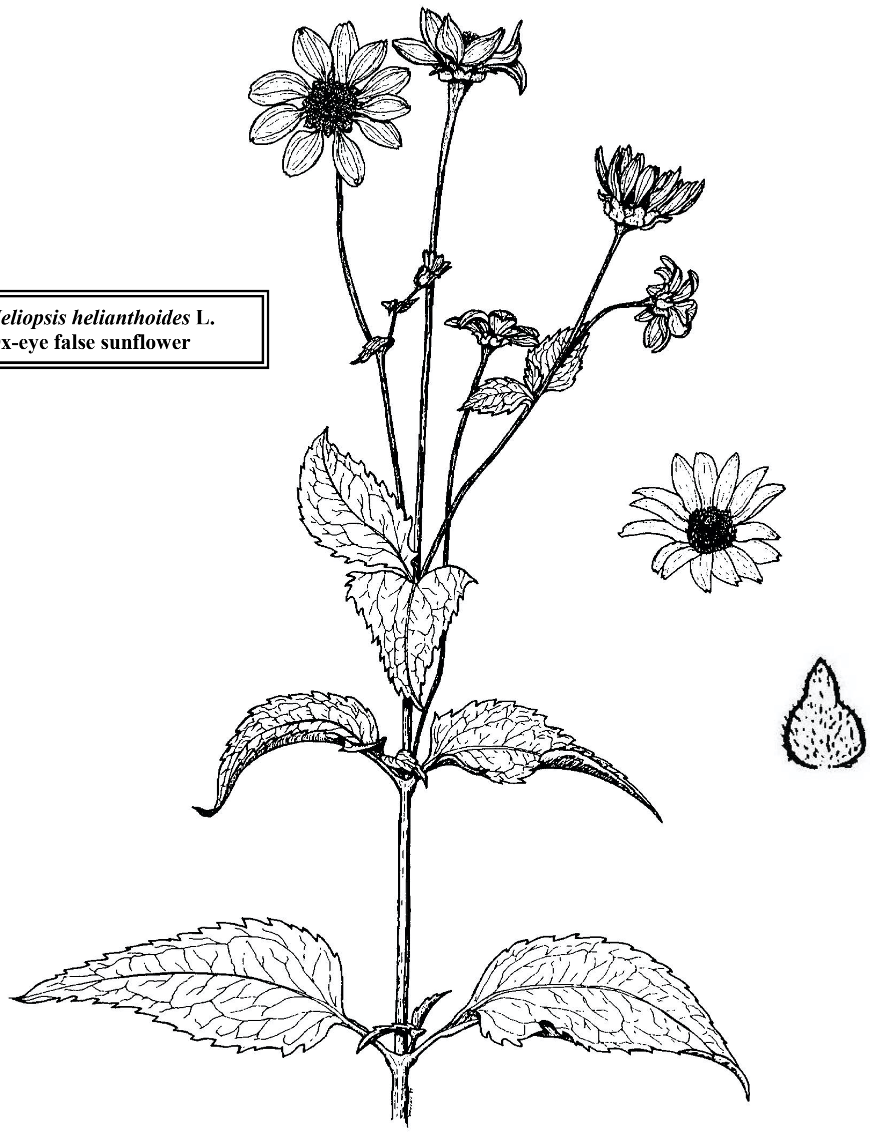
ELSBERRY PLANT MATERIALS CENTER

2001 TECHNICAL REPORT



Heliopsis helianthoides L. **Ox-eye false sunflower**

Line drawings provided by "An Illustrated Guide to Iowa Prairie Plants" by Paul Christiansen and Mark Muller and the University of Iowa Press.

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Materials Plant Program

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Elsberry Plant Materials Center

2001

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2001
Technical Report
Elsberry Plant Materials Center
Elsberry, Missouri

Introduction

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

The Elsberry PMC serves Illinois, Iowa and Missouri, and 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 is 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 are finding suitable plants for wetland situations, high traffic areas, wildlife food and habitat, farmstead and field windbreaks, and windbarriers. Also, pastures, landscape and beautification, roadside restoration, biofuel concerns, riparian plantings, woodland, erosion control on cropland and etc.

Each of the three states served by the Center has identified their 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 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.

New avenues have been established and used by the Plant Materials discipline to release plants to the commercial market: Source Identified, Selected and Tested. 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 59 plants during its 67-year history. Fifty-three of the total numbers of plants released are natives.

