	4	4		9	7	4	6	6	4.91	3	Reps 3, 4
IA-7	3	3	4	3	2	4	4	7	7	3	4	3	3.92	2	Rep 5

Legend Rating for Vigor: 1 = Excellent, 9 = Poor

Summary of Insect and Disease Resistance

Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Rep 7**	**Rep 8**	**Rep 9**	**Rep 10**	**Rep 11**	**Rep 12**	**Average**	**Best**	**Location**
IA-1	3	3	2	2	2	2	5	4	3	2	3	2	2.73	2	R,3,4,4,
															6. 10, 12
IA-2	2	2	2	2	3	2	3	5	4	4	3	2	2.91	2	R,1-4,6,12
IA-3	2	3	3	3	2	3	3	3	2	4	3	3	2.91	2	R,1, 5, 9
IA-4	2	2	3	2	2		4	4	3	2	3		2.78	2	R,1,2,4,5,
															10
IA-5	3	2	3	3	3	2	2	2	4	2	2	2	2.45	2	R,2,6,7,8,
															10,11,12
IA-6	2	2	2	2	3	2	4	3	4	3	4	3	2.91	2	R,1-4,6
IA-7	3	3	2	2	2	3	2	3	3	3	4	3	2.73	2	R,3-5,7

Legend Rating for Insect and Disease Resistance: 1 = Excellent, 9 = Poor

Summary of Missouri Collections Located in Field # 7 — **Table #3**

Summary of Height (Inches)

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average	Best	Location
MO-1	25 e	14 e	25 w	18.5 w	16 w	19.5 w	20.5 w	21 w	20.5 w	19.5 w	20.0	25	Reps 1,3
MO-2	20 w	24.5 w	19 w	26 w	17.5 e	9 w	7.5 w	7 w	8.5 w	13.5 w	15.3	26	Rep 4
MO-3	17 w	13 w	7 e	5 w	9.5 e	15 e	23 w	24 e	17 e	24.5 w	15.5	24	Rep 8
MO-4	10 w	16 e	20 w	23 e	25.5 w	8 w	18.5 e	16 w	18.5 w	14 w	16.9	25.5	Rep 5
MO-5	18 e	13 w	15.5 e	13 e	14 e	16.5 w	7 e	19.5 w	13.5 w	16.5 w	14.4	19.5	Rep 8
MO-6	19 w					24 w	12 w	24 w	20.5 w	22.5 w	20.6	24	Reps 6,8
MO-7	21 w	21 w	19 e	21 w	18 w	dead	12 e	12 e	15.5 e	16.5 e	17.3	21	Reps 1,2,4
MO-8	13.5 e	8.5 e	14 e	6 w	13 w	25 w	19 e	22.5 e	25 e	19 e	16.6	25	Reps 6,9
MO-9	21 e	17 w	19 e	27 e	11.5 w	18.5 w	17.5 e	25 e	17 e	20.5 e	19.4	25	Rep 8
MO-10	24 e	18 e	28 e	27.5 e	19 w	10 e	18.5 w	15.5 w	18 w	15 w	19.4	27.5	Rep 3
MO-11	14.5 e	23.5 e	24 w	24 e	10.5 w	7.5 w	18 e	21.5 e	26 e	18.5 e	18.8	26	Rep 9
MO-12	24.5' e	23 w	20.5 w	13 w	10 w	15 e	18 w	18.5 w	23.5 w	18 w	17.7	24.5	Rep 1
MO-13	plt mow	25.5 w	20.5 w	25 w	18 e	25.5 w	25.5 w	19.5 e	24.5 w	17 w	22.3	25.5	Reps 6,7
MO-14	21 e	21.5 w	27 w	20 e	13 e	15.5 e	14 w	18.5 w	20 w	17 w	18.8	27	Rep 3
MO-15			14.5 w	16.5 e	19.5 w						16.8	19.5	Rep 5

Summary of Spread (Inches)

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average	Best	Location
MO-1	1.5 e	2 d	2.5 w	0.5 w	0.5 w	2 e	5.5 w	4 w	4 w	2.5 w	2.6	5.5	Rep 7
MO-2	5 w	2 w	2 w	3 w	5 e	1.5 w	1.5 w	2.5 w	0.5 w	5 w	2.6	5	Reps1,5,10
MO-3	1 w	0.5 w	0.5 e	0.5 e	1 e	2 w	0.5 w	0.5 e	0.5 e	1.5 w	0.8	2	Rep 6
MO-4	1.5 w	1.5 e	1 w	0.5 e	1 w	1 w	2 e	1.5 w	0.5 w	1 w	1.1	2	Rep 7
MO-5	1.5 e	1.5 w	1.5 e	0.5 e	1 e	2 w	2.5 e	1.5 w	3 w	1 w	1.6	3	Rep 9
MO-6	2 w								1 w	3 w	2	3	Rep 10
MO-7	2.5 w	1 w	1.5 e	2.5 w	3 w	dead	0.5 e	3 e	1 e	2 e	1.8	3	Reps 5,8
MO-8	4 e	2 e	3.5 e	1 e	3 w	4 w	1 e	2 e	1 e	1 w	2.1	4	Reps 1,6
MO-9	3 e	1.5 w	2 e	3 e	1 w	3.5 w	1 e	3 e	0.5 e	3 w	2.1	3.5	Rep 6
MO-10	4 e	2.5 e	2 e	1.5 e	1 w	0.5 e	4.5 w	2.5 w	1 w	0.5 w	1.8	4.5	Rep 7

Table #3 - continued

Summary of Spread - continued

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average	Best	Location
MO-11	1.5 e	2 e	2 e	1.5 e	0.5 w	1 w	1.5 e	1 e	1 e	3.5 e	1.6	3.5	Rep 10
MO-12	4 e	3.5 w	4 w	2 w	1.5 w	0.5 e	2 w	2 w	4 w	1 w	2.5	4	Reps 1,3,9
MO-13	plt mow	0.5 w	1.5 w	2.5 w	1 e	3.5 w	1 w	1.5 e	4 w	2 w	1.9	4	Rep 9
MO-14	2 e	2 w	2 w	3 e	5 e	2 e	0.3 w	0.5 w	4 w	2 w	2.3	5	Rep 5
MO-15			1.5 w	1 e	1.5 w						1.3	1.5	Reps 3,5

Summary of Vigor

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average	Best	Location
MO-1	1	4	1	3	4	2	4	2	2	3	2.6	1	Reps 1,3
MO-2	1	1	3	1	3	7	7	8	8	5	4.4	1	Reps 1,2,4
MO-3	3	4	8	8	5	4	7	1	4	5	4.9	1	Rep 1
MO-4	3	3	2	1	1	7	3	5	3	4	3.2	1	Reps 4,5
MO-5	3	4	4	4	4	4	8	3	4	4	4.2	3	Reps 1,8
MO-6	3					2	5	1	2	1	2.2	1	Reps 8,10
MO-7	2	7	3	2	3	dead	6	5	4	4	4.0	2	Reps 1,4
MO-8	2	7	4	8	4	1	3	1	1	3	3.4	1	Reps 6,8,9
MO-9	2	4	3	1	5	6	3	1	4	2	3.1	1	Reps 4,8
MO-10	1	4	1	1	3	6	3	4	2	6	3.1	1	Reps 1,3,4
MO-11	4	1	1	1	5	8	3	2	1	4	3.0	1	Reps 2-4,9
MO-12	1	1	1	1	4	4	3	3	1	4	2.3	1	Reps 1-4,9
MO-13	plt mow	1	2	1	3	1	1	3	1	4	1.9	1	Reps 2,4,6,7,9
MO-14	2	1	8	2	4	4	4	3	2	4	3.4	1	Rep 2
MO-15		3		4	3						3.3	3	Reps 2,5

Legend for Vigor: 1 = Excellent, 9 = Poor

Summary of Insect and Disease Resistance — **Table #4**

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average	Best	Location
MO-1	2	3	2	3	4	2	5	3	2	3	2.9	2	Reps 1,3,6,9
MO-2	2	2	4	2	3	4	4	4	5	2	3.2	2	Reps 1,2,4,10
MO-3	3	3	4	4	4	5	3	2	4	2	3.4	2	Reps 8,10
MO-4	2	3	4	2	2	4	4	3	5	2	3.1	2	Reps 1,4,5,10
MO-5	3	4	3	4	3	2	3	4	4	3	3.3	2	Rep 6
MO-6	4					2	3	2	3	2	2.4	2	Reps 6,8,10
MO-7	2	3	3	4	4	dead	3	2	4	3	3.1	2	Reps 1,8
MO-8	2	4	4	5	3	2	4	3	2	2	3.1	2	Reps 1,6,9,10
MO-9	3	3	3	2	3	3	4	2	2	3	2.8	2	Reps 4,8,9
MO-10	2	2	2	2	2	4	2	5	3	4	2.8	2	Rep 1-5,7
MO-11	4	2	3	3	3	5	3	3	2	3	3.1	2	Reps 2,9
MO-12	2	2	2	4	3	4	2	2	4	2	2.7	2	Reps 1-3,7,8,10
MO-13	plt mow	2	2	4	2	2	2	3	2	3	2.4	2	Reps 2,3,5,6,7,9
MO-14	3	2	3	3	2	4	3	2	3	3	2.8	2	Reps 2,5,8
MO-15		4	4	3	3						3.5	3	Reps 4,5

Legend for Insect and Disease Resistance: 1 = Excellent, 9 = Poor

Summary of Illinois Collections, Located in Field #12

Accession	Average Height (Inches)	Average Spread (Inches)
IL-1	12.5	IL-1 2.8
IL-2	13.3	IL-2 3

	Average Insect/Disease	Average Vigor
IL-1	2	IL-1 3
IL-2	2.3	IL-2 3.9

Study MOPMC-P-0001-WE, WL **Table #5**
Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa*, Michx.

2004 Evaluation
Summary of Iowa Collections, Located in Field #6

Summary of Height (Feet)

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Rep 11	Rep 12	Avg.
IA-1	2.2	4.0	2.8	2.9	2.6	2.4	2.2	2.3	3.7	3.6	3.6	3.5	**3.0**
IA-2	2.9	3.1	2.4	2.7	2.9	3.1	2.4	3.6	3.5	3.4	3.7	3.8	**3.1**
IA-3	3.7	2.3	2.5	3.0	2.7	3.2	2.4	dead	3.6	2.5	3.3	3.4	**3.0**
IA-4	3.0	4.0	3.4	4.1	3.2	3.1	3.8	3.1	4.4	3.8	4.1	4.3	**3.7**
IA-5	4.3	3.7	4.9	3.7	3.5	3.2	3.2	3.2	3.5	dead	3.2	2.6	**3.5**
IA-6	2.3	3.0	2.4	2.4	3.6	3.5	dead	dead	3.4	3.1	2.2	3.5	**2.9**
IA-7	3.5	3.2	3.2	3.2	3.7	3.6	3.2	4.1	2.4	3.4	3.8	4.1	**3.5**

Summary of Spread (Feet)

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Rep 11	Rep 12	Avg.
IA-1	2	3.6	2.5	3.2	2.9	2.5	3	2	3.8	3.7	3	3.2	**3.0**
IA-2	2.7	2.7	2.4	2.1	2.2	2.8	3	3	2.6	3	2.9	2.6	**2.7**
IA-3	3.7	2.1	2.8	2.7	2.4	3.3	1.5	dead	3.3	3.1	2.2	3.6	**2.8**
IA-4	3	2.6	3.1	3.4	3	3.4	5	3.7	3	3.1	3.4	3.4	**3.3**
IA-5	4.4	3.2	3.3	4.1	3.8	2.5	2	3.4	2.9	dead	3.1	2.4	**3.2**
IA-6	2	3.6	2.2	2.4	3.4	3.4	dead	dead	3.8	3.2	2.6	2.5	**2.9**
IA-7	2.8	2.6	2.3	2.4	3.5	3.2	3.3	3.5	2.2	3.7	3	3.4	**3.0**

Summary of Vigor (1-9 Rating) 1=Very Good 9=Poor

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Rep 11	Rep 12	Avg.
IA-1	5	3	5	3	4	5	4	5	3	3	3	4	**3.9**
IA-2	4	3	5	5	4	4	5	3	4	4	3	4	**4.0**
IA-3	2	5	4	3	5	4	6	dead	3	4	5	3	**4.0**
IA-4	3	3	2	2	3	3	2	3	2	2	3	2	**2.5**
IA-5	1	3	1	2	2	4	5	3	4	dead	4	5	**3.1**
IA-6	5	3	5	4	3	3	dead	dead	3	3	5	4	**3.8**
IA-7	3	4	3	3	2	3	4	4	4	3	3	3	**3.3**

Summary of Insect and Disease Resitance (1-9 Rating) 1=Very Good 9=Poor

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Rep 11	Rep 12	Avg.
IA-1	2	3	3	3	1	4	2	3	2	2	2	2	**2.4**
IA-2	1	2	2	1	2	2	4	2	2	2	3	2	**2.1**
IA-3	2	2	3	3	2	3	2	dead	2	2	2	2	**2.3**
IA-4	2	3	2	2	3	2	3	2	3	2	2	1	**2.3**
IA-5	2	2	2	2	1	3	3	3	3	dead	5	2	**2.5**
IA-6	2	2	2	2	2	1	dead	dead	1	1	1	2	**1.6**
IA-7	2	3	2	1	2	2	2	2	2	2	4	2	**2.2**

Study MOPMC-P-0001-WE, WL **Table #6**
Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa*, Michx.

2004 Evaluation
Summary of Missouri Collections, Located in Field #7

Summary of Height (Feet)

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average
MO-1	3.0	3.2	3.2	2.8	3.7	2.4	3.9	dead	dead	2.4	**3.1**
MO-2	2.8	3.4	dead	3.1	3.6	dead	dead	dead	dead	2.6	**3.1**
MO-3	3.8	3.4	3.3	3.1	2.8	2.1	2.8	2.7	1.7	2.4	**2.8**
MO-4	3.6	3.1	2.9	3.3	3.0	1.3	3.1	3.1	3.2	2.8	**2.9**
MO-5	1.9	2.8	3.1	3.8	3.3	2.8	dead	2.8	2.9	3.3	**3.0**
MO-6	3.4					2.2	3.0	3.0	1.5	3.0	**2.7**
MO-7	3.9	dead	2.5	2.8	2.1	dead	dead	2.6	dead	3.6	**2.9**
MO-8	3.2	2.1	3.0	2.2	2.6	2.4	3.0	3.6	2.7	3.2	**2.8**
MO-9	4.3	2.8	4.2	2.6	2.4	2.5	1.3	4.2	1.6	3.4	**2.9**
MO-10	3.2	3.4	3.3	2.7	2.2	2.6	2.3	2.5	2.2	dead	**2.7**
MO-11	2.6	3.1	2.5	2.1	1.7	2.8	2.4	2.4	2.7	3.0	**2.5**
MO-12	2.4	2.4	3.0	2.0	2.2	2.0	2.7	2.6	2.4	3.2	**2.5**
MO-13	3.8	3.8	2.8	3.6	2.9	3.1	2.9	2.4	3.2	1.7	**3.0**
MO-14	3.5	3.3	2.6	2.8	1.7	2.1	dead	2.1	2.9	2.6	**2.6**
MO-15		3.9	3.1	3.0	3.1						**3.3**

Summary of Spread (Feet)

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average
MO-1	2.4	3.5	3.2	2.5	3.7	2.7	3.8	dead	dead	2.2	**3.0**
MO-2	3.2	3	dead	3.1	2.3	dead	dead	dead	dead	3	**2.9**
MO-3	3	2.6	3.5	2.9	2.6	2.3	2.3	2.7	1.7	3	**2.7**
MO-4	2.6	2.8	2.5	2.6	2.3	1.1	2.9	2.4	3	3	**2.5**
MO-5	1.8	3	2.3	3.4	3.3	2.5	dead	2.5	2.6	2.6	**2.7**
MO-6	2.6					2	2.1	2.6	1.2	2.4	**2.2**
MO-7	3.3	dead	2.6	3.5	2.1	dead	dead	2.8	dead	4	**3.1**
MO-8	2.9	1.9	3.3	1.8	2.2	2.6	2.4	3.1	2.7	3.1	**2.6**
MO-9	4.2	2.7	3.2	2.3	2.4	2.1	1.3	4.3	1.5	2.9	**2.7**
MO-10	2.9	2.8	2.7	3	2.2	2.2	2.1	2	2.7	dead	**2.5**
MO-11	2.6	2.8	2.6	1.8	1.9	2.4	2	2.6	3.4	3.3	**2.5**
MO-12	1.5	2.8	2.7	2	2.3	2.4	2.7	3	3	4.2	**2.7**
MO-13	3.4	3.1	2.9	3.6	3	2.9	2.6	2.3	3.2	1.2	**2.8**
MO-14	2.1	4.4	2.3	3.4	2.1	2.1	dead	2.7	2.5	3.1	**2.7**
MO-15		3.3	3.3	2.7	3.1						**3.1**

2004 Evaluation **Table #6 - continued**

Summary of Missouri Collections, Located in Field #7

Summary of Vigor (1-9 Rating) 1=Very Good 9=Poor

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average
MO-1	4	4	3	5	2	4	1	dead	dead	5	**3.5**
MO-2	5	4	dead	3	5	dead	dead	dead	dead	4	**4.2**
MO-3	3	4	3	4	4	5	4	4	7	4	**4.2**
MO-4	3	4	4	4	4	8	3	4	3	4	**4.1**
MO-5	6	5	4	1	3	4	dead	4	4	4	**3.9**
MO-6	4					5	4	4	8	4	**4.8**
MO-7	3	dead	5	3	6	dead	dead	5	dead	1	**3.8**
MO-8	3	6	3	6	5	4	4	2	4	3	**4.0**
MO-9	1	5	3	4	4	5	7	1	7	4	**4.1**
MO-10	4	4	3	3	4	5	4	6	5	dead	**4.2**
MO-11	4	4	5	6	6	4	5	4	3	3	**4.4**
MO-12	6	5	4	6	5	5	3	4	4	2	**4.4**
MO-13	3	3	4	2	3	3	4	6	4	7	**3.9**
MO-14	4	4	5	3	6	5	dead	4	4	4	**4.3**
MO-15		2	3	3	3						**2.8**

Summary of Insect and Disease Resistance (1-9 Rating) 1=Very Good 9=Poor

Acc. No.	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Average
MO-1	3	5	3	2	4	1	2	dead	dead	3	**2.9**
MO-2	4	2	dead	2	4	dead	dead	dead	dead	2	**2.8**
MO-3	3	4	3	3	2	2	2	2	3	2	**2.6**
MO-4	2	2	3	3	2	1	2	2	2	1	**2.0**
MO-5	1	3	2	2	2	1	dead	2	2	2	**1.9**
MO-6	4					2	2	2	1	2	**2.2**
MO-7	3	dead	2	2	2	dead	dead	2	dead	1	**2.0**
MO-8	4	3	3	4	3	1	3	2	3	2	**2.8**
MO-9	2	2	3	2	1	3	1	3	2	2	**2.1**
MO-10	3	4	2	2	1	2	1	3	2	dead	**2.2**
MO-11	3	3	3	2	3	2	2	2	2	2	**2.4**
MO-12	2	2	4	4	2	3	1	1	3	1	**2.3**
MO-13	5	2	3	1	2	2	3	2	4	3	**2.7**
MO-14	6	3	2	3	2	2	dead	2	3	3	**2.9**
MO-15		2	3	3	1						**2.3**

Study MOPMC-P-0001-WE, WL **Table #7**
Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa*, Michx.

2004 Evaluation
Summary of Illinois Collections, Located in Field #12

2004 Evaluation (AVERAGES)
Summary of Illinois Collections, Located in Field #12

Accession No.	Height (Feet)	Spread (Feet)	Insect/Disease	Vigor
IL-1	1.9	1.8	3.0	5.5
IL-2	1.7	1.6	2.8	6.1

There were only 2 collections from Illinois so they were put into 1 replication and the accessions were averaged. Height and spread are measured in feet and insect and disease resistance and plant vigor have been given a rating of 1-9; 1 is very good and 9 is poor.