CLIMATIC DATA – CALENDAR YEAR 2001

TEMPERATURE (Fahrenheit)

Month	69 Year Monthly High Average	Year 2001 Monthly High Average	Year 2001 Monthly High Departure	69 Year Monthly Low Average	Year 2001 Monthly Low Average	Year 2001 Monthly Low Departure
January	37.99	35.87	-2.12	18.28	18.81	+.53
February	43.15	42.49	-.86	22.68	25.00	+2.32
March	53.83	51.35	-2.48	37.17	28.52	-8.65
April	66.63	73.90	+7.26	42.58	48.90	+6.32
May	76.60	77.58	+.97	57.81	55.94	-1.88
June	85.43	83.33	-2.10	72.61	60.80	-11.80
July	89.66	89.00	-.66	65.49	68.16	+2.67
August	87.64	87.94	+.30	63.29	65.58	-8.96
September	80.41	78.73	-1.68	54.88	54.33	-.55
October	69.57	67.39	-2.19	43.68	44.32	+.64
November	54.20	60.32	+6.11	32.63	38.61	+5.98
December	42.00	46.58	+4.58	23.04	29.48	6.44

2001	
Last Killing Frost	April 1
First Killing Frost	Nov 9
Number of Frost-Free Days	207

CLIMATIC DATA – CALENDAR YEAR 2001

Precipitation (Inches)

Month	71 Year Average	2001 Total	Departure
January	1.86	2.16	+.30
February	2.00	4.45	+2.44
March	3.15	1.19	-1.96
April	3.69	1.91	-1.78
May	3.96	3.65	-.31
June	3.79	4.68	+.89
July	3.45	7.16	+3.71
August	3.33	6.16	+2.83
September	3.33	3.07	-.26
October	2.99	5.55	+2.56
November	2.90	3.04	+.14
December	2.47	2.64	+.17
Year Total	36.97	45.66	+8.68

Tours, Visitors, and Meetings

The Elsberry Plant Materials Center was visited by 308 registering guests. These individuals represented many walks of life, foreign and domestic, students, farmers, ranchers, researchers and other professionals.

They came individually and in formal groups. All were interested in one or more aspects of our dynamic soil and water conservation program.

The following groups are representative of the interest in the Elsberry Plant Materials Program. Not all individuals are included in this listing.

Groups	Date 2001	Number of Participants
Agro-Forestry Group	January 13	36
Prescribed Burn Workshop	February 15	13
Plant Materials Liaison Group	April 11-13	12
Plant Materials Center Annual Tour	June 13	39
Native American Tour of PMC	June 14	6
Northeast District (National Teachers' Association)	July 5	54
Trees Forever Group	July 19	20
Missouri Department of Conservation CICC Meeting	July 24	20
Missouri Department of Conservation Quarterly Meeting	July 30	9
Daughters of American Revolution (DAR)	September 4	9
Grow Native Group	October 23	8
West Technical High School	October 11	10

Groups	Date 2001	Number of Participants
State Conservationists' Advisory Committee Meeting	October 25	6
Elsberry Elementary School (3rd & 4th Grade)	October 30	158
Regional Technology Specialists	November 14	8

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 brought in 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 which 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:

To 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 evaluation 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's (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 treefoil, 'Mandan' Canada wildrye, and several bermudagrasses including 'Hardy' and OK-74-12-6. 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 cover crop for tree plantings.

2000

No new accessions were added in 2000. Two species that are getting the most interest are the Lincoln County accession 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 covercrop 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 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 has 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 number 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.

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.

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 (see 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 which 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 (see 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 (see Table #2).

No additional selections were made for landscape plants in 1999 (see 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 it's 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.

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: Henry, J.

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 about 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 did.

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 9062310, 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 2001. Plans are to release this accession as a selected class germplasm in year 2001.

2000

Plans were to release accession 9062310, 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. Nine ounces of seed were harvested from the planting located in Field #11 on the PMC on July 19, 2000. Seed was matured and 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 (9062310) of arrowwood is Floyd County, Iowa near Charles City.

2001

The selected accession of arrowwood (9062310) 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.

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 oneside 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 a 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 (See 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 breeders' 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) was 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. Seed from this cross will be tested in study MOPMC-P-003-PA, WL. 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.

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**

Accession Number	Ploidy Level	Percent Protein 5/3/96	6/27/96	7/19/96	Regrowth_3/ 8/27/96	Regrowth 10/15/96
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	6/16/96	1	1.3	5.0	1	59.6
9061984	6/16/96	1	1.6	5.3	2	41.5
9061991	6/24/96	1	2.0	5.0	1	66.9
9061948	6/8/96	2	2.0	5.0	2	71.7
9062005	6/8/96	2	2.8	4.9	4	82.7
9061924	6/10/96	2	1.9	4.0	1	75.9
9062085	6/1/96	5	1.9	4.3	3	83.3
9061937	6/1/96	3	3.0	4.5	4	85.2
9061944	6/24/96	3	2.1	4.8	1	76.4
9062018	7/1/96	2	2.3	4.3	3	59.6
9061994	7/1/96	3	2.7	4.4	3	67.6
9061999	6/24/96	3	2.9	4.4	4	68.4
9062032	6/24/96	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.

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 a 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 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.

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 Choke cherry, *Prunus virginiana L.*

Study Leader: Henry, J.

Introduction:

Choke cherry 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 choke cherry 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 choke cherry for use as wildlife food and habitat in the three states served by the Center.

Objectives:

The objective is to assemble, comparatively evaluate, select and release adapted cultivars/ selections of choke cherry.