Study MOPMC-P-001 Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa*, Michx.								
Plot Layout: 5-11-02								
Field 7 - Missouri Collections				**2 ROWS**			**Table #8**	
		Reps					**Reps**	
		12	Border Plant		Border Plant	**3**		**NORTH**
			14	accessions	1			
			13	"	2			
			12	"	3			
			11	"	4			
			10	"	5			
			9	"	6			
		10	8	"	7		**1**	
			7	"	8			
			6	"	9			
			5	"	10			
			4	"	11			
			3	"	12			
			2	"	13			
			1	"	14			
			14	accessions	1			
			13	"	2			
			12	"	3			
			11	"	4			
			10	"	5			
			9	"	15			
		9	8	"	7		**2**	
			7	"	8			
			6	"	9			
			5	"	10			
			4	"	11			
			3	"	12			
			2	"	13			
			1	"	14			
			Repeat	accessions	Repeat			
		8	14		1 to 14		**3**	
			to 1		replacing 6 with 15			
		7	Repeat	accessions	Repeat		**4**	
			14		1 to 14			
			to 1		replacing 6 with 15			
		6	Repeat	accessions	Repeat			
			14		1 to 14		**5**	
			to 1		replacing 6 with 15			
		13	Border Plant		Border Plant	**1**		
FOURTEEN ACCESSIONS PER REPLICATION. FIVE REPLICATIONS PER ROW.								
TWO ROWS TOTALING 10 REPLICATIONS AND 70 PLANTS.								
								.

Study MOPMC-P-001 Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa*, Michx.

Plot Layout: 5-30-02 — **Table # 9**

Two plants planted per location — **BP=Border Plant (only one plant planted)**

FIELD 6 - Iowa Collections

2 ROWS

REPS	3 (BP)	3 (BP)	REPS
	2	6	
	5	2	
	6	7	
12	4	1	1
	7	3	
	1	5	
	3	4	
	4	5	
	7	3	
	5	7	
11	1	2	2
	3	6	
	2	1	
	6	4	
	4	1	
	7	3	
	2	2	
10	1	7	3
	3	5	
	5	4	
	6	6	
	5	7	
	4	3	
9	3	1	
	7	4	4
	1	6	
	2	2	
	6	5	
	1	4	
	6	2	
	5	5	
8	3	3	5
	7	1	
	4	6	
	2	7	
	1	2	
	6*	5	
	4	7	
7	2	1	6
	7	3	
	3	6*	
	5	4	
	2 (BP)	1 (BP)	

NORTH

*ONLY ONE OF PLANT 6 PLANTED IN THESE LOCATIONS. RAN OUT OF PLANT 6.

(BP=Border Plant)

STUDY MOPMC-P-0001-WO **Table #10**

Assembly, Evaluation and Selection of Bur Oak, *Quercus macrocarpa*, Michx.

NORTH

Illinois bur oak assembly

Planted 4/17/02

FIELD #12

R O A D W A Y

'Cuivre River' Virginia wildrye

Purple prairie clover

ROADWAY

IL 2 IL 2 IL 1 IL 2 IL 2 IL 2 IL 2 IL 2 IL 2 IL 1 IL 2 IL 2 IL 2 IL 2 IL 2 IL 2 IL 1 IL 2 IL 2

12 feet between each planting number

Study ID Code: MOPMC-P-0002-WE, WL

Study Title: Assembly, Evaluation and Selection of False Indigo Bush, *Amorpha fruticosa,* L.

Study Leader: Cordsiemon, R.

Description:

False indigo bush, *Amorpha fruticosa* L., is a medium sized shrub up to ten feet in height. The general shape is an open canopy with the bulk of foliage and twigs in the upper 1/3 of the crown. The leaves are alternate, pinnately compound. Each leaflet is up to two inches long and just over one inch wide with a small, bristly like point at the rounded tip. The flowers are in dense spikes on the upper part of the plant, often several spikes clustered together. Each flower has dark indigo-purple petals with yellow tipped stamens. Flowering time: late spring to midsummer. Twigs are rigid, glabrous, red-brown or gray, often with an insect caused, long swelling near the tip. The fruit is a small, warty kidney shaped pod (1/2 inch long), with large glandular dots, in a crowded cylindrical cluster. The fruit persist on the shrub through winter. Found in more open areas along lakes and streams. May be found in upland areas where additional moisture is received.

Objective:

The objective of this study is to select a local source, fast growing, high seed producing false indigo bush.

Materials and Methods:

Field collections were assembled, accessioned and held in storage until the collection period ended. The assemblage of collections began at the PMC in November 2000. After the collection period was over, the seed was planted in the greenhouse using the Root Pruning Method (RPM) containers. The plants will be transplanted in a selected field on the PMC (preferably bottomland site). The design will be a randomized complete block with three plants per plot: one block for the Iowa collections, one for the Illinois collections and one for the Missouri collections.

Discussion:

2000

A total of 32 collections were made from the PMC three state service area including North Dakota: 19 from Iowa, eight from Missouri, four from Illinois and one from North Dakota. On February 15, 2000, these collections were given accession numbers and placed in the PMC greenhouse for germination. At the time this report was written these collections were continuing germination in the greenhouse. During the period April-May 2001 these collections will be planted in Fields #6, #7 and #10 on the PMC. Collections from each

state will be planted in separate fields on the PMC. The planting design will be a randomized complete block with three plants per plot. Refer to Table #1 for collection information.

2001

Three separate plantings were established in the month of June 2001: Iowa's collections of false indigo bush were planted in Field #10 on the PMC on June 21, Illinois collections were planted in Field # 6 on June 20 and Missouri's collections were planted in Field # 7 on June 21. Each planting reflected a randomized complete block design with four plants per plot. Survival evaluations were conducted in October 2001.

2002

The three separate plantings representing Iowa, Illinois and Missouri collections were evaluated on several occasions in 2002 to document vigor, height, spread, insect and disease resistance and seed production. Table #1 contains collection information. The evaluation data was not documented in this year's report but will be in the 2003 Annual Technical Report.

2003

Seed was harvested from the evaluation plantings of each of the states in October 2003. The seed from these plantings was allocated to the respective states for use in field plantings.

2004

Seed was harvested from the three state plantings in October 2004. Evaluation data from the past year was compiled and is noted in Tables #2, #3, and #4. Galls formed on a few branches of each plant causing some concern as to how this might effect seed production. These galls are possibly caused by a caterpillar that has laid eggs in the branch. The branch dies at the location where the gall forms. Each gall will be hand clipped off and burned to eliminate any further infestation in the winter of 2004-05. Also each plant will be sprayed around the base with a non-selective herbicide while the plant is dormant. The intention is to eliminate competition and allow for an application of the insecticide, Merit. Merit is a systemic insecticide that will help eliminate any further insect damage. Seed production has declined slightly and seed germination has declined significantly. The galls may have resulted in poor seed production, but they are not totally responsible for poor seed germination. The seed have been examined and there may be evidence of another insect affecting the plant or the possibility of seed not filling. The false indigo plantings seemed to have flowered just fine and moisture was not a problem with the abundance of rainfall in 2004. Another insect does seem likely and other nurseries have experienced seed damage of a weevil burrowing into the seeds. This has not been identified yet at the PMC, but will be closely monitored in the next year. Each planting will be evaluated again in 2005 for height, spread, vigor, and insect and disease resistance. The data collected will be noted in the 2005 report. Selections were made and each is scheduled for release in 2005.

Study MOPMC-P-0002-WE, WL – False Indigo

Table #1

Temporary No.	State	County	MLRA	Collector
MO-1	Missouri	Audrain	N/A	Mack Ellis
MO-2	Missouri	Knox	N/A	John Keith Doug Rainey
MO-3	Missouri	Marion	N/A	Mack Ellis Jay Lingwall
MO-4	Missouri		N/A	Maurice Davis
MO-5	Missouri		N/A	Maurice Davis
MO-6	Missouri	Lincoln	115	Jerry Kaiser
MO-7	Missouri	Pike	115	Keith Jackson
MO-8	Missouri	Pettis	116B	Shannon Zezula
IL-1	Illinois	Champaign	111	Kenton Macy
IL-2	Illinois	Champaign	110	Graciela Moreno
IL-3	Illinois	Piatt	108	Kenton Macy
IL-4	Illinois	Lawrence	114	Kenton Macy
IA-1	Iowa	Monona	107	Drew Delang
IA-2	Iowa	Adams	108	Mark Palmquist
IA-3	Iowa	Jones	105	Joe Wagner
IA-4	Iowa	Decatur	109	Kevin Reynolds
IA-5	Iowa	Dickinson	103	Carroll Oskvig
IA-6	Iowa	Dickinson	103	Carroll Oskvig
IA-7	Iowa	Dickinson	103	Carroll Oskvig
IA-8	Iowa	Dickinson	103	Carroll Oskvig
IA-9	Iowa	Dickinson	103	Carroll Oskvig
IA-10	Iowa	Dickinson	103	Carroll Oskvig
IA-11	Iowa	Dickinson	103	Carroll Oskvig
IA-12	Iowa	Dickinson	103	Carroll Oskvig
IA-13	Iowa	Dickinson	103	Carroll Oskvig
IA-14	Iowa	Dickinson	103	Carroll-Oskvig
IA-15	Iowa	Iowa	108	Timothy Meyer
IA-16	Iowa	Decatur	109	Melvin Moe
IA-17	Iowa	Henry	108C	Dova Ensminger
IA-18	Iowa	Jefferson	N/A	Shawn Dettmann
IA-19	Iowa	Louisa	108C	Shawn Dettmann

Study MOPMC-P-0002, WE, WL - Assembly, Evaluation and Selection of False Indigo Bush, Amorpha fruticosa, L.																				Field 6	
																				Table #2	
		Rep 1	Rep 1	Rep 1	Rep 1	Avg.	Rep 2	Rep 2	Rep 2	Rep 2	Avg.	Rep 3	Rep 3	Rep 3	Rep 3	Avg.	Rep 4	Rep 4	Rep 4	Rep 4	Avg.
IL-1	height	3.4	3.4	3.2	n/a	**3.33**	2.5	3.7	1.7	3.9	**2.95**	3.2	2.3	3.4	2.5	**2.85**	3.4	2.7	4.7	2.1	**3.23**
	spread	4.6	4.2	2.9	n/a	**3.90**	2.3	2.7	1.8	4.8	**2.90**	1.5	2.4	3.8	3.2	**2.73**	2.6	3.0	5.2	1.2	**3.00**
	vigor	3	3	7	n/a	**4.33**	7	5	8	5	**6.25**	7	6	5	5	**5.75**	6	5	2	8	**5.25**
	seed prod.	3	4	8	n/a	**5.00**	0	4	0	3	**1.75**	0	0	5	5	**2.50**	5	3	2	0	**2.50**
IL-2	height	2.7	3.0	3.8	3.0	**3.13**	n/a	3.0	3.6	4.0	**3.53**	3.2	3.9	3.2	2.9	**3.30**	2.1	3.3	3.2	2.2	**2.70**
	spread	3.3	4.8	2.6	3.8	**3.63**	n/a	3.2	3.7	4.9	**3.93**	3.0	3.5	2.9	3.0	**3.10**	1.7	3.7	2.6	0.8	**2.20**
	vigor	4	4	4	4	**4.00**	n/a	7	4	3	**4.67**	4	4	6	5	**4.75**	8	4	7	8	**6.75**
	seed prod.	7	3	4	4	**4.50**	n/a	8	4	3	**5.00**	4	4	4	5	**4.25**	0	3	6	0	**2.25**
IL-3	height	4.4	4.4	3.4	n/a	**4.07**	2.3	3.4	4.2	4.3	**3.55**	3.2	3.9	3.2	2.9	**3.30**	3.1	2.4	3.5	2.2	**2.80**
	spread	4.9	3.9	4.9	n/a	**4.57**	2.4	4.7	4.2	3.1	**3.60**	3.0	3.5	2.9	3.0	**3.10**	3.2	1.7	4.5	2.1	**2.88**
	vigor	4	6	4	n/a	**4.67**	7	4	2	4	**4.25**	4	4	6	5	**4.75**	3	7	4	7	**5.25**
	seed prod.	2	5	3	n/a	**3.33**	7	3	2	5	**4.25**	4	4	4	5	**4.25**	3	0	3	6	**3.00**
IL-4	height	3.3	n/a	4.4	3.0	**3.57**	1.7	3.6	3.0	4.1	**3.10**	5.6	4.1	3.2	2.2	**3.78**	2.1	2.8	4.0	3.3	**3.05**
	spread	2.9	n/a	4.2	2.8	**3.30**	1.6	4.0	3.0	5.9	**3.63**	5.1	3.9	4.9	1.7	**3.90**	0.7	2.0	3.9	3.2	**2.45**
	vigor	5	n/a	3	5	**4.33**	8	4	6	3	**5.25**	1	4	5	0	**2.50**	8	7	3	5	**5.75**
	seed prod.	6	n/a	2	4	**4.00**	0	0	4	2	**1.50**	2	3	3	0	**2.00**	8	6	3	5	**5.50**

Study MOPMC-P-0002, WE, WL - Assembly, Evaluation and Selection of False Indigo Bush, Amorpha fruticosa, L.																					
																				Field 7	
																				Table #3	
		Rep 1	Rep 1	Rep 1	Rep 1	Ave.	Rep 2	Rep 2	Rep 2	Rep 1	Ave.	Rep 3	Rep 3	Rep 3	Rep 3	Ave.	Rep 4	Rep 4	Rep 4	Rep 4	Ave.
MO-1	height	2.8	3.4	3.0	3.5	**3.18**	3.5	4.1	3.6	N/A	**2.80**	4.2	3.2	2.9	4.1	**3.60**	1.9	0.9	1.8	2.2	**1.70**
	spread	3.1	3.6	2.6	3.6	**3.23**	2.3	4.8	3.0	N/A	**2.53**	4.0	4.9	1.4	4.7	**3.75**	1.3	0.6	0.9	1.1	**0.98**
	vigor	7	7	7	5	**6.50**	6	5	6	N/A	**4.25**	5	5	7	5	**5.50**	9	9	9	8	**8.75**
	seed prod.	8	8	8	6	**7.50**	0	5	6	N/A	**2.75**	8	0	0	0	**2.00**	0	0	0	0	**0.00**
MO-3	height	3.6	2.7	2.1	2.6	**2.75**	2.4	2.8	4.0	2.4	**2.90**	2.6	3.1	2.7	3.2	**2.90**	2.8	1.8	3.0	2.8	**2.60**
	spread	5.7	3.3	2.2	3.0	**3.55**	4.4	2.9	4.6	2.2	**3.53**	5.0	4.3	3.6	3.9	**4.20**	3.9	0.9	4.2	4.0	**3.25**
	vigor	5	7	8	7	**6.75**	6	7	5	8	**6.50**	7	6	7	6	**6.50**	7	8	6	6	**6.75**
	seed prod.	7	0	0	7	**3.50**	9	6	7	0	**5.50**	7	6	6	6	**6.25**	7	0	7	6	**5.00**
MO-4	height	4.9	4.4	3.9	3.7	**4.23**	4.3	3.9	1.7	3.8	**3.43**	3.0	3.9	2.8	3.2	**3.23**	4.0	4.1	2.0	4.9	**3.75**
	spread	5.3	3.4	2.4	3.6	**3.68**	2.4	2.2	0.9	3.2	**2.18**	2.6	3.0	2.2	1.2	**2.25**	3.5	6.3	1.3	5.2	**4.08**
	vigor	3	5	6	5	**4.75**	5	6	8	5	**6.00**	6	6	7	8	**6.75**	5	5	8	4	**5.50**
	seed prod.	7	6	9	5	**6.75**	0	0	0	8	**2.00**	8	0	0	0	**2.00**	7	6	0	7	**5.00**
MO-5	height	5.3	4.0	2.2	4.0	**3.88**	1.6	3.8	4.9	3.7	**3.50**	3.3	3.4	3.6	3.7	**3.50**	4.0	4.0	2.6	5.5	**4.03**
	spread	6.2	3.6	2.5	2.3	**3.65**	0.8	4.5	4.7	3.2	**3.30**	3.3	3.2	3.5	2.6	**3.15**	2.9	3.2	2.0	4.7	**3.20**
	vigor	4.0	5.0	7.0	6.0	**5.50**	9.0	5.0	4.0	5.0	**5.75**	5.0	5.0	5.0	5.0	**5.00**	6.0	5.0	7.0	3.0	**5.25**
	seed prod.	0.0	8.0	0.0	8.0	**4.00**	0.0	0.0	0.0	0.0	**0.00**	0.0	0.0	0.0	0.0	**0.00**	0.0	0.0	0.0	4.0	**1.00**
MO-6	height	0.7	2.3	4.4	3.7	**2.78**	3.0	3.3	4.0	4.0	**3.58**	4.2	3.1	2.6	2.0	**2.98**	2.0	2.4	3.0	3.5	**2.73**
	spread	1.7	1.3	3.0	4.4	**2.60**	2.0	3.8	2.1	2.6	**2.63**	4.3	2.2	1.2	0.7	**2.10**	1.2	1.5	2.3	3.0	**2.00**
	vigor	9.0	9.0	6.0	5.0	**7.25**	7.0	6.0	6.0	6.0	**6.25**	5.0	6.0	8.0	8.0	**6.75**	8.0	8.0	7.0	6.0	**7.25**
	seed prod.	0.0	0.0	0.0	0.0	**0.00**	0.0	0.0	0.0	0.0	**0.00**	8.0	0.0	0.0	0.0	**2.00**	0.0	0.0	0.0	9.0	**2.25**
MO-7	height	3.9	4.4	1.9	3.9	**3.53**	4.4	4.2	3.8	2.8	**3.80**	2.6	4.2	4.1	3.1	**3.50**	4.7	2.4	3.8	3.8	**3.68**
	spread	4.2	3.9	0.7	3.5	**3.08**	2.6	3.2	1.8	1.7	**2.33**	2.0	4.2	3.5	2.5	**3.05**	4.0	1.4	3.0	4.7	**3.28**
	vigor	6.0	6.0	9.0	7.0	**7.00**	5.0	5.0	6.0	8.0	**6.00**	7.0	5.0	5.0	7.0	**6.00**	5.0	7.0	5.0	5.0	**5.50**
	seed prod.	0.0	8.0	0.0	9.0	**4.25**	8.0	7.0	9.0	0.0	**6.00**	0.0	0.0	0.0	0.0	**0.00**	5.0	0.0	6.0	5.0	**4.00**
MO-8	height	3.2	3.3	2.2	3.0	**2.93**	2.6	2.0	2.4	3.5	**2.63**	3.0	2.8	3.2	2.4	**2.85**	2.9	3.6	3.0	3.2	**3.18**
	spread	6.2	3.6	2.5	4.3	**4.15**	1.6	2.3	1.8	3.9	**2.40**	3.6	2.0	3.0	1.3	**2.48**	3.9	4.4	3.9	4.0	**4.05**
	vigor	6.0	6.0	7.0	5.0	**6.00**	7.0	7.0	7.0	5.0	**6.50**	6.0	6.0	5.0	8.0	**6.25**	5.0	5.0	5.0	5.0	**5.00**
	seed prod.	8.0	8.0	0.0	7.0	**5.75**	0.0	0.0	0.0	7.0	**1.75**	8.0	0.0	0.0	0.0	**2.00**	8.0	6.0	4.0	8.0	**6.50**