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. The reason for placing this study on hold was the lack of personnel at the PMC to carry out the work involved with new studies. 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 choke cherry 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 twelve replications. This planting was made on June 23, 1998 in Field #6 on the PMC.

1999-2001

Table #1 lists the accessions of choke cherry collected, collector's name, state, county, MLRA, and soil type. Table #2 reflects the plants' performance for 1999, 2000 and 2001. 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.

Table #1 Accession Information

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 29I110J - Assembly and Evaluation of Chokecherry — **Table # 2**

Row	**Acc #**	90668664	90008107	9008157	9069664	9068664	9068660	9068664	90008107	9008157	9068660	9068183
1	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	1 3 3	3 8 7	2 3 3	2 3 3	2 3 3	2 2 2	2 3 3	3 6 5	2 7 7	0 0 0	0 0 0
	Ins/Dis	1 2 2	2 8 7	1 3 5	1 2 4	2 4	1 3 4	1 2 3	3 6 6	1 8 6	0 0 0	0 0 0
	Height	1.5 2.0 2.5	2.0 2.5 3.0	1.7 2.3 2.9	2.0 2.6 3.2	1.9 2.5 3.0	2.0 2.5 3.0	1.9 2.6 3.3	1.8 2.0 2.5	1.8 2.4 3.2	0 0 0	0 0 0
	Fruit Pro	0 0 5	0 0 4	0 0 7	0 8 5	0 0 7	0 6 4	0 6 3	0 7 6	0 8 4	0 0 0	0 0 0
Row	**Acc#**	9008107	9068658	9008107	9068183	9068667	9068669	9068664	9008157	9068660	9068668	9008107
2	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	1 2 2	2 4 4	1 4 3	1 3 3	2 3 3	1 2 2	1 1 1	1 3 3	4 5 5	2 1 1	4 8 7
	Ins/Dis	1 4 5	1 4 7	1 4 6	1 4 7	3 4 6	2 4 6	1 4 7	2 4 7	4 4 7	1 4 6	4 5 6
	Height	1.5 2.2 2.9	1.3 1.7 2.2	2.0 2.4 3.0	1.5 2.3 2.8	2.0 2.6 3.0	2.5 2.8 3.2	1.7 2.7 3.5	1.4 2.0 2.8	1.5 2.0 2.4	1.8 2.5 3.5	1.0 1.4 1.9
	Fruit Prod	0 7 5	0 0 6	0 6 6	0 7 7	7 5 3	6 4 2	6 4 2	0 6 3	0 7 7	7 4 3	0 8 6
Row	**Acc #**	9068668	9008107	9068658	9068668	9008183	9068660	9068667	9068664	9068658	9068669	9068664
3	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	1 2 2	1 1 1	0	1 1 1	5 7 6	1 2 2	1 1 1	2 7 6	2 3 3	2 4 4	2 5 5
	Ins/Dis	3 1 4	2 2 4	0	2 2 5	6 6 6	3 3 6	1 1 4	2 6 6	1 2 6	3 2 5	5 6 6
	Height	1.5 2.3 3.0	2.4 2.7 3.2	0	1.8. 2.7 3.3	1.0 1.5 2.0	2.0 2.5 3.5	2.0 2.3 3.2	1.4 1.9 2.2	1.7 2.4 3.1	1.5 2.2 2.8	1.3 1.8 2.3
	Fruit Prod	7 6 6	0 8 8	0	7 7 6	0 8 8	0 8 7	7 5 5	0 8 6	0 8 6	7 7 6	0 8 6
Row	**Acc #**	9068664	9008157	9008107	9068658	9068668	9068669	9068660	9068667	9068664	9068183	9008157
4	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	2 6 6	2 4 4	5 4 5	3 3 3	1 1 1	3 5 3	2 4 4	1 3 3	1 3 3	3 3 3	2 4 4
	Ins/Dis	3 6 6	3 3 3	2 1 3	5 2 4	2 4 5	3 6 6	2 3 5	2 4 4	1 4 5	3 2 4	3 2 5
	Height	1.6. 2.2 2.7	2.0 2.3 3.0	1.7 2.6 3.4	1.0 1.4 2.9	2.0 2.5 4.0	2.5 2.9 3.5	1.5 1.9 2.7	1.5 1.9 3.3	1.5 2.2 3.0	1.8 2.4 3,0	1.8 2.2 2.8
	Fruit Prod	0 0 7	8 6 6	0 8 6	7 5 3	6 4 2	0 6 4	0 0 4	6 4 4	0 7 4	7 6 3	0 6 3
Row	**Acc #**	9068668	9068667	9068664	9068660	9008157	9068183	9068668	9068669	9068658	9008107	9068660
5	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	2 4 5	1 2 4	2 3 4	2 3 3	1 2 2	2 5 5	1 2 2	2 5 5	3 3 3	4 4 4	3 8 6
	Ins/Dis	3 5 6	3 2 6	4 4 7	2 4 7	2 2 6	2 5 6	3 2 5	2 6 7	2 4 5	2 2 6	3 8 7
	Height	2.0 2.3 3.1	1.5 2.2 3.1	1.5 1.9 3.0	2.5 2.9 3.6	1.8 2.7 3.3	2.0 2.4 3.1	1.8 2.3 3.0	1.5 1.8 2.3	1.5 1.8 2.4	1.0 1.4 2.1	1.0 1.3 2.0
	Fruit Prod	7 4 3	7 5 5	0 8 7	0 7 7	0 6 4	0 0 7	8 7 7	7 6 6	0 8 8	0 7 7	0 7 6
										North		
										East		

Rating for Vigor & Ins/Dis = 1 = Excellent, 9 = Poor

Study 29I110J - Assembly and Evaluation of Chokecherry												Table # 2 - continued
Row 6	**Acc #**	9008107	9068664	9068660	9068669	9068658	9008157	9008107	9008183	9068668	9068667	9008183
6	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	2 5 5	2 3 3	1 3 4	1 2 2	2 4 4	2 3 4	4 8 6	1 3 3	1 3 3	2 2 2	3 9 3
	Ins/Dis	1 4 5	1 2 4	1 3 4	2 4 6	1 4 7	1 3 5	2 8 6	3 2 3	1 4 5	3 4 6	3 3 3
	Height	2.0 2.4 3.0	1.3 1.8 2.5	1.0 1.4 2.9	1.3 1.7 3.0	1.3 1.9 2.5	1.9 2.5 3.5	1.4 1.8 2.7	2.5 2.9 3.1	2.0 2.4 3.0	2.0 2.5 3.5	1.5 1.7 2.8
	Fruit Prod	0 7 4	0 7 5	0 5 4	6 4 3	7 4 3	8 6 6	0 7 6	0 7 7	8 7 6	7 5 4	6 6 6
Row 7	**Acc #**	9068664	9008107	9068664	9008183	9068667	9068668	9068658	9068669	9008157	9068660	9068664
7	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	3 4 3	2 3 3	2 3 3	6 8 6	4 4 4	2 1 1	0	4 7 6	2 2 2	3 4 2	3 6 5
	Ins/Dis	2 3 5	2 2 5	2 4 5	4 2 7	2 3 5	2 3 5	0	4 7 3	3 3 6	3 4 6	2 7 5
	Height	2.0 2.4 3.2	2.0 2.4 3.0	1.9 2.5 3.3	1.0 1.5 2.0	1.3 1.6 2.4	1.5 2.1 3.0	0	1.3 1.7 2.5	2.0 2.4 3.2	1.5 2.2 3.0	2.0 2.4 2.9
	Fruit Prod	6 4 3	0 8 7	0 8 6	7 6 3	6 5 5	7 5 5		5 5 5	0 8 7	0 7 5	0 0 6
Row 8	**Acc #**	9068668	9068669	9068667	9068664	9068668	9008107	9008157	9068660	9008183	9068658	9008107
8	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	2 3 3	4 4 4	3 3 2	4 4 4	3 4 5	5 5 5	0	4 3 4	6 7 7	4 4 4	3 5 5
	Ins/Dis	2 3 6	4 3 6	2 6 5	4 6 6	2 2 5	4 5 6	0	3 3 7	6 8 6	5 4 7	3 7 7
	Height	1.5 2.0 2.9	1.3 1.5 2.3	2.0 2.4 3.2	2.0 2.4 3.1	1.9 2.3 3.0	1.5 2.0 2.7	0	2.0 2.2 2.9	1.0 1.3 2.0	2.2 2.6 3.4	1.5 2.0 2.5
	Fruit Prod	7 4 3	3 3 3	6 4 3	0 0 6	0 8 7	0 8 7		0 7 7	0 7 6	0 8 8	0 7 6
Row 9	**Acc#**	9008107	9068668	9068667	9068660	9008183	9068658	9068664	9008107	9068669	9008157	9008157
9	**Year**	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01	99 00 01
	Vigor	3 2 3	4 3 2	3 4 4	4 5 3	5 9 7	3 8 6	3 6 6	4 6 5	0	2 3 3	3 5 5
	Ins/Dis	3 2 7	3 3 6	2 5 5	2 5 6	3 9 9	4 9 9	2 7 7	3 8 7	0	2 2 5	2 5 5
	Height	1.5 2.3 2.9	1.5 2.1 3.0	1.6 2.2 2.8	1.5 2.0 2.6	2.0 2.3 3.0	1.3 1.6 2.3	2.0 2.3 2.8	2.0 2.3 3.1	0	1.5 2.3 3.0	1.5 2.0 2.6
	Fruit Prod	0 6 6	7 4 3	6 4 4	0 8 7	0 8 7	0 8 7	0 8 6	0 0 5	0	0 8 5	0 6 4

North

East

Rating for Vigor & Ins/Dis = 1 = Excellent, 9 = Poor

Study 29I110J - Assembly and Evaluation of Chokecherry — **Table # 2 - continued**