Study MOPMC-P-0002, WE, WL - Assembly, Evaluation and Selection of False Indigo Bush, Amorpha fruticosa, L.																					Field 10
																					Table #4
		Rep 1	Rep 1	Rep 1	Rep 1	Avg.	Rep 2	Rep 2	Rep 2	Rep 2	Avg.	Rep 3	Rep 3	Rep 3	Rep 3	Avg.	Rep 4	Rep 4	Rep 4	Rep 4	Avg.
IA-1	height	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**
	spread	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**
	vigor	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**
	seed prod.	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**	n/a	n/a	n/a	n/a	**x**
IA-2	height	5.2	3.3	4.0	3.3	**3.95**	3.9	4.2	3.5	3.6	**3.80**	3.8	4.9	3.3	4.5	**4.13**	3.2	4.1	3.8	4.0	**3.78**
	spread	6.4	2.7	5.0	4.3	**4.60**	6.0	5.8	5.2	4.2	**5.30**	4.8	4.3	4.6	5.3	**4.75**	5.0	5.9	4.3	6.6	**5.45**
	vigor	3	6	4	5	**4.50**	4	4	6	6	**5.00**	4	4	5	4	**4.25**	5	4	5	4	**4.50**
	seed prod.	3	7	5	5	**5.00**	9	6	3	6	**6.00**	3	5	4	5	**4.25**	6	3	4	3	**4.00**
IA-3	height	2.7	3.9	2.8	3.4	**3.20**	3.2	3.7	4.0	3.9	**3.70**	4.0	3.7	3.0	3.1	**3.45**	3.2	3.6	4.0	4.6	**3.85**
	spread	2.3	7.3	4.0	5.3	**4.73**	3.6	3.3	3.6	4.2	**3.68**	5.7	5.3	4.4	4.2	**4.90**	5.0	4.8	3.7	4.6	**4.53**
	vigor	8	4	5	5	**5.50**	8	7	3	4	**5.50**	4	5	6	5	**5.00**	6	5	5	4	**5.00**
	seed prod.	9	3	6	4	**5.50**	5	6	4	5	**5.00**	4	7	0	6	**4.25**	4	4	5	3	**4.00**
IA-4	height	4.9	5.1	4.5	5.6	**5.03**	5.0	5.0	4.6	4.4	**4.75**	5.2	5.5	5.5	5.2	**5.35**	5.2	4.4	4.5	5.3	**4.85**
	spread	4.3	5.4	5.7	5.6	**5.25**	7.7	4.8	5.2	5.7	**5.85**	5.6	6.0	6.0	6.5	**6.03**	6.3	4.5	6.8	6.9	**6.13**
	vigor	3	2	3	2	**2.50**	3	3	3	3	**3.00**	3	3	3	3	**3.00**	5	6	5	3	**4.75**
	seed prod.	3	2	2	2	**2.25**	3	3	2	3	**2.75**	3	5	4	3	**3.75**	4	6	4	3	**4.25**
IA-5	height	5.0	4.7	4.5	4.2	**4.60**	4.6	4.0	4.4	4.7	**4.43**	4.9	4.0	4.3	4.1	**4.33**	4.0	3.1	3.9	4.5	**3.88**
	spread	6.0	6.5	5.5	3.4	**5.35**	7.6	6.8	4.8	5.7	**6.23**	6.5	4.0	4.8	6.8	**5.53**	5.2	4.0	5.6	7.4	**5.55**
	vigor	3	3	2	6	**3.50**	4	5	5	4	**4.50**	4	5	4	3	**4.00**	5	6	4	4	**4.75**
	seed prod.	3	4	2	9	**4.50**	4	5	8	6	**5.75**	7	9	4	8	**7.00**	6	7	3	7	**5.75**
IA-6	height	4.6	5.4	4.8	4.0	**4.70**	4.8	3.5	4.9	5.2	**4.60**	1.7	4.5	4.6	3.9	**3.68**	3.6	4.1	3.8	5.3	**4.20**
	spread	5.4	5.9	5.0	3.6	**4.98**	4.0	3.8	4.5	4.4	**4.18**	1.0	6.7	4.8	4.7	**4.30**	6.0	5.0	5.0	6.4	**5.60**
	vigor	4	3	3	5	**3.75**	4	5	3	3	**3.75**	9	4	4	5	**5.50**	4	4	4	3	**3.75**
	seed prod.	6	8	3	9	**6.50**	6	9	4	6	**6.25**	0	9	0	0	**2.25**	6	8	9	2	**6.25**
IA-7	height	5.4	4.7	5.0	4.4	**4.88**	5.2	4.5	4.2	4.9	**4.70**	4.4	3.5	4.1	4.6	**4.15**	4.6	5.4	4.6	4.4	**4.75**
	spread	6.7	4.8	5.7	4.3	**5.38**	5.9	6.6	3.8	5.8	**5.53**	4.0	2.0	5.3	4.0	**3.83**	5.6	6.0	5.8	7.3	**6.18**
	vigor	3	3	3	4	**3.25**	4	3	6	3	**4.00**	4	7	4	5	**5.00**	4	4	4	3	**3.75**
	seed prod.	4	3	4	3	**3.50**	3	2	7	3	**3.75**	4	8	5	6	**5.75**	4	3	3	3	**3.25**

Study MOPMC-P-0002, WE, WL - Assembly, Evaluation and Selection of False Indigo Bush, Amorpha fruticosa, L.																				Field 10	
cont.																					
		Rep 1	Rep 1	Rep 1	Rep 1	Avg.	Rep 2	Rep 2	Rep 2	Rep 2	Avg.	Rep 3	Rep 3	Rep 3	Rep 3	Avg.	Rep 4	Rep 4	Rep 4	Rep 4	Avg.
IA-8	height	4.5	7.5	6.4	6.1	**6.13**	3.7	6.2	5.5	5.7	**5.28**	4.9	4.5	5.3	4.8	**4.88**	4.9	7.3	5.3	5.7	**5.80**
	spread	3.6	3.2	6.2	7.7	**5.18**	3.8	5.7	6.0	5.6	**5.28**	5.6	3.0	4.8	6.7	**5.03**	5.0	5.0	7.4	9.0	**6.60**
	vigor	4	2	2	2	**2.50**	6	3	3	3	**3.75**	5	6	5	4	**5.00**	3	2	4	3	**3.00**
	seed prod.	0	5	4	6	**3.75**	7	5	7	2	**5.25**	6	9	6	7	**7.00**	3	9	5	6	**5.75**
IA-9	height	4.6	5.8	5.2	4.4	**5.00**	2.2	4.3	3.7	4.3	**3.63**	3.8	4.5	4.3	4.2	**4.20**	3.0	4.3	4.4	4.0	**3.93**
	spread	5.7	6.6	3.0	7.1	**5.60**	1.7	6.1	5.6	6.8	**5.05**	5.4	7.4	5.8	5.3	**5.98**	3.0	5.3	6.4	6.5	**5.30**
	vigor	3	2	3	3	**2.75**	7	6	4	4	**5.25**	5	4	4	4	**4.25**	7	4	4	4	**4.75**
	seed prod.	2	3	7	7	**4.75**	0	0	3	4	**1.75**	7	4	6	6	**5.75**	0	8	6	6	**5.00**
IA-10	height	4.9	4.5	4.9	4.4	**4.68**	5.1	4.2	3.9	4.4	**4.40**	6.1	5.0	3.8	5.1	**5.00**	4.5	4.4	4.8	4.8	**4.63**
	spread	7.5	7.1	5.9	4.4	**6.23**	3.8	4.8	4.7	5.5	**4.70**	4.8	5.6	5.5	4.0	**4.98**	5.7	6.8	5.6	5.5	**5.90**
	vigor	3	3	4	6	**4.00**	3	0	4	3	**2.50**	4	4	6	5	**4.75**	4	3	4	4	**3.75**
	seed prod.	3	6	3	0	**3.00**	8	4	5	3	**5.00**	5	0	0	9	**3.50**	3	2	0	0	**1.25**
IA-11	height	4.9	4.3	5.5	5.5	**5.05**	4.2	4.3	4.0	4.9	**4.35**	3.7	4.5	3.5	4.1	**3.95**	4.3	3.6	4.5	5.0	**4.35**
	spread	5.5	5.6	9.8	4.5	**6.35**	4.9	4.8	3.7	5.9	**4.83**	4.8	5.0	4.0	3.0	**4.20**	3.9	2.8	3.4	7.0	**4.28**
	vigor	4	3	2	3	**3.00**	6	7	6	4	**5.75**	4	3	4	4	**3.75**	4	7	7	3	**5.25**
	seed prod.	6	7	7	0	**5.00**	4	0	6	4	**3.50**	6	4	7	0	**4.25**	7	9	4	3	**5.75**
IA-12	height	4.7	5.2	5.0	5.3	**5.05**	4.3	3.8	5.4	3.8	**4.33**	4.6	4.5	3.6	3.7	**4.10**	4.9	4.5	4.3	4.3	**4.50**
	spread	4.0	5.6	4.0	7.0	**5.15**	6.8	3.8	6.3	4.5	**5.35**	4.1	3.3	4.1	3.5	**3.75**	5.6	3.9	4.0	4.2	**4.43**
	vigor	4	4	4	3	**3.75**	3	5	3	5	**4.00**	4	5	7	6	**5.50**	3	5	4	5	**4.25**
	seed prod.	7	0	8	2	**4.25**	6	5	4	8	**5.75**	5	9	5	6	**6.25**	2	7	0	0	**2.25**
IA-13	height	4.6	3.7	4.7	4.3	**4.33**	4.3	4.3	3.7	4.9	**4.30**	3.7	4.3	4.3	5.1	**4.35**	3.8	3.4	3.5	4.5	**3.80**
	spread	5.8	5.4	6.3	6.9	**6.10**	6.9	4.2	6.5	5.3	**5.73**	4.5	4.8	3.7	5.3	**4.58**	5.1	4.1	4.6	4.9	**4.68**
	vigor	5	4	2	4	**3.75**	4	5	5	4	**4.50**	5	4	4	6	**4.75**	3	6	5	4	**4.50**
	seed prod.	6	4	2	4	**4.00**	5	5	5	4	**4.75**	4	3	4	9	**5.00**	4	4	5	5	**4.50**
IA-14	height	4.1	4.4	3.9	4.1	**4.13**	3.5	4.4	4.4	4.3	**4.15**	3.8	5.4	4.5	4.0	**4.43**	4.5	4.6	3.8	4.3	**4.30**
	spread	5.0	6.6	5.0	5.3	**5.48**	3.5	7.1	5.4	4.8	**5.20**	4.0	5.0	3.4	4.0	**4.10**	6.7	4.5	5.8	5.0	**5.50**
	vigor	4	3	3	4	**3.50**	6	4	3	4	**4.25**	6	3	4	4	**4.25**	3	7	6	6	**5.50**
	seed prod.	0	0	3	4	**1.75**	6	3	3	3	**3.75**	0	9	8	7	**6.00**	7	0	3	7	**4.25**

Study MOPMC-P-0002, WE, WL - Assembly, Evaluation and Selection of False Indigo Bush, Amorpha fruticosa, L.																					Field 10
cont.																					
		Rep 1	Rep 1	Rep 1	Rep 1	Avg.	Rep 2	Rep 2	Rep 2	Rep 2	Avg.	Rep 3	Rep 3	Rep 3	Rep 3	Avg.	Rep 4	Rep 4	Rep 4	Rep 4	Avg.
IA-15	height	4.0	4.0	3.4	3.7	**3.78**	4.6	4.3	4.0	4.5	**4.35**	4.9	4.5	5.3	4.8	**4.88**	3.4	3.7	4.0	4.1	**3.80**
	spread	5.9	3.9	4.0	5.9	**4.93**	4.8	6.7	6.5	6.7	**6.18**	5.6	3.0	4.8	6.7	**5.03**	3.4	4.5	3.4	4.1	**3.85**
	vigor	4	6	7	5	**5.50**	3	3	4	4	**3.50**	5	6	5	4	**5.00**	6	4	4	4	**4.50**
	seed prod.	4	8	6	6	**6.00**	3	3	4	4	**3.50**	6	9	6	7	**7.00**	0	4	5	4	**3.25**
IA-16	height	4.1	5.1	4.4	n/a	**4.53**	4.9	5.2	4.7	4.4	**4.80**	4.3	5.2	4.3	3.7	**4.38**	3.7	4.4	4.0	4.1	**4.05**
	spread	6.6	7.5	6.7	n/a	**6.93**	8.2	6.2	5.0	6.4	**6.45**	5.5	6.5	5.3	7.5	**6.20**	5.3	4.3	5.3	5.5	**5.10**
	vigor	2	3	3	n/a	**2.67**	3	4	4	4	**3.75**	4	3	4	5	**4.00**	5	4	3	4	**4.00**
	seed prod.	2	3	4	n/a	**3.00**	2	4	4	3	**3.25**	4	4	0	6	**3.50**	4	7	4	4	**4.75**
ND-1	height	3.3	3.6	2.5	2.9	**3.08**	3.9	3.6	3.8	3.0	**3.58**	0.4	3.1	n/a	n/a	**1.75**	n/a	n/a	n/a	n/a	**0.00**
	spread	5.8	3.7	2.0	1.9	**3.35**	6.5	5.7	6.0	4.7	**5.73**	0.4	2.7	n/a	n/a	**1.55**	n/a	n/a	n/a	n/a	**0.00**
	vigor	5	8	9	9	**7.75**	4	5	5	7	**5.25**	9	8	n/a	n/a	**8.50**	n/a	n/a	n/a	n/a	**0.00**
	seed prod.	6	9	0	0	**3.75**	5	5	5	8	**5.75**	0	0	n/a	n/a	**0.00**	n/a	n/a	n/a	n/a	**0.00**
IA-18	height	4.8	3.0	4.0	3.0	**3.70**	4.9	3.3	3.7	3.8	**3.93**	3.2	4.1	3.8	3.8	**3.73**	n/a	2.6	3.1	2.3	**2.67**
	spread	4.9	3.3	4.0	4.5	**4.18**	4.7	3.0	4.0	5.4	**4.28**	4.3	7.0	5.8	5.3	**5.60**	n/a	3.0	3.7	2.1	**2.93**
	vigor	6	7	6	5	**6.00**	4	6	5	4	**4.75**	5	5	4	4	**4.50**	n/a	8	8	8	**8.00**
	seed prod.	7	9	7	4	**6.75**	3	7	7	5	**5.50**	4	4	4	5	**4.25**	n/a	0	9	0	**3.00**
IA-19	height	4.0	5.5	4.3	dead	**4.60**	4.3	4.1	4.7	4.4	**4.38**	4.0	5.3	4.3	5.0	**4.65**	4.3	4.4	3.8	4.0	**4.13**
	spread	5.6	6.2	5.6	dead	**5.80**	6.3	5.4	5.5	5.1	**5.58**	4.4	6.6	5.2	5.2	**5.35**	4.8	6.7	4.6	5.0	**5.28**
	vigor	4	3	5	dead	**4.00**	4	4	3	4	**3.75**	5	2	3	3	**3.25**	6	5	5	5	**5.25**
	seed prod.	4	4	7	dead	**5.00**	5	4	3	5	**4.25**	8	3	2	3	**4.00**	6	5	6	0	**4.25**

Study ID Code: MOPMC-P-0003-PA,WL

Study Title - Evaluation and Release of Eastern Gamagrass, *Tripsacum dactyloides, L.*

Study Leader: Bruckerhoff, S. B.

Introduction:

Eastern gamagrass, *Tripsacum dactyloides* L., is a tall warm season perennial grass found from Florida to Texas and Mexico, north and west to Massachusetts, New York, Michigan, Illinois, Missouri, Iowa and Nebraska. Eastern gamagrass grows in large clumps with thick rhizomes, broad flat leaves, the staminate and pistillate flowers in separate parts of the same many-flowered spikes. The pistillate spikelets are solitary and occur in hollowed portions on opposite sides of the thickened hard joints of the lower part of the rachis; this pistillate portion breaks up at maturity into several one-seeded joints. The staminate spikelets are two-flowered and in pairs on one side of a continuous rachis. Eastern gamagrass occurs on prairies, open limestone slopes, borders of woods and thickets, fields, and along roadsides and railroads. Eastern gamagrass is considered by many to be the ice-cream grass of the prairie. It is high in forage production and quality.

Problem:

The variety most commonly used in the PMC service area is 'Pete' and it performs well although its origin is Oklahoma and Kansas. This species is common in the PMC service area and a more adapted and improved variety should be able to be developed from native collections.

Objectives:

To evaluate and compare the variety 'Pete' with the best accessions from PMC study 29I107G and accessions developed at Woodward, Oklahoma.

Release an adapted variety and or varieties of eastern gamagrass for forage production and conservation uses in Missouri, Iowa, Illinois, Indiana and Ohio.

Cooperators:

Agriculture Research Service (ARS) Southern Plains Range Research Station, Woodward, Oklahoma.

Procedure:

Accessions selected previous work (Study 29I107G) at the Elsberry PMC and the Southern Plains Range Research Station at Woodward, Oklahoma will be assembled in 2000. Plants will be started in the greenhouse and planted in a randomized complete block with four replications. Plot size is nine feet by 18 feet consisting of three rows of plants, six plants per row with a three-foot spacing. The accessions will be tested for forage quality and production twice a year for three years.

Discussion:

2000

Plants arrived from Oklahoma in May and the study was planted in Field #9, pipeline D and E, June 28, 2000 and July 12, 2000. The plants from Elsberry were not as old so they were allowed to catch up. Plot map can be seen in Table #1.

2001

The plants established well in 2000 and only a few border row plants were replaced in 2001. Evaluations were taken on the interior four plants of each plot. Three forage harvests were taken during 2001 to compare yield and quality. Samples were sent to Woodward, Oklahoma for analysis. Evaluations will continue for three years.

2002

Forage harvests were taken twice in 2002 instead of three times as in 2001 because of the extremely dry summer. The first harvest was June 21, 2002 and the second harvest was delayed until August 6, 2002. These samples were sent to Woodward, Oklahoma for analysis. Evaluations will continue through 2003.

2003/2004

Forage harvests were made three times in 2003; June 19, July 30, and September 24. These samples were again sent to Woodward, Oklahoma for quality analysis. Forage yield and quality data for all three years can be seen in Table #2. The MOPMC accession 9083214 looked very good in comparison to the other accessions. This accession is a normal diploid plant. Seed production for this accession was again very low in 2004 and tested poorly for seed quality.

The Oklahoma accession FTII is a fertile triploid that has compared highly in evaluations at other PMCs also and is scheduled for release in 2005.

MOPMC-P-0003-PA,WL

Table #1

Elsberry PMC Field #9 **Pipeline D and E**

Rep 4		9061911	FTIV	FTII	9083214		
		FT94-8	9061924	FTG1	Pete	X	X
Rep 3		FTII	9061911	Pete	FTIV	P E	F T
		FTG1	9083214	FO94-8	9061924	T E	II
Rep 2		Pete	FTIV	FTII	FT94-8	X X X	X X X
		9083214	9061924	9061911	FTG1	X 6	X F
Rep 1		9061911+C34	FT94-8 \1	FTIV \1	9061924	1 9 2	T G 1
		FTII	Pete	9083214	FTG1	4 X \2	 X \2

Plot Size: 9' x 18' Planted 6/28/00, 7/12/00

3 rows of plants	X X X X X X
6 plants per row	X X X X X X
3 foot spacing	X X X X X X

\1 Southeast plant in plot was substituted with Pete because proper accession was not available.
\2 Above plots consisted of ten plants each for seed production information.

FTIV – Fertile Triploid OK accession	9061911 – Diploid MO accession
FT II – Fertile Triploid OK accession	9061924 – Diploid MO (North) accession
FGT I – Fertile Gynomonecious Triploid OK accn.	9083214 – Diploid Cross MO accession
FT 94-8 Fertile Triploid OK accession	'Pete' varietal release (Check)

Study MOPMC-P-0003-PA, WL Evaluation of Eastern Gamagrass														Table #2		
Yield Pounds/Acre			Density		1 Plant/9Sq. Ft.											
	Year 2001					Year 2002					Year 2003					3 Year
Cultivar	Rep 1	Rep 2	Rep 3	Rep 4	Ave.	Rep 1	Rep 2	Rep 3	Rep 4	Ave.	Rep 1	Rep 2	Rep 3	Rep 4	Ave.	Ave.
FTII	8478	9871	10140	8771	**9315**	6638	8598	7214	10948	**8349.5**	6538	7159	9236	7574	**7626.75**	**8430**
9083214	4940	6643	12981	11871	**9109**	7105	7619	8038	11111	**8468.25**	7487	6716	6357	8477	**7259.25**	**8279**
FTIV	6460	6590	7174	7600	**6956**	8915	7383	10206	9233	**8934.25**	5307	5704	8018	5926	**6238.75**	**7376**
Pete	5894	7236	5866	7280	**6569**	5691	7932	8951	10927	**8375.25**	7011	5228	7244	7785	**6817**	**7254**
FGT I	4617	2703	6488	4852	**4665**	5959	4918	6818	4455	**5537.5**	5607	5965	5511	3684	**5191.75**	**5131**
9061924	5518	4498	7985	4259	**5565**	4869	4674	7102	5023	**5417**	4324	4017	5745	3169	**4313.75**	**5099**
9061911	4363	4561	5229	4928	**4770**	5048	6615	5000	5613	**5569**	3969	4276	4302	3644	**4047.75**	**4796**
FT94-8	48	0	5104	0	**2576**	0	0	0	0	**0**	0	0	0	0	**0**	**2576**
Weighted Crude Protein																
	Year 2001					Year 2002					Year 2003					3 Year
Cultivar	Rep 1	Rep 2	Rep 3	Rep 4	Ave.	Rep 1	Rep 2	Rep 3	Rep 4	Ave.	Rep 1	Rep 2	Rep 3	Rep 4	Ave.	Ave.
9061911	9.80	11.03	12.45	11.43	**11.18**	13.12	11.90	14.91	11.48	**12.85**	13.62	13.02	15.26	14.69	**14.15**	**12.73**
9061924	9.98	10.05	11.62	12.11	**10.94**	11.97	12.60	11.44	9.65	**11.42**	13.60	15.10	13.68	14.99	**14.34**	**12.23**
FGT I	10.22	11.34	9.98	11.74	**10.82**	9.88	12.82	8.90	9.70	**10.33**	12.38	14.91	14.50	15.03	**14.21**	**11.78**
FT 94-8	13.57		8.33		**10.95**											**10.95**
9083214	9.84	9.92	10.04	10.84	**10.16**	8.27	7.85	9.66	8.80	**8.645**	13.42	14.80	13.56	11.99	**13.44**	**10.75**
Pete	10.17	9.75	10.20	9.87	**10.00**	9.18	7.73	7.82	9.02	**8.4375**	10.14	12.06	13.36	14.50	**12.52**	**10.32**
FT IV	8.86	10.47	9.42	9.55	**9.58**	8.33	7.99	8.67	7.57	**8.14**	11.56	11.35	13.44	11.38	**11.93**	**9.88**
FT II	9.59	9.34	8.14	10.00	**9.27**	9.58	6.04	8.43	7.82	**7.9675**	11.46	10.61	14.09	12.91	**12.27**	**9.83**

Study ID Code: MOPMC-T-0104

Study Title: Native Plant Identification

Study Leader: Kaiser, J. U.

Description:

Plant identification by landowners and NRCS Field Personnel is very challenging in the early seedling stages. As a result, plant identification workshops are being held in several locations in Missouri, Illinois and Iowa. As a result of these sessions, a need has developed which would make available via PowerPoint or on the web, color digital photos illustrating different characteristics of native grasses, legumes, and forbs. These photos could then be used during training workshops or extracted from the web by individuals interested in specific plant identification.

Objective:

There are many publications presently available for use regarding plant identification; however, the majority of these deal only with identification of matured plants. Not much information (photos) is readily available regarding seedling identification of native grasses, forbs, and legumes. The objective is to make available, particularly over the web, color photos of seedlings of native grasses (cool and warm season), legumes and forbs.

Materials and Methods:

Assemble seed and plants of selected native cool and warm season grasses, legumes and forbs and take color photos at different stages of growth.

Discussion:

2001

The study plan was developed and approved in August 2001. A total of 31 different species of native grasses (cool and warm season), legumes and forbs are involved in this study: five cool season grasses, four warm season grasses, five legumes and 17 forbs. Color photos will be taken of the seed of each species, seven, 14 and 30 days after germination and at flowering and seed set. These photos will then be placed on the plant materials web site and made available to those individuals interested in these plants.

The following is a listing of plant species included in this study.

2002

Digital photos and color slides are being taken of New England aster, roundhead lespedeza, oxeye false sunflower, Canada wildrye, Virginia wildrye, stiff goldenrod, prairie blazing star, oxeye false sunflower and rattlesnake master. Photos are being taken of the seed, seven days, 14 days, and 30 days after germination, at flowering, and seed set. Photos will then be placed on the plant materials web site and made available to NRCS employees and other individuals interested in these plants.

Native Cool Season Grasses	Native Warm Season Grasses
Elymus canadensis	*Spartina pectinata*
Elymus virginicus	*Paspalum laeve*
Calamagrostic canadensis	*Dichanthelium clandestinum*
Cinna arundinacea	*Sporobolus asper*
Uniola latifolia	
Native Forbs	**Native Legumes**
Liatris pycnostachya	*Lespedeza capitata*
Eryngium yuccifolium	*Desmodium canadense*
Coreopsis palmata	*Dalea purpureum*
Ratibida pinnata	*Dalea candide*
Aster novae-angliae	*Tephrosia virginiana L.*
Heliopsis helianthoides	
Echinacea pallida	
Monarda fistulosa	
Zizia aurea	
Ascelepias tuberosa	
Solidago rigida	
Silphium laciniatum	
Veronicastrum virginicum	
Penstemon digitalis	
Lobelia siphilitica	
Desmanthus illinoensis	
Liatris aster	

2003

The quality of the photography produced within the agency could not provide the enhanced resolution to capture the details needed from the species for the photos to be used on the web sites.

2004

A revision to the study plan was approved to be a partnership with Missouri Department of Conservation (MDC), a private professional photographer, and the Elsberry PMC to provide quality photography for web based native plant species.

The study will involve the photographer growing from seed the species listed below and photographing them at various stages. The stages are:

1) Seeds - 10 to 15 together, with a ruler for size.
2) Seedling - showing the cotyledons and the first true leaves.
3) Juvenile - 3 to 6 inches in height showing typical leaves together.
4) Diagnostic characteristic - a representative part of the plant that aids in identification.
5) Mature plant – showing the flowering stage.

The five stages of the 14 plants will provide 70 images.

Native Forbs	Native Legumes
Aster novae-angliae - New England Aster	*Chamaecrista fasciculate* - Partridge pea
Coreopsis palmate - Prairie Coreopsis	*Dalea candida* - White prairie clover
Echinacea pallida - Pale Purple coneflower	*Dalea purpureum* - Purple prairie clover
Eryngium yuccifolium - Rattlesnake master	*Desmnthus illinoensis* - Illinois bundleflower
Heliopsis helianthoides - Ox-eye sunflower	*Desmodium canadense* - Showy tick trefoil
Liatris pycnostachya - Prairie blazing star	*Lespedeza capitata* - Round-headed bushclover
Ratibida pinnata - Gray-headed coneflower	
Rudbeckia hirta - Black-eyed susan	

The photography was completed on the species above and our partner, MDC, is working on developing the website for the species photo images. The website will be developed in 2005. Once established, a link to the site will be set up within NRCS. The Elsberry PMC will inform the field when the website is on line. Twenty-six additional species consisting of native legumes, forbs and native grasses will be added in 2005.

Study ID Code: MOPMC-T-0105, PA

Study Title – Compatibility Study Using Native Warm Season and Cool Season Grasses with Native Legumes and Forbs

Study Leader: Bruckerhoff, S. B.

Introduction:

Herbaceous plantings using native species are often a single grass species or a mixture of grasses with few legumes or forbs. These types of plantings are typical for forage, conservation cover or even wildlife plantings. Many native forbs and legumes are compatible with native grass species in a native prairie. In a planting using native species it is important to know which ones are most likely to compete with the grasses during the establishment period. Forb and legume seed is more expensive than the grass seed and most plantings lack diversity.

Problem:

There is little to no documented information regarding the compatibility of native warm and cool season grasses with native legumes and forbs in a pasture or range seeding. As a result of the lack of this needed information, the PMC Advisory Committee has directed the PMC to initiate this study.

Objective:

The objective of this study is to determine which native forbs and legumes will establish the easiest and persist the longest with specific native grasses.

Procedure:

Secure seed of the following native cool and warm season grasses, forbs, and legumes.

- **Cool Season Grasses:** Virginia wildrye, Western wheatgrass, Junegrass, and Porcupinegrass.
- **Warm Season Grasses:** Eastern gamagrass, Little bluestem, Big bluestem, Indiangrass, and Switchgrass.
- **Forbs:** Oxeye daisy, Prairie coreopsis, and Grayhead coneflower.
- **Legumes:** Bush clover, *Desmodium canadense*, Purple prairie clover, White prairie clover, Illinois bundleflower, Goat's rue, Wild senna, and Lead plant.

Plots of a native warm season grass mixture, native cool season grass mixture and warm and cool season grass mixture will be established in four replications. Native legumes and forb mixtures will be planted with the grass mixtures. Plots will be planted in the spring and also as winter dormant plantings. All species will also be planted at the same time in the spring and winter except one warm and cool season grass mixture.

Plots will be mowed for weed control during the establishment year. The forage will be removed two to three times a year from half the plot the following years to assimilate rotational grazing.

Discussion:

2001

A site was prepared on the PMC using glyphosate to kill existing vegetation that consisted of mostly annual weedy species. The area was then plowed, disked and planted to an annual covercrop of 80% oats and 20% wheat. Plot composition of species can be seen in Table #1. Seeding rates are 40 pure live seed per square foot with 60% being the grass component and 40% being the forb and legume component.

2002

The winter dormant plots were planted January 8 and 9, 2002 using a plot planter. Seeding depth was one fourth inch for all species except the eastern gamagrass which was planted three fourths to one inch deep. The spring plots were planted May 20 and 21. All seed was planted at a depth of one fourth to one half inch with the exception of eastern gamagrass which again was planted at a depth of three fourths to one inch. All species that required treatment were stratified and/or scarified and inoculated. The plot map of the winter dormant planting is Table #2 and the spring planting is Table #3.

Mowing throughout the summer was the weed control method used. The plots were mowed when vegetation reached six to eight inches. Mowing height was three to four inches.

All plots were evaluated toward the end of the growing season for species composition. Most of the grasses were represented in the plots but in very low densities. Only sideoats gramma and Virginia wildrye appeared in plots in densities in the moderate range. The only legumes/forbs that were identified even at low densities were winter dormant planting Illinois bundleflower, grayhead coneflower, and prairie coreopsis. Spring planting was Illinois bundleflower and wild senna.

2003/2004

The plots were evaluated for specie density during 2003 and 2004 (see Tables 4 and 5). A winter burn was conducted on all plots in early 2004.

Most species that were planted were identified in the plots although some in very low densities. The specie in the legume/forb mixture showing up in the highest concentration is grayhead coneflower. Others most consistently found were *desmodium*, oxeye daisey, Illinois bundleflower(spring seeding only), and purple prairie clover (spring seeding only).

Most of the grass components of the plots established well but were not very thick stands. The sideoats gramma was high density and the plots with western wheatgrass, Junegrass, and porcupine grass were very poor or none at all.

Study MOPMC-PA-0105 Compatibility Study **Table #1**

8/16/01

Spring planting Randomized complete block 4 Replications

Winter dormant planting Randomized complete block 4 Replications \1

Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9
BB , SG 8'	LB , SO 8'	EG	T , SG	VW , IG	VW , WW	JG , PG	EG	Check
Legume	Legume	Legume	Legume	Legume	Legume	Legume		
Forb	Forb	Forb	Forb	Forb	Forb	Forb	Kura	
Mixture	Mixture	Mixture	Mixture	Mixture	Mixture	Mixture	clover	
			\1					

WS grass components	CS grass components	Legume components	Forb components
big bluestem (BB)	Virginia wildrye (VW)	bush clover	oxeye daisey
little bluestem (LB)	western wheatgrass (WW)	purple prairie clover	grayhead coneflower
switchgrass (SG)	junegrass (JG)	white prairie clover	prairie coreopsis
sideoats gramma (SO)	porcupine grass (PG)	desmodium	
eastern gamagrass (EG)		goat's rue	
indiangrass (IG)	timothy (T)	wild senna	
		Illinois bundleflower	
		lead plant	

Fall planted oats covercrop on winter dormancy plantings

plot size 10' X 20'

Kura clover

\1 This plot will not have a winter dormant planting but rather a late summer planting.

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STUDY MOPMC-T-0105 Native Grass/Legume/Forb Compatibility Study **Field #1** **Table #2**

Eastside

Dormant planting

Terrace

North

REP #1 1 2 3 4 5 9 7 8 ← Terrace →

Rep 1 Rep 2 Rep 3 Rep 4

REP #2 4 7 9 1 6 8 3 2 6 5 7 7

2 4 5 9 8 1 6 3 Rep 4

REP #3 6 1 4 2 9 3 8 5

← Roadway →

Plot #1	Big bluestem, switchgrass, Legume and Forb Mixture
Plot #2	Little bluestem, sideoats gramma, Legume and Forb Mixture
Plot #3	Eastern gamagrass, Legume and Forb Mixture
Plot #4	Timothy, switchgrass, Legume and Forb Mixture
Plot #5	Virginia wildrye, Indiangrass, Legume and Forb Mixture
Plot #6	Virginia wildrye, western wheatgrass, Legume and Forb Mixture
Plot #7	Junegrass, porcupine grass, Legume and Forb Mixture
Plot #8	Eastern gamagrass, Kura clover
Plot #9	Check Legume Mixture Only

.

STUDY MOPMC-T-0105 Native Grass/Legume/Forb Compatibility Study | **Field #1** | **Table #3**

West side
spring planting
planted 5/20-21/02

North

Terrace

REP #2	7	3	8	1	6	9	4	5	2		4	7	3	8	6	1	5	9	2	REP #4	
REP #1	1	7	9	1	6	8	3	2	9		3	8	1	6	4	9	2	5	7	REP #3	

Roadway

Plot #1	Big bluestem, switchgrass, Legume and Forb Mixture
Plot #2	Little bluestem, sideoats gramma, Legume and Forb Mixture
Plot #3	Eastern gamagrass, Legume and Forb Mixture
Plot #4	Timothy, switchgrass, Legume and Forb Mixture
Plot #5	Virginia wildrye, Indiangrass, Legume and Forb Mixture
Plot #6	Virginia wildrye, western wheatgrass, Legume and Forb Mixture
Plot #7	Junegrass, porcupine grass, Legume and Forb Mixture
Plot #8	Eastern gamagrass, Kura clover
Plot #9	Check Legume Mixture Only

.

Study MOPMC-PA-0105 Compatability Study																		Table #4	
															planted 5/20/02				
		Winter Dormant					Stems/square ft per plot												
		Plot #1		Plot #2		Plot #3		Plot #4		Plot #5		Plot #6		Plot #7		Plot #8		Plot #9	
		2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
WS grass components																			
big bluestem (BB)		0.75	1.25							0.13	0.00	0.25	0	0.13	0			0.25	0
little bluestem (LB)				0.50	0.38													0.13	0
switchgrass (SG)		1.75	1.75					0.50	0.50					1.25	0				
sideoats gramma (SO)				1.00	0.38														
eastern gamagrass (EG)						3.00	2.25									3.50	6.75		
indiangrass (IG)										1.75	1.00					0.13	0	0.25	0
CS grass components																			
Virginia wildrye (VW)										0.50	1.75	0.50	0.50						
western wheatgrass (WW)																			
junegrass (JG)																			
porcupine grass (PG)																			
timothy (T)								0.25	1.75										
Legume components																			
bush clover		0.13	0.13	0.13	0.25	0.13	0.25	0	0.13		0.50	0.25	0.50	0.25	0.25			0.13	0.13
purple prairie clover		0.13	0			0.13	0												
white prairie clover																			
desmodium		0.38	0.38	0.25	0.50	0.25	0.50	0.13	0.13	0.13	0.38	0.38	0.38	0.25	0.50			0.38	0.50
goat's rue												0.13	0	0.25	0.13			0	0.25
wild senna		0.38	0.25	0.38	0.50	0.38	0.50	0.25	0.50	0.25	0.38	0.25	0.38	0.25	0.38			0.38	0.13
Illinois bundleflower								0.13	0	0	0.13							0.13	0
lead plant														0.13	0			0.13	0
kura clover																0	0.25		
Forb components																			
oxeye daisey		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.38	0.50	0.13		0.50	0.50
grayhead coneflower		0.50	2.00	0.50	2.00	0.50	2.50	0.50	2.00	0.50	2.25	0.50	2.75	0	2.25			0.50	3.00
prairie coreopsis		0.13	0	0	0.50	0	0.13	0	0.25	0	0.25	0.13	0.25	0.38	0.25			0	0.38
.																			

Study MOPMC-PA-0105 Compatability Study																		Table #5	
															planted 5/20/02				
	Spring planted plots						Stems/square ft per plot												
	Plot #1		Plot #2		Plot #3		Plot #4		Plot #5		Plot #6		Plot #7		Plot #8		Plot #9	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
WS grass components																		
big bluestem (BB)	0.50	1.25																
little bluestem (LB)			0.75	0.38														
switchgrass (SG)	4.25	6.00					5.75	20.63										
sideoats gramma (SO)			30.00	26.25														
eastern gamagrass (EG)					1.75	6.38									2.00	3.00		
indiangrass (IG)									2.75	5.00								
CS grass components																		
Virginia wildrye (VW)									0.75	4.75	1.25	4.00						
western wheatgrass (WW)												0.13						
junegrass (JG)													0.13	0				
porcupine grass (PG)													0	0				
timothy (T)							0	0										
Legume components																		
bush clover	0.13	0.50	0.50	0.38	0	0.38	0	0.38	0.13	0.38	0.13	0.38	0.13	0.25			0.25	0.38
purple prairie clover	0.38	0.50	0.50	0.50	0.38	0.50	0.25	0.50	0.38	0.50	0.50	0.50	0.50	0.38			0.25	0.50
white prairie clover	0	0.13	0	0.25	0	0.38	0	0.50	0	0.13	0	0.38	0	0.13			0	0.50
desmodium	0.38	0.50	0.38	0.50	0.50	0.50	0.38	0.50	0.38	0.50	0.38	0.50	0.50	0.50			0.38	0.50
goat's rue	0	0.38	0.13	0.25	0.00	0.50	0.00	0.38	0.00	0.25	0.00	0.25	0.00	0.25			0	0.38
wild senna	0	0	0	0	0	0	0	0	0.13	0	0	0	0.13	0			0	0
Illinois bundleflower	0.38	0.50	0.25	0.25	0.38	0.38	0.50	0.50	0.38	0.38	0.50	0.50	0.50	0.50			0.50	0.38
lead plant	0.38	0	0.38	0	0.13	0	0.13	0	0.25	0	0.25	0	0.38	0			0.50	0
kura clover															0	0		
Forb components																		
oxeye daisey	0.50	0.50	0.50	0.50	0.38	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			0.50	0.50
grayhead coneflower	0.50	1.00	0.38	0.50	0.38	0.50	0.38	0.75	0.38	0.75	0.38	1.00	0.38	0.75			0.50	1.25
prairie coreopsis	0	0	0	0	0	0	0	0	0	0.13	0	0.13	0	0			0	0.13
.																		

Study ID Code: MOPMC-T-0106, BU

Study Title: Collection and Evaluation of Native Cool Season Grasses and Sedges for Filter Strips

Study Leader: Cordsiemon, R.

Description:

A need has developed out of a three-state technical review committee and approved by the State Conservationists Advisory Committee to evaluate different native cool season grasses and sedges for filter strips.

Grasses and sedges to be considered are Virginia wildrye, *Elymus canadensis*; Canada wildrye, *Elymus canadensis*; Junegrass, *Koeleria crista;* bluejoint, *Calamagrostic canadensis*; sweet woodreed, *Cinna arundinacea*; river oats, *Uniola latifolia*; longhair sedge, *Carex cosmosa*; Frank sedge, *Carex frankii*; shoreline sedge, *Carex hyalinolepis*; wheat sedge, *Carex atherodes*; raven's foot sedge, Carex crus-corvi Shuttlew, short sedge, *Carex shortina*, hop sedge, *Carex lupulina* Muhl., crested sedge, *Carex cristatella* Britton, bristle bract sedge, *Carex tribuloides*, and greater straw sedge, *Carex normalis*.

Objective:

There is little to no documented information regarding native cool season grasses and sedges being used in filter strip situations. In an attempt to respond to this lack of information, the PMC has been directed to initiate this study. Depending upon the performance of selected native cool season grasses and sedges in filter strip situations, previous recommendations may change to include those native cool season grasses and sedges performing excellently in this situation.

Discussion:

2001

The study plan for this study was initiated and approved by the State Conservationists' Advisory Committee in August of 2001. Selected field offices in the PMC service area will be contacted in the spring of 2002 requesting their participation in this collection, however everyone is welcomed to participate. One to three collections per state per species are being requested, both seeds and plants. The plants will be grown in the PMC greenhouse and later transplanted in randomized complete blocks. Each block will be one foot wide and five feet long with approximately 30 plants per plot. The spacing of the plants in the blocks will be six inches x six inches.

2002-2003

Collections of native sedges and cool season grasses began on July 2, 2002. The following chart reflects a listing of the collections made as of the time this report was developed. The collection period was extended one more year to make collections of

those species that have not been made or those species needing more collections. Fourteen additional collections were made in the state of Missouri and eleven were made in Iowa during 2003. Samples of seed from each different species were planted in the greenhouse to determine the germination percentage. The results will be documented in the 2004 Annual Technical Report. Field #10 on the PMC has been selected as the site for this study because of the access to water. Two collections of river oats were planted (vegetatively) on September 9, 2002. Both collections were performing with fair to good vigor.

2004

The planting site for this project was changed from Field #10 to Field #7. There is still available water and space. There were two separate wetland cells constructed by using a landscraper in order to simulate a wetland environment. The wetland cells measure 20 feet x 200 feet and are made up of several different individual blocks. The blocks themselves measure 5 feet x 20 feet (refer to Table #2 for map). Collections that did well in the greenhouse were stepped up in plug containers. They were planted in Field #7 on May 3 and were evaluated for percent stand, percent cover, lodging, and survival in late June (refer to Table #3). The west cell contains 17 blocks that include 100 plants per block of a particular species. The east cell contains 27 different collections consolidated into 11 different blocks. These collections were added together because they did not contain 100 plants. All blocks were planted on one foot by one foot spacing. Each collection will be evaluated three times in 2005, (late winter, summer, and fall) for percent stand and cover, lodging, and survival. The cells will be kept fairly damp throughout the growing season and will be treated with a pre-emergent grass herbicide in the sedge plots to help control annual grasses.