Row 1	**Acc #**	9068669			9068658			9008107			9068183			9068667			9068669			9068664			9008157			9068660			9068668			9068660		
10	**Year**	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01
	Vigor	4	3	3	6	4	4	4	4	4	7	9	3	5	5	4	6	4	4	4	4	4	3	4	3	3	2	2		0		3	3	3
	Ins/Dis	3	3	3	7	4	3	3	5	5	7	9	9	3	6	6	5	4	5	2	5	6	3	6	6	2	3	5		0		2	4	5
	Height	2.0	2.4	3.1	1.5	2.4	3.2	2.0	2.4	3.0	1.5	1.8	2.7	2.0	2.4	3.1	2.2	2.5	3.3	1.4	1.9	2.4	2.0	2.4	3.2	1.5	2.0	3.0		0		2.2	2.7	3.2
	Fruit Prod	0	7	4	0	8	5	8	6	6	0	0	7	0	6	6	8	7	5	0	5	5	8	8	6	0	7	5		0		6	6	4
Row 1	**Acc #**	9068664			9068664			9068668			9068660			9008107			9008157			9008183			9068667			9068658			9068669			9008183		
11	**Year**	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01
	Vigor	5	8	8	2	2	2	4	3	3		0		4	1	1	3	2	2	4	7	7	3	6	6	4	5	4	6	8	8	4	8	7
	Ins/Dis	3	7	6	1	1	2	3	3	4		0		3	2	4	4	2	4	1	8	7	2	7	6	5	8	7	7	8	7	2	8	8
	Height	2.0	2.2	3.0	2.3	2.7	3.2	1.5	2.0	2.7		0		2.0	2.5	3.1	2.0	2.7	3.5	1.5	1.8	2.4	2.0	2.4	3.0	1.5	2.4	3.0	1.8	2.4	3.0	2.0	2.4	3.2
	Fruit Prod	0	5	5	0	5	5	0	0	7		0		8	7	7	8	8	6	0	0	6	0	7	7	0	7	6	8	7	6	0	6	5
Row 1	**Acc #**	9008157			9068669			9068664			9068667			9068183			9008107			9068658			9068108			9008167			9008147			9068664		
12	**Year**	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01
	Vigor	3	4	4	3	8	8	3	3	3	4	2	2	2	2	3	4	1	3	2	1	1	5	4	4	4	2	2	4	3	4	3	4	4
	Ins/Dis	3	2	4	2	8	7	2	2	5	4	2	3	2	2	4	2	3	5	2	2	4	7	5	6	3	1	5	2	3	5	2	3	6
	Height	2.0	2.5	3.0	1.5	1.8	2.5	2.0	2.6	3.2	1.3	1.9	2.7	1.5	2.0	2.8	1.5	1.9	2.7	2.0	2.5	3.9	1.3	1.7	2.2	1.8	2.4	3.1	2.2	2.8	3.4	1.5	2.3	3.0
	Fruit Prod	8	7	7	8	7	6	0	6	6	0	7	7	0	0	5	8	6	6	0	7	5	7	7	5	7	6	4	6	6	4	0	5	5
Row 1	**Acc #**	9068668			9068108			9008167			9068108			9008147			9008157			9068108			9008167			9008147			9068108			9008107		
13	**Year**	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01
	Vigor	3	4	4	4	1	1	3	8	7	3	3	3	4	5	6	6	7	7	3	4	3	4	3	4	3	4	4	3	5	4	3	5	5
	Ins/Dis	2	2	5	3	2	5	2	8	7	3	2	6	3	7	7	3	8	6	2	2	4	3	5	6	2	3	6	2	6	6	4	3	5
	Height	1.5	2.0	2.5	1.5	2.0	3.0	1.5	1.8	2.4	2.0	2.6	3.4	1.4	1.8	2.6	1.3	1.6	2.1	1.5	2.0	2.5	1.4	1.9	2.6	2.0	2.6	3.0	1.5	1.9	2.7	1.5	2.4	2.9
	Fruit Prod	0	8	7	7	6	4	7	6	4	7	7	6	6	6	5	8	8	5	7	6	4	7	6	4	6	6	5	7	6	5	8	7	7
Row 1	**Acc #**	9008157			9008107			9068668			9068660			9068664			9008107			9008157			9008183			9068669			9068668			9068660		
14	**Year**	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01	99	00	01
	Vigor		0		4	2	2	4	6	5	4	3	3	3	3	3	3	2	1	3	4	5	3	6	6	4	6	4	4	2	2	7	4	5
	Ins/Dis		0		3	4	5	4	4	5	3	3	5	4	5	7	2	1	3	2	5	7	2	5	6	2	5	7	3	2	5	7	4	5
	Height		0		1.5	2.5	3.0	2.2	2.8	3.3	1.4	2.0	2.7	1.5	2.0	2.6	1.5	2.3	3.0	2.0	2.3	3.1	1.4	1.9	2.5	1.5	2.2	3.0	1.5	2.2	2.9	1.0	1.4	2.2
	Fruit Prod				8	6	6	0	7	6	6	6	5	0	5	5	8	6	5	8	8	6	0	6	5	8	6	6	0	8	7	6	6	4
																								North			East							

Rating for Vigor, Insect & Disease and Fruit Production: 1 = Excellent, 5 = Fair, 9 = Poor

Study No. 29A116W

Study Title: Evaluation of Miscellaneous Trees and Shrubs.