Table #1

Study MOPMC-T-0106, BU - Collection and Evaluation of Native Cool Season Grasses and Sedges for Filter Strips

Scientific Name	Common Name	Collector	City, State	Temp. Acc. No
Carex crus-corvi	Ravens foot sedge	Dennis Shirk	Vienna, MO	MO-1
Carex grayii	Gray sedge	Dennis Shirk	Vienna, MO	MO-2
Carex atherodes	Slough Sedge	Dennis Shirk	Vienna, MO	MO-3
Carex vulpinoidea Michx.	Fox sedge	Dennis Shirk	Vienna, MO	MO-4
Carex vulpinoidea Michx.	Fox sedge	Kaiser & Henry	Elsberry, MO	MO-5
Carex hyalinolepis Steud.	Thinscale scale	Kaiser & Henry	Elsberry, MO	MO-6
Carex crus-corvi Shuttlew	Crowfoot sedge	Kaiser & Henry	Elsberry, MO	MO-7
Carex hyalinolepis Steud.	Thinscale sedge	Paul Freese	Albany, MO	MO-8
Carex vulpinoidea Michx	Fox sedge	Kaiser & Henry	Elsberry, MO	MO-9
Scirpus atrovirens	Green bulrush	Kaiser & Henry	Elsberry, MO	MO-10
Scirpus atrovirens	Green bulrush	Kaiser & Henry	Elsberry, MO	MO-11
Carex frankii Kunth.	Franks sedge	Paul Frese	Albany, MO	MO-12
Carex lupulina Muhl.	Hop sedge	Raleigh Redman	Warrensburg, MO	MO-13
Carex grayii	Gray's sedge	Raleigh Redman	Warrensburg, MO	MO-14
Carex hyalinolepis Steud.	Thinscale sedged.	Raleigh Redman	Warrensburg, MO	MO-15
Carex frankii Kunth	Frank's sedge	Lingwall & Ellis	Ralls Co., MO	MO-17
Carex crus-corvi	Crowfoot sedge	Lingwall & Ellis	Ralls Co., MO	MO-18
Carex hyalinolepis Stued.	Thinscale sedge	Lingwall & Ellis	Ralls Co., MO	MO-19
Carex frankii Kunth	Frank's sedge	Raleigh Redman	Warrensburg, MO	MO-20
Chasmanthium latifolium	River oats	J. Kaiser	Troy, MO	MO-21

Table # 1-Study MOPMC-T-0106, BU - cont.

Scientific Name	Common Name	Collector	City, State	Temp. Acc. No
Chasmanthium latifolium	River oats	Travis Dinsdale	Springfield, MO	MO-22
Chasmanthium latifolium	River oats	Rodney Doolen	Puxico, MO	MO-23
Chasmanthium latifolium	River oats	J. Kaiser	Troy, MO	MO-24
Chasmanthium Latifolium	River oats	William Brouk	Benton, MO	MO-25
Carex crus-corvi Shuttlew	Ravensfoot sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-26
Carex shartina	Short sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-27
Carex	Shoreline sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-28
Carex hyalinoepis	Thinscale sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-29
Carex vulpinoidea Michx.	Fox sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-30
Carex crus-corvi Shuttlew	Ravensfoot sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-31
Carex vulpinoides Michx	Fox sedge	J. Kaiser J. Henry	BK Leach Wildlife Area	MO-32
Scipus atrovirens	Green bulrush	Aaron Jeffries	Howard Co, MO	MO-33
Carex frankii	Frank's sedge	Aaron Jeffries	Howard Co, MO	MO-34
Carex lupulina	Hop sedge	Aaron Jeffries	Howard Co, MO	MO-35
Carex shortina	Short sedge	Aaron Jeffries	Howard Co, MO	MO-36
Scirpus acutus	Hard-stemmed bulrush	Aaron Jeffries	Howard Co, MO	MO-37
Scirpus atrovirens	Green bulrush	Paul Frese	Gentry Co, MO	MO-38
Chasmanthium latifolium	River oats	Travis Dinsdale	Webster Co, MO	MO-39
Carex hyalinoepis Steud.	Thinscale sedge	Dave Hiatt	Martinsville, IL	IL-1

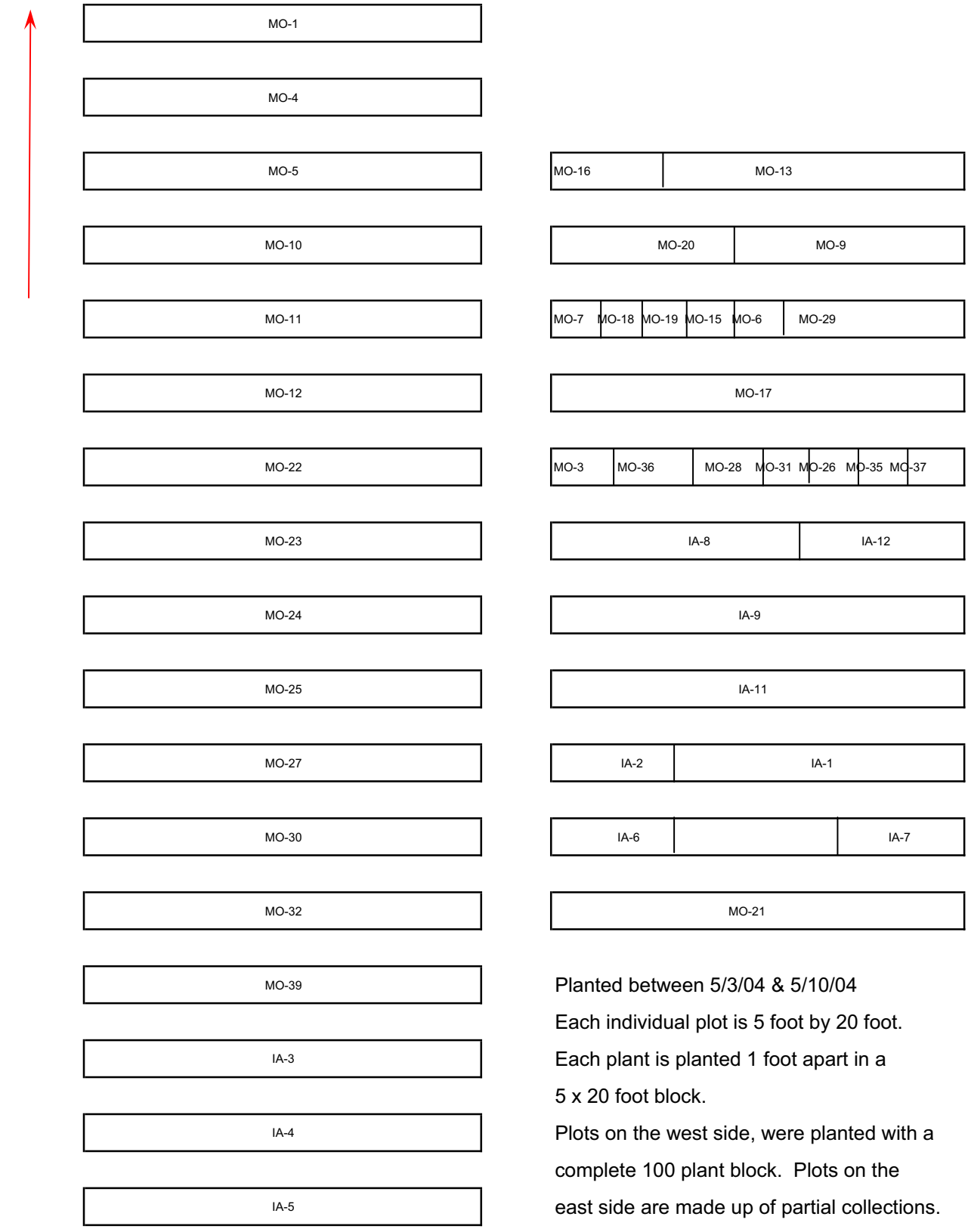
Table 1-Study MOPMC-T-0106, BU - cont.

Carex lupulina Muhl.	Hop sedge	Christine Talige	Fairfield, IA	IA-1
Carex cristatella Britton	Crested sedge	Tim Meyer	Williamsburg, IA	IA-2
Carex cristatella Britton	Crested sedge	Tim Meyer	Williamsburg, IA	IA-3
Carex vulpineidea	Fox sedge	Tim Meyer	Williamsburg, IA	IA-4
Scirpus atrovirens	Green bulrush	Tim Meyer	Williamsburg, IA	IA-5
Juncus interior Weigand	Inland rush	Tim Meyer	Williamsburg, IA	IA-6
Calamagrostis Canadensis	Bluejoint	Tim Meyer	Williamsburg, IA	IA-7
Scirpus atrovirens	Green bulrush	Tim Meyer	Williamsburg, IA	IA-8
Carex normalis	Larger straw sedge	Tom Hurford	Atlantic, IA	IA-9
Carex tribuloides	Bristle bract sedge	Tom Hurford	Atlantic, IA	IA-10
Carex normalis	Larger straw sedge	Tom Hurford	Atlantic, IA	IA-11
Scirpus atrovirens	Green bulrush	Tom Hurford	Atlantic, IA	IA-12

Sedge, Rush, and Cool Season Grass Plot - Field #7

North

Table #2



Planted between 5/3/04 & 5/10/04
Each individual plot is 5 foot by 20 foot.
Each plant is planted 1 foot apart in a
5 x 20 foot block.
Plots on the west side, were planted with a complete 100 plant block. Plots on the east side are made up of partial collections.

Study ID Code: MOPMC-T-0106, BU			Table #3
Collection and Evaluation of Native Cool Season Grasses and Sedges for Filter Strips			
	MISSOURI COLLECTIONS		
Collection	**Common Name**	**Scientific Name**	**# of Plants**
MO-1	Crowfoot Sedge	Carex crus-corvi	100 Plants
MO-3	Slough Sedge	Carex obnupta	7 plants
MO-4	Fox Sedge	Carex vulpinoidea	100 Plants
MO-5	Fox Sedge	Carex vulpinoidea	100 Plants
MO-6	Thinscale Sedge	Carex hyalinolepis	8 Plants
MO-7	Crowfoot Sedge	Carex crus-corvi	47 Plants
MO-9	Franks Sedge	Carex frankii	45 Plants
MO-10	Green Bulrush	Scirpus atrovirens	100 Plants
MO-11	Green Bulrush	Scirpus atrovirens	100 Plants
MO-12	Franks Sedge	Carex frankii	100 Plants
MO-13	Hop Sedge	Carex lupulina	25 Plants
MO-15	Thinscale Sedge	Carex hyalinolepis	3 Plants
MO-16	Franks Sedge	Carex frankii	75 Plants
MO-17	Franks Sedge	Carex frankii	76 Plants
MO-18	Crowfoot Sedge	Carex crus-corvi	11 Plants
MO-19	Thinscale Sedge	Carex hyalinolepis	3 Plants
MO-20	Franks Sedge	Carex frankii	54 Plants
MO-21	River Oats	Chasmathium latifolium	76 Plants
MO-22	River Oats	Chasmathium latifolium	100 Plants
MO-23	River Oats	Chasmathium latifolium	100 Plants
MO-24	River Oats	Chasmathium latifolium	100 Plants
MO-25	River Oats	Chasmathium latifolium	100 Plants
MO-26	Crowfoot Sedge	Carex crus-corvi	6 Plants
MO-27	Bottlebrush Sedge	Carex comosa	100 Plants
MO-28	Thinscale Sedge	Carex hyalinolepis	9 Plants
MO-29	Thinscale Sedge	Carex hyalinolepis	13 Plants
MO-30	Fox Sedge	Carex vulpinoidea	100 Plants
MO-31	Crowfoot Sedge	Carex crus-corvi	11 Plants
MO-32	Fox Sedge	Carex vulpinoidea	100 Plants
MO-35	Hop Sedge	Carex lupulina	19 Plants
MO-36	Squarrose Sedge	Carex squarrosa	6 Plants
MO-37	Hard-stemmed Sedge	(hard-stemmed bulrush) Schoenoplectus acutus	18 Plants
MO-39	River Oats	Chasmathium latifolium	100 Plants

Table 3 - continued			
	IOWA COLLECTIONS		
Collection	**Common Name**	**Scientific name**	**# of Plants**
IA-1	Hop Sedge	Carex lupulina	23 Plants
IA-2	Crested Sedge	Carex cristatella	52 Plants
IA-3	Crested Sedge	Carex cristatella	100 Plants
IA-4	Fox Sedge	Carex vulpinoidea	100 Plants
IA-5	Green Bulrush	Scirpus atrovirens	100 Plants
IA-6	Inland Rush	Juncus interior	17 Plants
IA-7	Bluejoint	Calamagrostis canadensis	23 Plants
IA-9	Larger Straw Sedge	Carex normalis	76 Plants
IA-8	Green Bulrush	Scirpus atrovirens	38 Plants
IA-11	Larger Straw Sedge	Carex normalis	76 Plants
IA-12	Green Bulrush	Scirpus atrovirens	60 Plants
Shoreline sedge is the same as thinscale sedge			
Crowfoot sedge is the same as ravenfoot sedge			

Study ID Code: MOPMC-T-0106, BU **Table #4**

Collection and Evaluation of Native Cool Season Grasses and Sedges for Filter Strips

Sedge, Cool Season Grass, and Bulrush Evaluation

DATE:___6/22/04___

Collection #	Name	Number of Plants	Percent Stand	Percent Cover	Lodging (1-9 Rating)	Notes
MO-1	Crowfoot Sedge	100	100	20	1	
MO-4	Fox Sedge	100	100	20	1	
MO-5	Fox Sedge	100	100	20	1	
MO-10	Green Bulrush	100	100	15	1	
MO-11	Green Bulrush	100	100	15	1	
MO-12	Franks Sedge	100	100	25	1	
MO-22	River Oats	100	80	5	1	
MO-23	River Oats	100	100	5	1	
MO-24	River Oats	100	95	5	1	
MO-25	River Oats	100	95	5	1	
MO-27	Bottlebrush Sedge	100	100	20	1	
MO-30	Fox Sedge	100	100	15	1	
MO-32	Fox Sedge	100	100	15	1	
MO-39	River Oats	100	80	5	1	
IA-3	Crested Sedge	100	100	30	1	
IA-4	Fox Sedge	100	100	15	1	
IA-5	Green Bulrush	100	100	20	1	
MO-13	Hop Sedge	25	100	25	1	
MO-16	Franks Sedge	75	100	25	1	
MO-9	Franks Sedge	45	100	25	1	
MO-20	Franks Sedge	54	100	20	1	
MO-29	Thinscale Sedge	13	100	15	1	
MO-6	Thinscale Sedge	8	100	20	1	
MO-15	Thinscale Sedge	3	66	15	1	
MO-19	Thinscale Sedge	3	33	15	1	
MO-18	Crowfoot Sedge	11	100	15	2	
MO-7	Crowfoot Sedge	47	100	20	2	
MO-17	Franks Sedge	76	100	10	1	
MO-37	Hard-stemmed Sedge	18	100	10	1	
MO-35	Hop Sedge	20	100	20	1	
MO-26	Crowfoot Sedge	6	100	10	2	
MO-31	Crowfoot Sedge	11	100	25	1	
MO-28	Thinscale Sedge	9	100	10	1	
MO-36	Squarrose Sedge	6	85	15	1	
MO-3	Slough Sedge	7	100	15	1	
IA-12	Green Bulrush	60	100	10	1	

Table #4 - continued

Collection #	Name	Number of Plants	Percent Stand	Percent Cover	Lodging (1-9 Rating)	Notes
IA-8	Green Bulrush	38	100	10	1	
IA-9	Larger Straw Sedge	76	100	20	1	
IA-11	Larger Straw Sedge	76	100	10	1	
IA-1	Hop Sedge	23	100	15	1	
IA-2	Crested Sedge	52	100	25	1	
IA-7	Bluejoint	21	92	15	1	
IA-6	Inland Rush	16	96	15	1	
MO-21	River Oats	76	95	5	1	

1-9 Rating 1 = No Lodging 9 = Severe Lodging

Study ID Code: MOPMC-T-0208-PA

Study Title: Testing Warm Season Grasses for Forage Quality

Study Leader: Bruckerhoff, S.

Description:

Warm season grass species have limited information available in regards to forage quality. Confidence exists in their forage production abilities in relation to beef production. Comparative information on forage quality throughout the growing season is often questioned with little available information to back it up.

Objective:

There is information in regards to forage quality of warm season species but usually it is for a specific variety and generally not throughout the growing season. The objective of this study is to make information available on forage quality throughout the growing season of warm season grass species. This information can be used to compare the quality of warm season grass species during the growing season and also at different vegetative stages.

Materials and Methods:

Commercially available cultivars/selections and accessions in advanced testing of a wide variety of warm season grasses will be assembled for testing. Plants of each accession will be started in the greenhouse from seed and transplanted into an evaluation nursery.

Species/cultivars/accessions to be tested

'Rountree' big bluestem	'Rumsey' Indiangrass
9078831 big bluestem	9083214 eastern gamagrass
'Cave-In-Rock' switchgrass	'Pete' eastern gamagrass
9062244 switchgrass	'El Reno' sideoats gramma
'Aldous' little bluestem	'Osarka' bermudagrass

The experimental design is a randomized complete block with four replications. The plants will be clipped. Original growth and regrowth dry matter will be analyzed for forage quality.

Testing times are as follows:

Original Growth Material	Regrowth Material
Mid-May	Mid May-Mid July taken Mid July
Mid-May	Mid May-Mid Aug taken Mid Aug
Mid-May	Mid July-Mid Aug taken Mid Aug
Mid-May	Mid Aug-Mid Sept taken Mid Sept

Discussion:

2002

The plants listed above will be propagated in the greenhouse and transplanted into an evaluation nursery the spring of 2003.

2003-2004

The evaluation nursery was planted in 2003 but did not establish well so missing plants were replanted and all plants were allowed to mature and develop during 2004. Sampling will begin in 2006.

Forage quality of warm season native grasses is generally lower than cool season forages when using wet chemistry lab procedures. True representation of forage quality is questionable when determining percent crude protein and digestibility. Fecal sampling analysis is another method of determining forage quality of plant material that has been processes (eaten and digested) by a cow. The PMC conducted a comparison between the two testing methods. Forage samples were green chopped and fed to weaned calves for four days. Replicated fecal samples were taken after the fourth day and sent for testing. Forage samples were also sent to the lab.

Study ID Code: MOPMC-T-0310-PA,WL

Study Title – Incorporating Native Warm Season Grasses into Cool Season Pasture with Grazing Management

Study Leader: Bruckerhoff, S. B.

Introduction:

The need exists for providing quality forage during the summer dormancy period of cool season grasses. Warm season grasses can help provide this forage but loss of production during the establishment period has slowed the utilization of these species.

Problem:

The establishment period for warm season grasses is typically longer than for cool season grasses. Warm season grasses generally are not grazed the year of establishment and sometimes do not provide full production until the third growing season.

Objectives:

The objective is to evaluate alterative methods of warm season grass establishment and also pasture management of cool season and warm season species growing together. Alternative establishment methods being evaluated will decrease or eliminate the loss of production during the warm season grass establishment period.

Cooperators: Local landowners with intensive managed grazing systems.

Procedure:

Close graze the fescue pasture for one grazing season prior to seeding the species listed below. Seeding will be completed during the winter dormant period and spring using the treatments listed below.

Broadcast - winter dormant planting
Drilled - spring planting
Strip tilled - spring planting

Randomized complete block design with 4 replications.

Cultivars/selections of warm season grasses will be assembled and planted into cool season grass pastures. Rotational grazing will be used as a control method to set back the cool season grass and allow the warm season grass a chance to become established. Rotational grazing will also be used to balance the warm and cool season grasses to utilize production from both.

Rotational grazing with a high stocking rate will be used during the establishment year and subsequent years to enhance the development of the planted species and also utilize the forage of the original pasture.

Species composition of treatments will be determined by transecting the plots.
Measure forage utilization (growth height) of species before and after grazing management.

Species/cultivars to be tested:

'Rountree' Big Bluestem	'Rumsey' Indiangrass
'Cave-in-Rock' Switchgrass	'Pete' Eastern Gamagrass
'Aldous' Little Bluestem	

Discussion:

2003

Fescue pasture was intensively grazed during 2002. The pasture was marked with 30' by 50' plots including five species and a check plot, three treatments, and four replications. The broadcast treatment was planted 2/13/03. The no-till treatment was planted 5/6/03 with eastern gama and switchgrass and 5/21/03 with big bluestem, little bluestem and indiangrass. The strip-till treatment plots were 50% tilled (30" wide strips) and planted the same as the no-till treatment.

The summer of 2003 had more than adequate rainfall to keep the fescue from going dormant and cattle did not keep it grazed close so all the plots were mowed twice during the summer to help control competition from the fescue. Warm season grass seedlings germinated on the tilled portion of the strip-till plots but none were found in the fescue sod. All plots were rotationally grazed until mid August and then again after November 1.

2004

The pasture was again utilized with rotational grazing but again the summer was cooler and wetter than average and the fescue expressed very little dormant period. Very few seedlings were found in any plots. This site will continue to be monitored. Another trial is scheduled for 2005.

Study ID Code: MOPMC-T-0311-RI, BU

Study Title: Control of Reed Canarygrass in Riparian Buffer Plantings

Study Leader: Cordsiemon, R.

Description:

The presence of reed canarygrass in areas being planted to CRP, EQIP, and WHIP riparian forest buffers affects the long term survival and growth of seedling trees. Effective control methods for reed canarygrass are needed to obtain sufficient survival and growth of planted trees to meet program objectives.

Objective:

The objective of this study is to determine the most effective control methods for reed canarygrass in riparian buffer plantings.

Materials and Methods:

Obtain plants for open sun site (PMC) of bur oak, native pecan, and silver maple (seedlings). Obtain plants for shaded area (Illinois) of common button bush, gray dogwood, Pagoda dogwood, American hazelnut, American witch hazel and hazel alder.

2003

Discussion:

An area for this study is located on the PMC in Field #3. Half of the area (west half) was treated with two quarts of Roundup per acre and the other half (east half) was treated with one quart of Roundup per acre in September 2002. The plots were laid out (randomized and replicated four times) in early April 2003. The following herbicides and rates were applied on April 14, 2003, Plateau-8.0 ounces per acre, OutRider-2.0 ounces per acre, Oust-5.0 ounces per acre, and Roundup-1.5 quarts per acre. There were also check plots, plots having weed barrier mats installed around the plants, and plots where the plants were mowed around as the treatment.

Three species of bare root seedlings (bur oak, native pecan, and silver maple) were obtained from the Iowa Department of Natural Resources (DNR) on April 28, 2003. These seedlings were planted on May 2, 2003. An evaluation of the herbicides for controlling reed canarygrass was made on June 9, 2003. The following is the results of that evaluation: Roundup exhibited the best control (90%), followed by Oust (70%), Plateau (40%), and OutRider (20%). The check plots were very weedy (0%), the plots which were mowed exhibited good to excellent control of the reed canarygrass (80%), and the plots with the weed barrier mats exhibited good to excellent control (80%).

The plots were again evaluated for effectiveness of herbicide in controlling of reed canarygrass in July and August 2003. The following is the results of the August evaluations. Roundup exhibited 33%, Oust exhibited 13%, Plateau exhibited 16% and OutRider exhibited 47% control of the reed canarygrass. The check exhibited 0%, mat exhibited 65% and the mowing around the plants exhibited 70% control of the reed canarygrass. There were some plots having a greater control of reed canarygrass in the earlier evaluations; obviously the reed canarygrass reinfested these plots.

An evaluation was also made on the survivability of the seedlings planted in areas where the herbicides were applied. There were some concerns that certain herbicides may have a detrimental affect on newly planted seedlings. The following is the results of that evaluation made on August 14, 2003. Plants in the Roundup plots exhibited 100% survival, plants in the Oust plots exhibited 83% survival, plants in the Plateau plots also exhibited 83% survival, and plants in the OutRider plots exhibited 66% survival. The check plots exhibited 100% plant survival, the survival of plants where the mats were installed exhibited 66%, and the plants where mowing was used for control of the reed canarygrass exhibited 66% survival.

The duration of this study is 2003-2006. Table #1 reflects the plot layout.

2004

The plots were evaluated for survival, height, and vigor on May 11. (Refer to tables #3 and #4) After a discussion with the Missouri NRCS state forester, Doug Wallace, it was determined that the application rate for Oust should be lowered from 5oz./acre to 1oz./acre; all other herbicide rates would remain the same. Plots were sprayed for the second year on May 24 and will be evaluated again in the late spring of 2005 for survival, height, and vigor. Table #4 refers to both 2003 and 2004 evaluations and compares the survival rates of each tree and each canarygrass control method used.

Study: MOPMC-T-0311 - RI, BU, Controls of Reeds Canarygrass in Riparian Buffer Plantings

Table #1

Date Seedlings were Planted: 5/2/03

North

Rep 1

Rows	Row/Plant	Row/Plant	Row/Plant	Row/Plant		Row/Plant	Row/Plant	Row/Plant
Ft.	**A**	**B**	**C**	**D**		**E**	**F**	**G**
Apart	**Roundup**	**Oust**	**Outrider**	**Plateau**		**Check**	**Mat**	**Mow**
10	M	P	B	P		B	P	M
10	B	M	P	M		P	M	B
10	P	B	M	B		M	B	P

Plants:
M=Maple
B=Bur Oak
P=Pecan

Reps are 20' apart

Rep 2

Rows	Row/Plant	Row/Plant	Row/Plant	Row/Plant		Row/Plant	Row/Plant	Row/Plant
Ft.	**C**	**A**	**D**	**B**		**F**	**G**	**E**
Apart	**Outrider**	**Roundup**	**Plateau**	**Oust**		**Mat**	**Mow**	**Check**
10	B	P	M	P		P	M	B
10	M	B	B	B		B	B	P
10	P	M	P	M		M	P	M

Reps are 20' apart

Rep 3

Rows	Row/Plant	Row/Plant	Row/Plant	Row/Plant		Row/Plant	Row/Plant	Row/Plant
Ft.	**B**	**D**	**A**	**C**		**G**	**F**	**E**
Apart	**Oust**	**Plateau**	**Roundup**	**Outrider**		**Mow**	**Mat**	**Check**
10	P	B	M	P		M	B	P
10	B	P	P	M		B	P	B
10	M	M	B	B		P	M	M

Reps are 20' apart

Rep 4

Rows	Row/Plant	Row/Plant	Row/Plant	Row/Plant		Row/Plant	Row/Plant	Row/Plant
Ft.	**D**	**A**	**B**	**C**		**E**	**G**	**F**
Apart	**Plateau**	**Roundup**	**Oust**	**Outrider**		**Check**	**Mow**	**Mat**
10	M	P	B	B		P	M	B
10	P	B	M	P		B	B	P
10	B	M	P	M		M	P	M

.

MOPMC-T-0311 **Evaluation of trees planted within canrygrass using different control methods**

7/29/03 Evaluation **Table #2**

		Roundup		Oust		Outrider		Plateau		Check		Mat		Mow	
		height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor
Rep 1	Pecan	2.5	4	2.4	4	1.4	7	2.3	3	1.7	9	1.4	4	1.5	7
	Bur Oak	2.1	7	2.8	9	2.7	8	2.3	8	2	1	2.1	3	2.6	4
	Maple	3.3	5	1.5	1	1.6	2	1.7	2	1.6	2	1.9	1	1.5	4
Rep 2	Pecan	2.4	9	2.6	9	1.9	5	2	5	0.8	7	2	9	2.4	3
	Bur Oak	2.2	9	2.3	5	2.1	5	x	x	2.2	9	x	x	2.3	8
	Maple	1.7	5	2	3	1.9	3	1.5	4	1.6	2	2.1	1	1.6	5
Rep 3	Pecan	1.3	3	x	x	1.8	4	2.7	3	x	x	2.3	9	3.4	8
	Bur Oak	1.4	7	2.8	5	2	9	2.2	8	1.9	9	2.7	8	2.6	8
	Maple	2	2	1.6	6	1.5	2	1.2	2	1.7	4	x	x	1.2	7
Rep 4	Pecan	1.4	7	1.1	9	1.5	7	1.4	5	x	x	x	x	1.8	9
	Bur Oak	1.7	7	1.5	5	x	x	2.4	5	2	7	2.5	4	1.9	9
	Maple	1.6	3	1.7	4	2	3	1.9	3	1.5	3	2.2	2	1.6	7
Averages		height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor
	Pecan	1.9	5.8	2.0	7.3	1.7	5.8	2.1	4.0	1.3	8.0	1.9	7.3	2.3	6.8
	Bur Oak	1.9	7.5	2.4	6.0	2.3	7.3	2.3	7.0	2.0	6.5	2.4	5.0	2.4	7.3
	Maple	2.2	3.8	1.7	3.5	1.8	2.5	1.6	2.8	1.6	2.8	2.1	1.3	1.5	5.8

x = indicates the plant has died

MOPMC-T-0311 **Evaluation of control of canarygrass within the plot**
7/29/03 Evaluation

	Rep 1	Rep 2	Rep 3	Rep 4	Average
Oust	1	1	1	1	1
Roundup	9	5	3	5	5.5
Plateau	5	5	3	5	4.5
Outrider	9	5	5	3	5.5
Mat	1	1	1	1	1
Mowed	1	1	1	1	1
Check	9	9	9	9	9

The plots were given a visual rating based on the amouont of canarygrass present within the plot

1= Excellent Control
3= Good Control
5= Fair Control
9= Poor Control

MOPMC-T-0311 **Evaluation of trees planted within canrygrass using different control methods**

5/11/04 Evaluation **Table #3**

		Roundup		Oust		Outrider		Plateau		Check		Mat		Mow	
		height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor
Rep 1	Pecan	2.2	3	2.4	6	x	x	x	x	x	x	x	x	x	x
	Bur Oak	x	x	x	x	x	x	x	x	2.4	4	2	3	x	x
	Maple	2.3	4	1.7	3	2.1	2	2.4	3	1.8	3	2.1	4	1.6	3
Rep 2	Pecan	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Bur Oak	x	x	2.4	3	2	6	x	x	x	x	x	x	x	x
	Maple	1.7	7	2.1	3	2.3	3	2	3	x	x	1.8	3	1.2	7
Rep 3	Pecan	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Bur Oak	2.7	2	2.8	3	x	x	1.6	4	x	x	x	x	x	x
	Maple	1.8	3	2.1	2	2	3	2	2	2	3	x	x	1.3	3
Rep 4	Pecan	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Bur Oak	1.5	3	x	x	x	x	2.4	2	x	x	2.3	4	x	x
	Maple	1.5	7	2.1	3	2	3	2.1	2	1.5	3	2.8	3	1.5	2
Averages		height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor	height	vigor
	Pecan	2.2	3.0	2.4	6.0	x	x	x	x	x	x	x	x	x	x
	Bur Oak	2.1	2.5	2.6	3.0	2.0	6.0	2.0	3.0	2.4	4.0	2.2	3.5	x	x
	Maple	1.8	5.3	2.0	2.8	2.1	2.8	2.1	2.5	1.8	3.0	2.2	3.3	1.4	3.8

x = indicates the plant has died

MOPMC-T-0311 **Evaluation of canarygrass control within the plot**

5/11/04 Evaluation

	Rep 1	Rep 2	Rep 3	Rep 4	Average
Oust	2	1	1	1	1.25
Roundup	2	2	5	2	2.75
Plateau	7	5	2	5	4.75
Outrider	7	4	4	2	4.25
Mat	8	8	8	9	8.25
Mowed	5	7	9	9	7.50
Check	9	9	9	9	9.00

The plots were given a visual rating based on the amouont of canarygrass present within the plot

1= Excellent Control
3= Good Control
5= Fair Control
9= Poor Control

MOPMC-T-0311 **Evaluation of trees planted within canarygrass using different control methods**

Table #4

7/29/2003 Evaluation

		Roundup	Oust	Outrider	Plateau	Check	Mat	Mow
Rep 1	Pecan	Alive	Alive	Alive	Alive	Alive	Alive	Alive
	Bur Oak	Alive	Alive	Alive	Alive	Alive	Alive	Alive
	Maple	Alive	Alive	Alive	Alive	Alive	Alive	Alive
Rep 2	Pecan	Alive	Alive	Alive	Alive	Alive	Alive	Alive
	Bur Oak	Alive	Alive	Alive	**DEAD**	Alive	**DEAD**	Alive
	Maple	Alive	Alive	Alive	Alive	Alive	Alive	Alive
Rep 3	Pecan	Alive	**DEAD**	Alive	Alive	**DEAD**	Alive	Alive
	Bur Oak	Alive	Alive	Alive	Alive	Alive	Alive	Alive
	Maple	Alive	Alive	Alive	Alive	Alive	**DEAD**	Alive
Rep 4	Pecan	Alive	Alive	Alive	Alive	**DEAD**	**DEAD**	Alive
	Bur Oak	Alive	Alive	**DEAD**	Alive	Alive	Alive	Alive
	Maple	Alive	Alive	Alive	Alive	Alive	Alive	Alive

Percent Survival 7/29/2003 Evaluation

Averages		**Roundup**	**Oust**	**Outrider**	**Plateau**	**Check**	**Mat**	**Mow**	**Total**
	Pecan	100%	75%	100%	100%	50%	75%	100%	86%
	Bur Oak	100%	100%	75%	75%	100%	75%	100%	89%
	Maple	100%	100%	100%	100%	100%	75%	100%	96%

5/11/2004 Evaluation

		Roundup	Oust	Outrider	Plateau	Check	Mat	Mow
Rep 1	Pecan	Alive	Alive	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**
	Bur Oak	**DEAD**	**DEAD**	**DEAD**	**DEAD**	Alive	Alive	**DEAD**
	Maple	Alive	Alive	Alive	Alive	Alive	Alive	Alive
Rep 2	Pecan	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**
	Bur Oak	**DEAD**	Alive	Alive	**DEAD**	**DEAD**	**DEAD**	**DEAD**
	Maple	Alive	Alive	Alive	Alive	**DEAD**	Alive	Alive
Rep 3	Pecan	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**
	Bur Oak	Alive	Alive	**DEAD**	Alive	**DEAD**	**DEAD**	**DEAD**
	Maple	Alive	Alive	Alive	Alive	Alive	**DEAD**	Alive
Rep 4	Pecan	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**	**DEAD**
	Bur Oak	Alive	**DEAD**	**DEAD**	Alive	**DEAD**	Alive	**DEAD**
	Maple	Alive	Alive	Alive	Alive	Alive	Alive	Alive

Percent Survival of 5/11/2004 Evaluation

Averages		**Roundup**	**Oust**	**Outrider**	**Plateau**	**Check**	**Mat**	**Mow**	**Total**
	Pecan	25%	25%	0%	0%	0%	0%	0%	7%
	Bur Oak	50%	50%	25%	50%	25%	50%	0%	36%
	Maple	100%	100%	100%	100%	75%	75%	100%	93%

Study ID Code: MOPMC-T-0412- WE, WL, RI

Study Title – Testing Selected Trees for Tolerance to the Herbicide Outrider

Study Leader: Bruckerhoff, S. B.

Introduction:

The Monsanto herbicide "Outrider",Sulfosulfuron, is a selective herbicide for control of annual and perennial grass and broadleaf weeds in noncrop areas. It is very effective in the control of johnsongrass and is also effective in the control of tall fescue at higher rates. Outrider is used to control johnsongrass on roadsides. It is also labeled for use on some warm season grasses.

Problem:

Weed control during the establishment period of woody plantings is critical. Although several options are available, timing is very important for adequate control. Additional options are needed, especially in the control of johnsongrass and reed canarygrass while establishing woody plantings.

Objectives:

The objectives are to test the tolerance of woody plant material to the herbicide Outrider, and also apply the same rates to reed canarygrass to determine its effectiveness of control.

Procedure:

Commercially available species of woody plants typically used for wetland, wildlife and riparian plantings will be assembled at the PMC and tested for tolerance to the herbicide Outrider, Sulfosulfuron. One and two year old container trees will be obtained from Forrest Keeling Nursery.

Outrider has been observed to be somewhat effective in controlling reed canarygrass using split applications. Outrider will also be applied on reed canarygrass plots and tested for control at the same timing and rates as the trees.

Container trees (see list below) were planted in a randomized complete block with four replications. Trees were one or two year old container stock. Trees were watered as needed. A replication consisted of one tree each from the list below. Four replications were sprayed over the top of the trees with each of the following treatments:

1. Spring split application of Outrider (1 1/3 oz each), May/June, five to eight weeks apart
2. Summer application of Outrider (2.0 oz) late June to early July
3. Fall/spring split application of Outrider (1 1/3 oz each) Septembe/May
   This treatment was changed to Roundup, see discussion below.

Trees were evaluated for seedling height and overall condition (vigor, survival, resistance to herbicide application, etc.) prior to treatment and again after treatment.

Silver Maple	Sycamore	Swamp Oak
Pin Oak	Burr Oak	Walnut
Pecan	Cottonwood	Bald Cypress
Green Ash	Roughleaf Dogwood	American Plum
Blackhaw	Hazelnut	Chokecherry
False Indigo Bush	Buttonbush	

Cooperators:

Jim Graham, Monsanto Company, St. Louis, Missouri and Wayne Lovelace, Forrest Keeling Nursery, Elsberry, Missouri.

Discussion:

2004

The evaluation block was planted April 6, 2004 using a randomized complete block design with four replications. Three chemical treatments were used; treatment #1, a split application of 1.33 ounces of Outrider herbicide was sprayed directly over the top of all tree species on May 11, 2004 and again on June 29, 2004. Treatment #2 was a maximum rate of 2.0 ounces of Outrider herbicide again sprayed directly over the top of the second block of trees on June 29, 2004. Treatment #3 was intended to be another split application of Outrider herbicide applied in September, 2004 and May, 2005 but was changed to a 2 quart rate of Roundup that was applied over the top of the trees on November, 5, 2004.

The treatments applied to the trees were also applied to reed canarygrass at the same time and rates. By mid-summer it was apparent that Outrider would only suppress reed canarygrass and not kill it. Treatment #3 was changed to Roundup to help define the window of opportunity for controlling reed canarygrass and not damaging the trees.

The trees were evaluated for overall condition (vigor, survival, resistance to disease, insects, chemical damage, stress, etc.) on a scale of 1 = excellent and 9 = dead. The trees were also measured for height in feet.

Evaluations were compared between treated plots and untreated checks before and after treatment. RC (rating of condition) and RH (rating of height) can be seen in table #1. These ratings were calculated as the difference in treated plots minus the difference in check plots or RC/RH = (T2-T1) – (CK2-CK1)

Where:

RC = Rating of condition of the tree

RH = Rating of height of the tree

T2 = Evaluation of the overall condition (1 = Excellent, 9 = dead), after treatment of the tree getting chemical treatment.

T1 = Evaluation of the overall condition (1 = Excellent, 9 = dead), before treatment of the tree getting chemical treatment.

CK2 = Evaluation of the overall condition (1 = Excellent, 9 = dead), after treatment date of the untreated tree (Check)

CK1 = Evaluation of the overall condition (1 = Excellent, 9 = dead), before treatment date of the untreated tree (Check).

The scale for the comparison of ratings is at the bottom of the charts in table #1.

Summary of results

Most trees experienced little to no damage from the chemical application treatments and almost no stunting when compared to the untreated checks.

Trees that were not as resistant to the chemical treatments and degree of damage by each treatment are listed below.

Damage to trees from application of Outrider or Roundup (treatment #3) herbicides:

	Treatment #1	**Treatment #2**	**Treatment #3**
Extensive damage			**Bald cypress**
Moderate damage		**Hazelnut**	**False indigo**
		Roughleaf dogwood	
		Silver maple	

Notes:

The species that had moderate damage from the Outrider herbicide had very good recovery with later observation.

Walnut at the time of evaluation looked in poor condition but later observation did not indicate damage, so it was not listed above.