Study Leader: Henry, J.

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:

1994-2001

This study is a long-term ongoing evaluation of miscellaneous trees and shrubs that were not part of a collection made over a broad area. Some new species will be planted yearly. Although this study was started in 1989, it includes some species from past studies. Presently there are 29 different species included in this study. Twenty-two of the total of 29 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 assembly, accession numbers, sources and date planted.

Table #2 reflects the plants' performance for years 1990-1992, 1998-2001.

Study 29A116W

Table #1 List of species included in study.

Common Name	**Genus**	**Species**	**Accession Number**	**Alternate Number**	**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

Common Name	Genus	Species	Accession Number	Alternate Number	Source	Date Planted
Prairie rose	*Rosa*	*setigera*	495616		Ames, IA	4/90
Ural falsepirea	*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	*Lnoicera*	*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
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
Whihita osageorange	*Maclura*	*pomifera*			Kansas	5/91
Denmark osageorange	*Maclura*	*pomifera*			Denmark, IA	6/92

Common Name	**Genus**	**Species**	**Accession Number**	**Alternate Number**	**Source**	**Date Planted**
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**

Tree						Date	No.	No. Survived							Ave. Ht. (Ft.)							Ave. Wd. (Ft.)						
No.	Common Name	Genus	Species	Accn #	Alt. No.	Plt.	Plt.	90	91	92	98	99	OO	2001	90	91	92	98	99	OO	2001	90	91	92	98	99	OO	2001
1	Densehead mt. ash	Sorbus	alnifolia		7761	Nov-65	2	2	2	2	2	2	2	2	21	22	22	25	26	25.7	26	8.2	8.2	8.2	12	12.4	12.9	13.3
2	Ruby' redosier dog.	Cornus	stolonifera	443229		5/9/89	4	4	4	4	4	4	4	4	0.7	3.7	3.9	4	4.7	4.7	5.3	1.8	3.6	4.8	3.5	4	4.2	4.7
3	Late lilac	Syringa	villosa	9006228		5/9/89	4	4	4	3	0	0	0	0	0.4	0.7	2.3	0	0	0	0	1.2	1.3	2.4	0	0	0	0
4	Redstone' cornelian cherry dogwood	Cornus	mas	9055585		5/9/89	3	3	3	3	3	3	3	3	1.4	1.9	2.8	4.5	5	5	6.2	0.4	0.8	1.4	4.5	5	5.5	6.5
5	Roselow' sargent crabapple	Malus	sargentii	477986		5/9/89	3	3	3	3	0	0	0	0	2	2.7	2.9	0	0	0	0	1	1.7	2.6	0	0	0	0
6	Elsmo' lacebark elm	Ulmus	parvifolia	9004438		5/9/89	2	2	2	2	2	2	2	2	5.4	9.6	11.8	27	27	27.6	28.3	3.3	6.4	7.4	16	16.5	17	18
7	Blueleaf honeysukle	Lonicera	korolkowi	9062152		5/9/89	6	6	6	6	6	6	6	6	4	6.8	8	12	12	12.4	12.8	5.6	8.8	9.8	13	13.3	13.8	14
8	Birch	Betula	species	502295		4/16/90	3	1	1	1	1	1	1	1	3.4	3.4	4.1	6	6.5	6.8	7.5	1.5	1.9	2.8	5	5.7	6	6.5
9	Willow oak	Quercus	phellos		4723	4/16/90	4	4	4	4	4	4	4	4	1.7	2.6	4.1	23	23	23	23	1	1.8	3.7	12	12	12.9	12.9
10	Fragrant epaulettetree	Pterostyrax	hispida		A-8079	4/16/90	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Bradford pear	Pyrus	calleryana		19173	4/21/69	2	2	2	2	2	2	1*	1	27	27	27	29	30	17*	18	20	20	21	33	33.6	15*	15.5
12	Prairie rose	Rosa	setigera	495616		4/16/90	2	2	2	2	2	2	2	2	1.5	3.7	4.7	6.6	7	7	7	1.6	5.5	5.9	10	10.4	10.7	11
13	Ural falsespirea	Sorbaria	sorbifolia		7778	4/16/90	7	7	7	7	7	7	7	7	1	1.8	2.3	5	5	5	5	0.6	1.8	2.1	6	6.5	6.9	7.1
14	Weeping lilac	Syringa	pekinensis	478008		4/16/90	3	2	2	2	2	2	2	2	1	1	1.5	7	7.3	7.7	8	0.7	1	2	7.5	7.8	8	8.2
15	Flameleaf sumac	Rhus	copallina		7764	4/16/90	4	2	2	2	2	2	2	2	1.6	2.9	5.3	7	7.7	7.9	8.2	0.8	2.8	5.3	8	8.3	8.5	8.9
16	Western paper birch	Betula	occidentalis	495882		4/16/90	3	2	2	2	2	2	2	2	1.3	4.5	3	8	8.8	9.1	8.8	0.3	2.4	3.9	5	5.6	5.9	6.2
17	Honeysuckle	Lonicera	maackii	477998		4/16/90	4	3	3	3	3	3	3	3	0.7	1.5	2.7	7.8	7.9	7.9	7.9	0.6	1.2	2.7	4.5	5	5.5	5.9
18	Mountain ash	Sorbus	reducta		A-8371	4/16/90	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Blackhaw	Viburnum	prunifolium		2813	4/16/90	4	2	2	2	2	2	2	2	2.6	2.7	3.4	8	8.5	8.7	9	0.7	1.3	2.4	5	5.3	5.5	6
20	Largeleaf dogwood	Cornus	macraphylla		10178	4/18/90	3	3	3	3	3	3	3	3	1.7	2.2	3	7.5	7.9	8	8.2	0.5	0.9	1.7	4.5	5	5.4	5.7
21	Border privet	Ligustrum	obtusifolium	477010		4/18/90	4	3	3	3	0	0	0	0	1.4	2.4	2.6	0	0	0	0	0.8	2.3	2,3	0	0	0	0
22	Willow oak	Quercus	phellos		4724	4/18/90	4	4	4	4	4	4	4	4	1.3	3.1	4.4	13	13	13.5	14	0.8	2.4	3.8	12	12.4	12.7	13.4
23	Arrowwood	Viburnum	dentatum			Apr-91	5	4	4	4	4	4	4	4	2	4.3	4.5	7	7	7	7	0.5	2	2.4	4.5	4.7	4.9	5.3
24	Redbud	Cercis	canadensis	496399		5/8/91	3	3	3	3	3	3	3	3	0.5	3.2	3.7	11	11	11.6	11.9	0.25	0.5	2.7	10	10.5	10.8	11.4
25	Birch	Betula	nigra	14942		5/8/91	5	3	3	3	3	3	3	3	0.5	0.7	1.4	11	11	11.7	12.3	0.4	0.4	1.4	7	7.4	7.9	8.2
26	Wichita' osage orange	Maclura	pomifera			Apr-92	1	1	1	1	1	1	1	1	0.5	0.5	1	13	13	13.5	13.9	0.25	0.3	2.5	13	13.2	13.7	14.3
27	Denmark osage orange	Maclura	pomifera			6/19/92	1	1	1	1	1	1	1	1	0.5	0.5	1	13	13	13.5	14	0.25	0.3	0.5	7	7.3	7.7	8
28	Autumn olive	Eleagnus	umbellata			4/26/99	5				5	5	5	5				2.5	3	3	3			1.5	2	3	3.4	3.8
29	Austree willow	Salix Matsudana X Alba				4/14/95	2				2	2	2	2				30	31	31	31				10	10.5	11	11.3
	*Severe Wind Damage																											

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: Bruckerhoff, S. B.

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 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 become a 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 project 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 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 (see 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 start of 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.

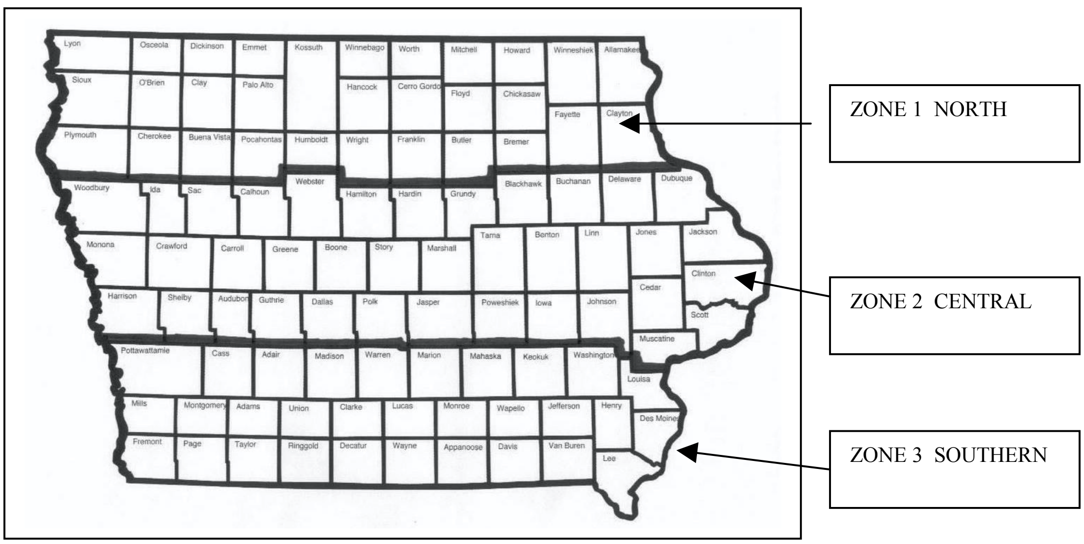
New plant releases for 2000 were Northern Iowa Germplasm Big Bluestem, Northern Iowa Germplasm Tall Dropseed, Northern Iowa Germplasm Roundhead Lespedeza, and Southern Iowa Germplasm Prairie Blazing Star.