MOPMC-T-0412, WE, WL, RI

Table #1

Ratings of Comparison of Overall Condition of Trees being Evaluated

Treatment #1 Split Application - 1.3oz. Of Outrider 5/11/2004, 1.3oz. Of Outrider 6/29/2004

Treatment #2 - 2.0oz. Of Outrider - Single application 6/29/2004

Treatment #3 - Roundup 2.0 Quart/Acre Single application - 11/5/2004

	Comparison of treatment #1 and check \1 Ratings of condition (RC) comparison		Comparison of treatment #2 and check \1 Ratings of condition (RC) comparison			Comparison of treatment #3 and check \1 Ratings of condition (RC) comparison
	8/12/2004	9/22/2004	8/12/2004	9/22/2004	4/29/2005	4/29/2005
Silver Maple	1.25	3.00	-1.00	0.25	-2.30	-3.80
Sycamore	0.35	0.45	0.60	0.95	2.65	1.70
Swamp Oak	0.98	1.43	1.48	1.68	2.08	-1.10
Pin Oak	2.90	2.85	2.40	2.10	1.25	-1.85
Burr Oak	1.65	1.25	-0.10	-0.25	1.35	-1.15
Walnut	-0.30	-0.35	-0.80	-3.10	0.70	4.55
Pecan	-0.40	2.30	-0.15	-1.20	-0.05	-0.85
Cottonwood	-0.60	0.05	-2.60	-1.95	-1.55	-0.60
Bald Cypris	0.30	-0.50	0.80	0.00	-0.60	5.15
Green Ash	2.45	2.65	-0.05	0.65	-0.95	-2.10
Roughleaf Dogwood	4.25	3.50	1.50	1.25	0.85	-0.15
American Plum	1.05	0.20	1.05	-1.30	4.20	2.00
Blackhaw	1.15	0.85	0.40	0.35	-1.40	-0.25
Hazelnut	2.75	3.10	1.50	2.35	1.10	-0.50
Chokecherry	1.00	1.15	0.75	-1.35	-0.45	-0.35
False Indigo	2.00	1.75	1.75	1.75	3.25	2.75
Buttonbush	2.00	1.45	0.25	-0.30	1.35	0.90

\1 Ratings of condition comparison

negative numbers indicate improvement in tree condition with treatment

0 to 3 indicates little to no damage from chemical treatment

3 to 5 indicates moderate damage from chemical treatment

5 to 7 indicates extensive damage from chemical treatment

7 to 9 severe damage or death of tree

Ratings of comparison of Height of Trees being evaluated **Table #1**

Treatment #1 Split Application - 1.3oz. Of Outrider 5/11/2004, 1.3oz. Of Outrider 6/29/2004

Treatment #2 - 2.0oz. Of Outrider - Single application 6/29/2004

Treatment #3 - Roundup 2.0 Quart/Acre Single application - 11/5/2004

	Comparison of treatment #1 and check \2 Ratings of heighth (RH) comparison		Comparison of treatment #2 and check \2 Ratings of heighth (RH) Comparison			Comparison of treatment #3 and check \2 Ratings of heighth (RH) comparison
	8/12/2004	9/22/2004	8/12/2004	9/22/2004	4/29/2005	4/29/2005
Silver Maple	-0.36	-0.41	-0.23	-0.44	-0.38	-0.02
Sycamore	-0.10	0.05	0.21	0.31	0.40	-0.04
Swamp Oak	-0.19	-0.21	-0.08	-1.21	-0.64	0.57
Pin Oak	0.26	0.25	-0.01	-0.03	0.30	0.08
Burr Oak	0.18	0.21	0.15	0.13	0.12	0.02
Walnut	0.04	-0.79	0.42	0.53	-1.06	-1.44
Pecan	-0.12	-0.21	0.10	-0.68	-0.64	0.77
Cottonwood	-0.60	-1.93	1.16	1.25	2.01	1.26
Bald Cypris	0.05	-0.40	0.87	-0.33	-0.33	-0.02
Green Ash	-0.20	-0.48	-0.13	-0.28	0.14	0.32
Roughleaf Dogwood	-0.19	0.00	0.22	0.07	-0.17	-1.57
American Plum	-0.96	-1.08	-0.11	-0.01	-0.12	-0.52
Blackhaw	0.26	-0.01	0.29	0.19	0.97	0.88
Hazelnut	0.48	0.44	0.71	1.14	-0.22	-1.33
Chokecherry	0.90	0.74	0.04	0.29	0.38	-0.01
False Indigo	-0.84	-0.90	-1.37	-1.60	-2.05	0.05
Buttonbush	-0.79	-1.02	-0.04	0.00	0.02	-0.23

\2 Ratings of height comparison

negative numbers indicate that treated plants outperformed untreated trees

0 to 3 indicates that treated trees may have encountered minor stunting

3 to 5 indicates trees show signs of moderate stunting

5 to 7 indicates extensive stunting

7 to 9 severe stunting to death among treated trees

	Releases from the Elsberry Plant Materials Center					
		Alphabetically				
			Accession	Secondary	Type of	Year of
Scientific Name	Release Name	Common Name	Number	Agency(ies)	Release	Release
Acer ginnala Maxim.	Flame	Amur maple	483442		I	1978
Andropogon gerardii L.	**OZ-70**	**big bluestem**	**9078831**			**2004**
Andropogon gerardii Vitman.	Northern Iowa	big bluestem	9068614	UNI,IARV,IAT,ICIA	N	2000
Andropogon gerardii Vitman.	Southern Iowa	big bluestem	9068616	UNI, IARV, IAT, ICIA	N	1999
Andropogon gerardii Vitman.	Northern MO	big bluestem	9079000	UMC,MDC,MODOT	N	1999
Andropogon gerardii Vitman.	Central Iowa	big bluestem	9068615	UNI,IARV,IAT,ICIA	N	1998
Andropogon gerardii Vitman.	OH-370	big bluestem	9062323	ARPMC	N	1997
Andropogon gerardii Vitman.	Rountree	big bluestem	474216	MOA	N	1983
Aster novae-angliae L.	Central Iowa	New England Aster	9068682	UNI, IARV, IAT, ICIA	N	2002
Aster novae-angliae L.	Northern Iowa	New England Aster	9068681	UNI, IARV, IAT, ICIA	N	2002
Aster novae-angliae L.	Southern Iowa	New England Aster	9068683	UNI, IARV, IAT, ICIA	N	2002
Bouteloua curtipendula (Michx.) Torr.	Central Iowa	sideoats grama	9062279	UNI,IARV,IAT,ICIA	N	1995
Bouteloua curtipendula (Michx.) Torr.	Northern Iowa	sideoats grama	9062278	UNI,IARV,IAT,ICIA	N	1995
Bouteloua curtipendula (Michx.) Torr.	Southern Iowa	sideoats grama	9062280	UNI,IARV,IAT,ICIA	N	1995
Bromus inermis Leyss.	Elsberry	smooth brome	469227	MOA	Nat.	1954
Coreopsis Palmata Nutt.	Northern MO	prairie coreopsis	9079028	MDC, NAS	N	2001
Coreopsis Palmata Nutt.	Western MO	prairie coreopsis	9079029	MDC, NAS	N	2001
Cornus drummondii C.A. Meyer	Corinth	roughleaf dogwood	9055632		N	1997
Cornus drummondii C.A. Meyer	Jefferson	roughleaf dogwood	9055650		N	1997
Cornus drummondii C.A. Meyer	Tazewell	roughleaf dogwood	9055667		N	1997
Cornus drummondii C.A. Meyer	Nicholson	roughleaf dogwood	9055594		N	1997
Cornus mas L.	Redstone	cornelian cherry dogwood	516476		I	1991
Dalea purpurea	Northern Iowa	Purple prairie clover	9068608	UNI, IARV, IAT, ICIA	N	2003
Dalea purpurea	Central Iowa	prairie clover	9068609	UNI,IARV,IAT,ICIA	N	1998
Desmodium spp.	**Northern MO**	**showy tick trefoil**	**9079012**	**MDC**	**N**	**2004**
Desmodium canadense L.	Alexander	showy tick trefoil	9057110		N	1997
Echinacea pallida Nutt.	Northern Iowa	pale purple coneflower	9068611	UNI, IARV, IAT, ICIA	N	2002
Echinacea pallida Nutt.	Southern Iowa	pale purple coneflower	9068613	UNI, IARV, IAT, ICIA	N	2002
Elaeagnus umbellata Thunb.	Elsberry	autumn olive	476986		I	1979
Elymus canadensis L.	Southern Iowa	canada wildrye	9062277	UNI,IARV,IAT,ICIA	N	1997
Elymus canadensis L.	Central Iowa	Canada wildrye	9062276	UNI,IARV,IAT,ICIA	N	1995
Elymus canadensis L.	Northern Iowa	Canada wildrye	9062275	UNI,IARV,IAT,ICIA	N	1995

Releases from Elsberry PMC - continued						
			Accession	Secondary	Type of	Year of
Scientific Name	Release Name	Common Name	Number	Agency(ies)	Release	Release
Elymus virginicus L.	Cuivre River	Virginia wildrye	9803169	MDC	N	2002
Elymus virginicus L.	Northern MO	Virginia wild rye	9079044	UMC,MDC,MODOT	N	1999
Eryngium yuccifolium Michx.	Southern Iowa	rattlesnake master	9068604	UNI, IARV, IAT, ICIA	N	1999
Eryngium yuccifolium Michx.	Central Iowa	rattlesnake master	9068603	UNI, IARV, IAT, ICIA	N	1999
Eryngium yuccifolium Michx.	Northern Iowa	rattlesnake master	9068602	UNI,IARV,IAT,ICIA	N	1998
Glycine sp. L **	Bobwhite	soybean	421822	MOPMC,ARS, MOA,	I	1975
Heliopsis helianthoides (L.) Sweet	Southern Iowa	oxeye false sunflower	9068607	UNI,IARV,IAT,ICIA	N	1997
Heliopsis helianthoides (L.) Sweet	Northern Iowa	oxeye false sunflower	9068605	UNI,IARV,IAT,ICIA	N	1996
Heliopsis helianthoides (L.) Sweet	Central Iowa	oxeye false sunflower	9068606	UNI,IARV,IAT,ICIA	N	1995
Koeleria macrantha	Central Iowa	Prairie Junegrass	9068621	UNI, IARV, IAT, ICIA	N	2003
Koileria macrantha	Northern Iowa	Prairie Junegrass	9068620	UNI, IARV, IAT, ICIA	N	2003
Lespedeza capitata Michx.	Northern Iowa	roundhead lespedez	9062284	UNI, IARV, IAT, ICIA	N	2000
Lespedeza capitata Michx.	Southern Iowa	roundhead lespedez	9062283	UNI, IARV, IAT, ICIA	N	1997
Lespedeza capitata Michx.	Central Iowa	roundhead lespedeza	9062282	UNI, IARV, IAT, ICIA	N	1996
Liatris aspera, Michx.	Southern Iowa	Rough Blazing Star	9068686	UNI, IARV, IAT, ICIA	N	2003
Liatris aspera, Michx.	Central Iowa	Rough Blazing Star	9068685	UNI, IARV, IAT, ICIA	N	2003
Liatris aspera, Michx.	Northern Iowa	Rough Blazing Star	9068684	UNI, IARV, IAT, ICIA	N	2003
Liatris pycnostachya, Michx	Northern MO	blazing star	9079020	MDC, NAS	N	2001
Liatris pycnostachya, Michx	Southern Iowa	prairie blazing star	9068628	UNI, IARV, IAT, ICIA	N	2000
Liatris pycnostachya, Michx	Northern Iowa	prairie blazing star	9068626	UNI, IARV, IAT, ICIA	N	1999
Liatris pycnostachya, Michx	Central Iowa	prairie blazing star	9068627	UNI, IARV, IAT, ICIA	N	1999
Liatris pycnostachya, Michx.	Western MO	blazing star	9079021	MDC, NAS	N	2001
Liriodendron tulipifera L.	Union	tulip poplar	9055584		N	1997
Lonicera maackii Maxim	Cling Red	Amur honeysuckle	483450		I	1978
Monarda fistulosa L.	Southern Iowa	Wild Bergamot	9068680	UNI, IARV, IAT, ICIA	N	2003
Panicum virgatum L.	Central Iowa	Switchgrass	9068706	UNI, IARV, IAT, ICIA	N	2003
Panicum virgatum L.	Cave-In-Rock	switchgrass	469228	MOA	N	1974
Panicum virgatum L. *	Shawnee	switchgrass	591824		N	1995
Ratibida pinnata, Barnh.	**Northern MO**	**Grayhead coneflower**	**9079060**	**MDC**	**N**	**2004**
Schizachyrium scoparium (Michx.) N	**Southern MO**	**little bluestem**	**9079006**	**MDC**	**N**	**2004**
Schizachyrium scoparium (Michx.) Nash	Central Iowa	little bluestem	9062320	UNI,IARV,IAT,ICIA	N	1997
Schizachyrium scoparium, Michx.	Northern Iowa	little bluestem	9062319	UNI, IARV, IAT, ICIA	N	1999
Schizachyrium scoparium, Michx.	Southern Iowa	little bluestem	9962321	UNI, IARV, IAT, ICIA	N	1999
Schizachyrium scoparium, Michx.	Northern MO	little bluestem	9079004	UMC,MDC,MODOT	N	1999

Releases from Elsberry PMC - continued						
			Accession	Secondary	Type of	Year of
Scientific Name	Release Name	Common Name	Number	Agency(ies)	Release	Release
Solidago rigida L.	Southern Iowa	rigid goldenrod	9068619	UNI, IARV, IAT, ICIA	N	2002
Solidago rigida L.	Central Iowa	rigid goldenrod	9068618	UNI, IARV, IAT, ICIA	N	2002
Solidago rigida L.	Northern Iowa	rigid goldenrod	9068617	UNI,IARV,IAT,ICIA	N	1998
Sorghastrum nutans (L) Nash.	Northern MO	indiangrass	9079036	UMC,MDC,MODOT	N	1999
Sorghastrum nutans (L) Nash.	Western MO	indiangrass	9079037	UMC,MDC,MODOT	N	1999
Sorghastrum nutans (L). Nash	Central Iowa	Indiangrass	9062317	UNI,IARV,IAT,ICIA	N	1996
Sorghastrum nutans (I). Nash	Northern Iowa	Indiangrass	9062316	UNI,IARV,IAT,ICIA	N	1996
Sorghastrum nutans (L.) Nash.	Southern Iowa	indiangrass	9062318	UNI,IARV,IAT,ICIA	N	1998
Sorghastrum nutans (L.) Nash.	Rumsey	Indiangrass	315747	MOA	N	1983
Sporobolus compositus (Poir.) Merr.	Northern Iowa	tall dropseed	9062313	UNI, IARV, IAT, ICIA	N	2000
Sporobolus compositus (Poir.) Merr.	Central Iowa	tall dropseed	9062314	UNI,IARV,IAT,ICIA	N	1996
Sporobolus compositus var. com.	Southern Iowa	tall dropseed	9062315	UNI, IARV, IAT, ICIA	N	2002
Sporobolus compositus var. comp.	Northern MO	tall dropseed	9079040	MDC, NAS	N	2001
Ulmus parvifolia Jacq.	Elsmo	lace bark elm	9004438		I	1990

* Primary Agencies: ARS=Agricultural Research Service; NEARD=Nebraska Agricultural Research Division; MOPMC=Missouri Plant Materials Center; IAA=Iowa Agricultural Experiment Station at Ames; PARP=Purdue Agricultural Research Program

** Primary Agency: MDC=Missouri Department of Conservation

N=native releases; collected within the USA, occurring naturally in the USA. Generally refers to a plant which occurs naturally in a particular region, state ecosystem or habitat without direct or indirect human activity.

Nat.=naturalized releases; collected from a population within the USA, but were originally introduced to the USA sometime in the past.

I=introduced; means that the original collection from which the release was made was not from within the USA.

	Releases from the Elsberry Plant Materials Center					
		By Year				
			Accession	Secondary	Type of	Year of
Scientific Name	Release Name	Common Name	Number	Agency(ies)	Release	Release
Andropogon gerardii	OZ-70	big bluestem	9078831		N	2004
Desmodium spp.	Northern MO	showy tick trefoil	9079012	MDC	N	2004
Ratibida pinnata, barnh.	Northern MO	grayhead coneflower	9079060	MDC	N	2004
Schizachyrium scoparium (Michx.) Nash	Southern MO	little bluestem	9079006	MDC	N	2004
Dalea purpurea	Northern Iowa	purple prairie clover	9068608	UNI, IARV, IAT, ICIA	N	2003
Panicum virgatum L.	Central Iowa	switchgrass	9068706	UNI, IARV, IAT, ICIA	N	2003
Koeleria macrantha	Central Iowa	prairie Junegrass	9068621	UNI, IARV, IAT, ICIA	N	2003
Koeleria macrantha	Northern Iowa	prairie Junegrass	9068620	UNI, IARV, IAT, ICIA	N	2003
Monarda fistulosa L.	Southern Iowa	wild bergamot	9068680	UNI, IARV, IAT, ICIA	N	2003
Liatris aspera, Michx.	Southern Iowa	rough blazing star	9068686	UNI, IARV, IAT, ICIA	N	2003
Liatris aspera, Michx.	Central Iowa	rough blazing star	9068685	UNI, IARV, IAT, ICIA	N	2003
Liatris aspera, Michx.	Northern Iowa	rough blazing star	9068684	UNI, IARV, IAT, ICIA	N	2003
Elymus virginicus L.	Cuivre River	Virginia wildrye	9803169	MDC	N	2002
Aster novae-angliae L.	Central Iowa	New England aster	9068682	UNI, IARV, IAT, ICIA	N	2002
Aster novae-angliae L.	Northern Iowa	New England aster	9068681	UNI, IARV, IAT, ICIA	N	2002
Aster novae-angliae L.	Southern Iowa	New England aster	9068683	UNI, IARV, IAT, ICIA	N	2002
Echinacea pallida Nutt.	Northern Iowa	pale purple coneflower	9068611	UNI, IARV, IAT, ICIA	N	2002
Echinacea pallida Nutt.	Southern Iowa	pale purple coneflower	9068613	UNI, IARV, IAT, ICIA	N	2002
Sporobolus compositus var. com.	Southern Iowa	tall dropseed	9062315	UNI, IARV, IAT, ICIA	N	2002
Solidago rigida L.	Southern Iowa	rigid goldenrod	9068619	UNI, IARV, IAT, ICIA	N	2002
Solidago rigida L.	Central Iowa	rigid goldenrod	9068618	UNI, IARV, IAT, ICIA	N	2002
Coreopsis palmata	Northern MO	prairie coreopsis	9079028	MDC, NAS	N	2001
Coreopsis Palmuta Nutt.	Western MO	prairie coreopsis	9079029	MDC, NAS	N	2001
Sporobolus compositus var. comp.	Northern MO	tall dropseed	9079040	MDC, NAS	N	2001
Liatris pycnostachya, Michx.	Western MO	blazing star	9079021	MDC, NAS	N	2001
Liatris pycnostachya, Michx	Northern MO	blazing star	9079020	MDC, NAS	N	2001
Sporobolus compositus (Poir.) Merr.	Northern Iowa	tall dropseed	9062313	UNI, IARV, IAT, ICIA	N	2000
Andropogon gerardii	Northern Iowa	big bluestem	9068614	UNI,IARV,IAT,ICIA	N	2000
Liatris pycnostachya, Michx	Southern Iowa	prairie blazing star	9068628	UNI, IARV, IAT, ICIA	N	2000
Lespedeza capitata Michx.	Northern Iowa	roundhead lespedez	9062284	UNI, IARV, IAT, ICIA	N	2000
Andropogon gerardii Vitman	Southern Iowa	big bluestem	9068616	UNI, IARV, IAT, ICIA	N	1999
Schizachyrium scoparium, Michx.	Northern Iowa	little bluestem	9062319	UNI, IARV, IAT, ICIA	N	1999
Eryngium yaccifolium Michx.	Southern Iowa	rattlesnake master	9068604	UNI, IARV, IAT, ICIA	N	1999
Eryngium yaccifolium Michx.	Central Iowa	rattlesnake master	9068603	UNI, IARV, IAT, ICIA	N	1999
Schizachyrium scoparium, Michx.	Southern Iowa	little bluestem	9962321	UNI, IARV, IAT, ICIA	N	1999
Liatris pycnostachya, Michx	Northern Iowa	prairie blazing star	9068626	UNI, IARV, IAT, ICIA	N	1999
Liatris pycnostachya, Michx	Central Iowa	prairie blazing star	9068627	UNI, IARV, IAT, ICIA	N	1999
Elymus virginicus L.	Northern MO	Virginia wild rye	9079044	UMC,MDC,MODOT	N	1999
Sorghastrum nutans (L) Nash.	Northern MO	indiangrass	9079036	UMC,MDC,MODOT	N	1999
Andropogon gerardii Vitman	Northern MO	big bluestem	9079000	UMC,MDC,MODOT	N	1999
Sorghastrum nutans (L) Nash.	Western MO	indiangrass	9079037	UMC,MDC,MODOT	N	1999
Schizachyrium scoparium, Michx.	Northern MO	little bluestem	9079004	UMC,MDC,MODOT	N	1999
Andropogon gerardii Vitman	Central Iowa	big bluestem	9068615	UNI,IARV,IAT,ICIA	N	1998
Dalea purpurea	Central Iowa	prairie clover	9068609	UNI,IARV,IAT,ICIA	N	1998
Eryngium yuccifolium Michx.	Northern Iowa	rattlesnake master	9068602	UNI,IARV,IAT,ICIA	N	1998
Solidago rigida L.	Northern Iowa	rigid goldenrod	9068617	UNI,IARV,IAT,ICIA	N	1998
Sorghastrum nutans (L.) Nash.	Southern Iowa	indiangrass	9062318	UNI,IARV,IAT,ICIA	N	1998
Andropogon gerardii Vitman.	OH-370	big bluestem	9062323	ARPMC	N	1997
Cornus drummondii C.A. Meyer	Corinth	roughleaf dogwood	9055632		N	1997
Cornus drummondii C.A. Meyer	Jefferson	roughleaf dogwood	9055650		N	1997
Cornus drummondii C.A. Meyer	Tazewell	roughleaf dogwood	9055667		N	1997
Cornus drummondii C.A. Meyer	Nicholson	roughleaf dogwood	9055594		N	1997

Releases from the Elsberry Plant Materials Center - continued						
			Accession	Secondary	Type of	Year of
Scientific Name	Release Name	Common Name	Number	Agency(ies)	Release	Release
Desmodium canadense L.	Alexander	showy tick trefoil	9057110		N	1997
Elymus canadensis L.	Southern Iowa	canada wildrye	9062277	UNI,IARV,IAT,ICIA	N	1997
Heliopsis helianthoides (L.) Sweet	Southern Iowa	oxeye false sunflower	9068607	UNI,IARV,IAT,ICIA	N	1997
Lespedeza capitata Michx.	Southern Iowa	roundhead lespedez	9062283	UNI, IARV, IAT, ICIA	N	1997
Liriodendron tulipifera L.	Union	tulip poplar	9055584		N	1997
Schizachyrium scoparium (Michx.) Nash	Central Iowa	little bluestem	9062320	UNI,IARV,IAT,ICIA	N	1997
Heliopsis helianthoides (L.) Sweet	Northern Iowa	oxeye false sunflower	9068605	UNI,IARV,IAT,ICIA	N	1996
Lespedeza capitata Michx.	Central Iowa	roundhead lespedeza	9062282	UNI, IARV, IAT, ICIA	N	1996
Sorghastrum nutans (L). Nash	Central Iowa	Indiangrass	9062317	UNI,IARV,IAT,ICIA	N	1996
Sorghastrum nutans (l). Nash	Northern Iowa	Indiangrass	9062316	UNI,IARV,IAT,ICIA	N	1996
Sporobolus compositus (Poir.) Merr.	Central Iowa	tall dropseed	9062314	UNI,IARV,IAT,ICIA	N	1996
Bouteloua curtipendula (Michx.) Torr.	Central Iowa	sideoats grama	9062279	UNI,IARV,IAT,ICIA	N	1995
Bouteloua curtipendula (Michx.) Torr.	Northern Iowa	sideoats grama	9062278	UNI,IARV,IAT,ICIA	N	1995
Bouteloua curtipendula (Michx.) Torr.	Southern Iowa	sideoats grama	9062280	UNI,IARV,IAT,ICIA	N	1995
Elymus canadensis L.	Central Iowa	Canada wildrye	9062276	UNI,IARV,IAT,ICIA	N	1995
Elymus canadensis L.	Northern Iowa	Canada wildrye	9062275	UNI,IARV,IAT,ICIA	N	1995
Heliopsis helianthoides (L.) Sweet	Central Iowa	oxeye false sunflower	9068606	UNI,IARV,IAT,ICIA	N	1995
Panicum virgatum L. *	Shawnee	switchgrass	591824		N	1995
Cornus mas L.	Redstone	cornelian cherry dogwood	516476		I	1991
Lonicera maackii Maxim	Cling Red	Amur honeysuckle	483450		I	1978
Ulmus parvifolia Jacq.	Elsmo	lace bark elm	9004438		I	1990
Andropogon gerardii Vitman.	Rountree	big bluestem	474216	MOA	N	1983
Sorghastrum nutans (L.) Nash.	Rumsey	Indiangrass	315747	MOA	N	1983
Elaeagnus umbellata Thunb.	Elsberry	autumn olive	476986		I	1979
Acer ginnala Maxim.	Flame	Amur maple	483442		I	1978
Glycine sp. L **	Bobwhite	soybean	421822	MOPMC,ARS, MOA,	I	1975
Panicum virgatum L.	Cave-In-Rock	switchgrass	469228	MOA	N	1974
Bromus inermis Leyss.	Elsberry	smooth brome	469227	MOA	Nat.	1954
* Primary Agencies: ARS=Agricultural Research Service; NEARD=Nebraska Agricultural Research Division; MOPMC=Missouri Plant Materials						
Center; IAA=Iowa Agricultural Experiment Station at Ames; PARP=Purdue Agricultural Research Program						
** Primary Agency: MDC=Missouri Department of Conservation						
N=native releases; collected within the USA, occurring naturally in the USA. Generally refers to a plant which occurs naturally in a particular						
region, state ecosystem or habitat without direct or indirect human activity.						
Nat.=naturalized releases; collected from a population within the USA, but were originally introduced to the USA sometime in the past.						
I=introduced; means that the original collection from which the release was made was not from within the USA.						
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	Studies/Projects at the Elsberry Plant Materials Center
	Studies 1958 through 2004
Study/Project Number System: Initially the numbers were assigned numerically plus the year the the study/project was initiated. Later a different numbering system was adopted which involved the designated state number, a letter to denote the type of project/study and finally a numerical number.	
Study/Project No.	
Year Started	**Title**
2-58	Quaker Comphrey Evaluation
3-58	Comparison of Winter Annual Cover Crops
6-62	Fertilizer Rate Study on Midland Bermudagrass, *Cynadon dactylon*
10-59	Interseeding Cover Crops in Corn
14-61	Evaluation of *Lotus corniculatus* L. Strains
15-61	Evaluation of Bermudagrass Strains
17-61	Black Locust, *Robinia pseudoacacia* L. Trials
18-61	The Rate, Date and Method of Seeding *Lespedeza daurica schmidae*
19-61	Living Fence Trials
20-61	Plants for Bank Stabilization
21-62	Evaluation of Legumes for Wildlife
23-63	Evaluation of *Phalaris arundinacea* L. 'Ioreed' Reed Canarygrass Strains
24-62	Method of Seeding Creeping Foxtail
25-63	Advanced Evaluation of Plant Materials for Grass Waterways
26-63	Evaluation of Japanese Pagodatree *(Sophoro japonica)* for Posts
27-63	Direct Seeding vs Transplanting Sawtooth Oak, *Quercus acutissima Carruthers*
28-63	Effect of Cultural Methods on Crownvetch, *Coronilla varia* L. Seed Production
31-63	*Lespedeza capitata* Michx. - Roundhead Lespedeza
	Ecotype Evaluation
34-63	Cultural Methods for Seeding Grasses in Woodland Pastures
35-63	Effect of Cultural Methods on Seed Production of *Phalaris arundinacea* L.,
	'Ioreed' Reed Canarygrass

Studies/Projects at the Elsberry Plant Materials Center - cont.	
Study/Project	**Title**
37-63	Forage Yields and Season of Production for Several Grasses and Legumes
	Clipped Bi-Weekly at Three Inches and Six Inches
38-64	Advanced Evaluation of Perennial Grasses for Summer Pasture
42 -65	Establishment of Crownvetch and Trefoil in Dead Litter Mulch
44-65	Grasses and Legumes for Goose Browse on the Clarence Cannon
	Wildlife Refuge
46-66	Method of Seeding Trials with 'Garrison' Creeping Foxtail
49-69	Seed Yield of Three *Panicum virgatum*, Switchgrass Selections: Mich 381;
	Blackwell', M1-5714; and M1-5845, 'Cave-In-Rock'
50-69	Seed Yield and Seed Retention of Four *Phalaris arundinacea*, Reed
	Canarygrass Selections: 'Ioreed', 'Rise', 'Frontier', and 'Auburn'
51-A-70	Herbicide Tolerance of Four Waterway Grasses: *Alopecurus arundinaceus*,
	Garrison' Creeping Foxtail; *Bromus inermis*, smoothbrome; *Phalaris*
	arundinacea, reed canarygrass; and *Panicum virgatum*, switchgrass
51-B-71	Herbicide Tolerance of New Seeding of *Festuca arundinacea*, Tall Fescue;
	Andropogon gerardii, Big Bluestem, *Sorghastrum nutans*, Indiangrass; and
	Panicum virgatum, Switchgrass
51-C-71	Herbicide Tolerance of New Seedling of Tall Fescue, Big Bluestem ,
	Indiangrass and Switchgrass
29I052W	Growth Rate Study of European Alder on Deep Alluvial Soil
53-72	Growth Rate Study of Poplar (Cottonwood) On a Deep Alluvial Soil
54-72	Rhizome Development of Two Tall Fescue, *Festuca arundinacea*,
	Selections: M1-6161 and M1-6162
29A055	Evaluations of *Sorghastrum nutans*, Indiangrass (M17073), Poly-Cross
	Indiangrass for Leafiness, Disease-Free Characteristics and
	Seed Production
56-71	Comparative Evaluation of New Lotus Accessions With Names and Used
	Varieties to Determine Potential as a Long Lived Legume in Three State
	Area Saved
29I057-72	Growth Rate Study of Poplars (Cottonwood) On a Deep Alluvial Soil
	Deep Alluvial Soil
29A058-72	Evaluation for Naming and Releasing of Elsberry Developed Big Bluestem
	and Indiangrass

Studies/Projects at the Elsberry Plant Materials Center - cont.	
Study/Project	**Title**
59-72	Sorghum Evaluation as Wildlife Game Feed
29I060-69	Replacement of the American Elm Tree
61-72	Advanced Evaluation of Meadow Foxtail, *Alopecurus pratensis*, PI-305495,
	as a Waterway Grass as Compared to 'Garrison' Creeping Foxtail,
	Alopecurus arundinaceus the Standard for Comparison
29I062J	Trees and Shrubs for Use as Wildlife Food and Cover Plants
29I063	Plants for Use in Critical Area Stabilization
29I064W	Plants for Wood Products
65-78	Plants for Use in Landscape and Beautification
29I066W-72	Developing Winterhardy Nut Bearing Trees and Shrubs for Planting in Parks,
	Wildlife Areas and Natural Areas
29I067K	Trees for Windbreaks
68-72	Response of Yellow Poplar to Thinning
69-72	Black Cherry Demonstration
70-73	Desmodium for Wildlife Food and Cover
71-73	Evaluation for Naming and Releasing of Elsberry Developed Autumn Olive,
	M1-6369
72-73	Evaluation of M1-4701, *Lonicera maackii*, Amur Honeysuckle for
	Naming and Releasing
73-73	Establishment of Warm-Season Grasses with Herbicides for Weed Control.
	Herbicides are Not Tested or Have Label Clearance for Warm-Season Grasses
29A074M	Cover Crops in Soybeans
------	NJ-927, *Eleagnus umbellata*, Autumn Olive for Wildlife Food and Cover
29A075F	Plants for Shoreline and Wetland Stabilization
29I076G-78	Establishment of Warm Season Grasses
-------	Evaluation of Cold Hardy *Paspalum notatum* Selections
29I077P	Evaluation of Plants for Vegetating Salt Damaged Areas

Studies/Projects at the Elsberry Plant Materials Center - cont.	
Study/Project	**Name**
29I078D	Field Evaluation Planting to Evaluate Plants for Use on Alkali Bearing
	Soils in Southern Illinois
29I079D	Field Evaluation Planting to Evaluate Species of Plants for Use on Revegetating
	Acid Coal Mine Spoil in Illinois
29I081D	Field Evaluation Planting to Evaluate Species of Plants for use in Revegetating
	Acid Coal Mine Spoil in Iowa
29I082D	Field Evaluation Planting to Evaluate Species of Plants for Use in Revegetating
	Acid Coal Mine Spoil in Illinois
29I083M	Legume Cover Crop for No-Till Corn Production
29I084G	Legumes to Enhance Fescue Pastures
29A085S	Debearding Fluffy Native Grass Seed, (Big Bluestem and Indiangrass)
29I086L	Use of an Absorbant Polymer in Coating Native Grass Seed
29I087D	Plants with Increased Tolerance to Aluminum and Manganese
29A088W	Cooperative Screening Study of Native and Introduced Sources of Eastern
	Cottonwood
29I089V	Multiple Use Legume Assembly and Evaluation
29I090G	No-Till Establishment of Warm-Season Grasses in Cool Season Grass Sod
29I091G	Weed Control Treatments for Warm Season Grass Establishment
29I092G	Perennial Grasses as Cover Crops for Use in No-Till Systems
29I093R	Miscellaneous Grass Evaluation
29A094M	Cover Crops in Corn, Soybeans and Milo
29A095M	Field Evaluation Planting to Evaluate Cover Crops - Rochester, Minnesota
29I097G	Assembly and Evaluation of Big Bluestem, *Andropogon gerardii*, Vitman.
29I099J	Assembly and Evaluation of Roughleaf Dogwood, *Cornus drummondii*
29I100J	Assembly and Evaluation of Blackhaw, *Viburnum prunifolium* L.
29I101J	Assembly and Evaluation of Arrowwood, *Viburnum dentatum* L.

Studies/Projects at the Elsberry Plant Materials Center - cont.	
Study/Project	**Name**
29A105M	Evaluation of Winter Annual Grass for Cover Crops in No-Till Soybeans
29I107G	Assembly and Evaluation of Eastern Gamagrass, *Tripsacum dactyloides* L.
29I108G	Assembly and Evaluation of Low Growing Rhizomatous Switchgrass,
	Panicum virgatum L., for Use in Waterways, Filter Strips and Other
	Conservation Uses
29I109W	Direct Seeding Methods of *Quercus* sp., Oaks
29I110J	Assembly and Evaluation of Chokecherry, *Prunus virginiana* L.
29A111G	Field Evaluation of Selected Perennial Grasses for Pasture Wildlife Habitat
	and Erosion Control (Varietal Study)
29I112J	Assembly and Evaluation of Nannyberry, *Viburnum lentago* L.
29I113J	Assembly and Evaluation of Serviceberry, *Amelanchier arobrea* (Michx. F.)
	Fern.
29I114K	Field Evaluation of Woody Plant Materials in Cooperation with Mineral
	Area College
29A116W	Evaluation of Miscellaneous Trees and Shrub Species
29A117H	Intercenter Strain Trial of *Tripsacum dactyloides* L., Eastern Gamagarss
29A118G	Field Evaluation of Selected Perennial Grasses for Pasture, Wildlife Habitat
	and Erosion Control (Varietal Study)
29A121W	Conifer Evaluation for Windbreak Plantings
29A122G	Evaluation of Perennial Warm-Season Grasses as Windbarriers in Southeast
	Missouri
29A123M	Winter Cover Crop Study for No-Till Soybeans
29I124G	Production of Native Iowa Ecotypes of Grasses and Forbs for Roadside,
	Critical Areas, and All Other Vegetative Plantings Where Native Grasses
	and Forbs are Now Being Planted
29A125G	Fertility and Harvest Management of Eastern Gamagrass for Forage
	Production
29I126W	Woody Columnar Collection

Studies/Projects at the Elsberry Plant Materials Center - cont.	
Study/Project	**Title**
29A127G	Field Evaluation of Selected Perennial Grasses for Pasture, Wildlife
	Habitat and Erosion Control
29A128J	*Cornus florida* L., Flowering Dogwood, Interagency Study Between
	Department of Interior, National parks Service, National Capital Region and
	the Department of Agriculture
29A130G	Grass Hedges for Control of Runoff and Erosion
29A131O	Treatment of Animal Wastewaters by Constructed Wetlands
29I132O	Miscellaneous Wetland Plant Evaluation
29I133J	Assembly and Evaluation of Gray Dogwood, *Cornus racemosa*
29I134J	Assembly and Evaluation of Eastern Redcedar, *Juniper virginiana* L.
29I135J	Assembly and Evaluation of Hazelnut, *Corylus americana* , Marsh.
29I136J	Assembly and Evaluation of WIld Plum, *Prunus americana* , Marsh.
29A137O	Wetland Riparian Progagation, Establishment and Demonstration
29I138G	Residue Decomposition Trial
29A139G	Field Evaluation of Establishment of Herbaceous Plant Materials on Sand
	Covered Flooded Areas in Missouri
29A140W	Yellow Poplar Evaluation
29I141G	Assembly and Evaluation of Little Bluestem, *Schizachyrium scoparium* ,
	Michx.
29I142G	Production of Native Missouri Ecotypes of Grasses, Legumes and Forabs for
	Roadside, Critical Areas, and All Other Vegetative Plantings Where Native
	Plants are Now Being Planted
29I143G	Seed Coat/Seeding Rates Study
29A144G	Biofuel Study of Different Strains/Varieties of Switchgrass
29A145	Wear Tolerance Demonstration of Vegetation in High Traffic Areas
MOPMC-P-0001	Assembly, Evaluation and Selection ofBur Oak, *Quercus macrocarpa* , Michx.
WO,WL,WE	
MOPMC-P-0002	Assembly, Evaluation and Selection of False Indigo Bush,.
WE, WL	*Amorpha fruticosa* , L.
MOPMC-P-0003	Evaluation and Release of Eastern Gamagrass,*Tripsacum dactyloides* , L.
PA, WL	

Studies/Projects at the Elsberry Plant Materials Center - cont.	
Study/Project	**Title**
MOPMC-T-0104	Native Plant Identification
MOPMC-PA-0105	Compatibility Study Using Warm Season and Cool Season Native Grasses
	with Native Legumes and Forbs
MOPMC-BC-0106	Collection and Evaluation of Native Cool Season Grasses and Sedges
	for Filter Strips
MOPMC-P-0107	Evaluation and Release of Big Bluestem, *Andropogon gerardii*, L
MOPMC-T-0208-PA	Testing Warm Season Grasses for Forage Quality
MOPMC-0209-PA,	Evaluation and Release of *Paspalum* Species
WL	
MOPMC-T-0310-PA, WL	Incorporating Native Warm Season Grasses Into Cool Season Pastures
	With Grazing Management
.	
MOPMC-T-0311-RI, BU	Control of Reed Canarygrass in Riparian Buffer Plantings
MOPMC-T-0412-WE,	Testing Selected Trees for Tolerance to the Herbicide Outrider
WL, RI	
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Herbaceous and Woody Seed and Plant Production at the Elsberry PMC 2004

The plant and seed inventory at the Elsberry PMC is used for field plantings, special plantings, demonstration plantings, research studies and commercial release.

Name	Seed Harvested in 2004
Herbaceous Species	**PLS (Pounds)**
'Rountree' big bluestem *Andropogon gerardii*	162 Foundation
'Rumsey' indiangrass *Sorghastrum nutans*	0 Foundation
'Pete' eastern gamagrass *Tripsicum dactyloides* L.	39 Foundation
'Cave-In-Rock' switchgrass *Panicum virgatum*	119 Foundation
'OH-370' big bluestem *Andropogon gerardii*	125 Foundation
'OZ-70' big bluestem *Andropogon gerardii*	113 Foundation
'Alexander' tick trefoil *Desmodium canadense*	45 Foundation
Flood tolerant switchgrass *Panicum virgatum*	90 Foundation
Low growing switchgrass *Panicum virgatum*	68 Foundation
'Bobwhite' soybean *Glycine spp.*	475 Foundation
Iowa Ecotype Plantings (10 Species; 28 Plots)	149 Total
Missouri Ecotype Plantings (15 Species; 17 Plots)	170 Total

Herbaceous and Woody Seed and Plant Production – continued

Name:	Seed & Plant Inventory as of December 2004	
Woody Species	**Plants**	**Seed Bulk (Pounds)**
'Union' tulip tree *Liriodendron tulipifera*	0	2.00
Nicholson Germplasm roughleaf dogwood *Cornus drummondii*	0	0.70
Corinth Germplasm roughleaf dogwood *Cornus drummondii*	0	0.40
Tazewell Germplasm roughleaf dogwood *Cornus drummondii*	0	0.30
Jefferson Germplasm roughleaf dogwood *Cornus drummondii*	0	0.30
American hazelnut (9083247) (Composite) *Corylus americana*	1290	0
American plum (9083241) (Composite) *Prunus Americana*	52	4.5
Arrowwood (9068590) (Iowa Selection) *Viburnum dentatum*	269	0
'Redstone' Cornelian cherry (9055585) *Cornus mas*	0	2.60

For more information about this and other conservation plants, contact your local NRCS field office or Conservation District, or browse the Web at http://Plant-Materials.nrcs.usda.gov (Plant Materials) or http://plants.usda.gov (PLANTS database).

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