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 weed control is a serious problem.

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 Plantins Where Native Grasses and Forbs are Now Being Planted (UNI).				
				Table #2
Project Status				
Common Name		**Accession**		
Genus/Species	**Zone**	**Number**	**Status of Accession**	**Status of Increase Plot**
Big bluestem	1	9068614	Released in 2000	in production
Andropogon gerardii	2	9068615	Released in 1998	in production
	3	9068616	Released in 1999	in production
Sideoats grama	1	9062278	Released in 1994	in production
Bouteloua curtipendula	2	9062279	Released in 1994	in production
	3	9062280	Released in 1994	in production
Purple prairie clover	1	9068608	Released in 1998	Increase plot planted in 1998
Dalea purpurea	2	9068609	Planned release 2002	Increase plot planted in 1999
	3	9068610	Planned release 2002	increase plot planted in 1999
Pale purple coneflower	1	9068611	Planned release 2002	in production
Echinacea pallida	2	9068612	Release in 1998	in production
	3	9068613	Planned release 2002	in production
Canada wildrye	1	9062275	Released in 1994	in production
Elymus canadensis	2	9062276	Released in 1994	out of production
	3	9062277	Released in 1994	out of production
Rattlesnake master	1	9068602	Released in 1998	in production
Eryngium yuccifolium	2	9068603	Released in 1999	in production
	3	9068604	Released in 1999	in production
Oxeye false sunflower	1	9068605	Released in 1997	in production
Heliopsis lelianthoides	2	9068606	Released in 1996	in production
	3	9068607	Released in 1997	in production
Junegrass	1	9068620	Planned release for 2003	
Loeleria macrantha	2	9068621	Planned release for 2003	
	3	9068622	Planned release for 2003	increase plot planted in 2001
Round-head bushclover	1	9062281	Released in 1999	in production
Lespedeza capitata	2	9062282	Released in 1996	in production
	3	9062283	Released in 1997	in production
Rough blazing star	1	9068684	Planned release for 2002	increase plot planted in 2000
Liatris asper	2	9068685	Planned release for 2002	increase plot planted in 2000
	3	9068686	Planned release for 2002	increase plot planted in 2000
Blazing star	1	9068626	Released in 1999	in production
Liatris pycnostachya	2	9068627	Released in 1999	in production
	3	9068628	Released in 2000	in production

Study 29I124G - Native Iowa Ecotypes				Table #2 - continued
Common Name		**Accession**		
Genus/Species	**Zone**	**Number**	**Status of Accession**	**Status of Increase Plot**
Horsemint	1	9068678		increase plots planted in 2000
Monarda fistulosa	2	9068679		increase plots planted in 2000
	3	9068680		increase plots planted in 2000
Little bluestem	1	9062319	Released in 1999	in production
Schizachyrium	2	9062320	Released in 1997	in production
scoparium	3	9062321	Released in 1999	in production
Compassplant	1	9068675		
Silphium laciniatum	2	9068676		
	3	9068677		
Stiff goldenrod	1	9068617	Released in 1998	in production
Solidago rigida	2	9068618	Planned release for 2001	in production
	3	9068619	Planned release for 2001	in production
Indiangrass	1	9062316	Released in 1997	in production
Sorghastrum nutans	2	9062317	Released in 1996	in production
	3	9062318	Released in 1998	in production
Tall dropseed	1	9062313	Released in 2000	in production
Sporobolus compositus	2	9062314	Released in 1996	in production
	3	9062315	Released in 1997	in production
New England aster	1	9068681	Planned release in 2002	increase plot planted in1999
Aster novae angliae	2	9068682	Planned release in 2002	increase plot planted in1999
	3	9068683	Planned release in 2002	increase plot planted in1999
Butterfly milkweed	1	9068687		
Asclepias tuberosa	2	9068688		
	3	9068689		
Blue lobelia	1	9068696		increase plot planted in 2000
Lobilia siphilitica	2	9068697		increase plot planted in 2000
	3	9068698		increase plot planted in 2000
Switchgrass	1	9068705		
Panicum virgatum	2	9068706		
	3	9068707		
Golden alexanders	1	9068702		
Zizia aurea	2	9068703		
	3	9068703		

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: Henry, J.

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 understory 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 NCR upon request.

Discussion:

1994 - 1999

As of the date of 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 four to four and a half 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 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).

Study: 29I1320

Study Title: Miscellaneous Wetland Plant Evaluation

Study Leader: Henry, J.

Introduction:

Wetlands are areas, periodically saturated or inundated by surface or ground water, that support vegetation adapted for saturated soil conditions. In the Environmental Protection Agency (EPA) Region Seven states of Iowa, Kansas, Missouri and Nebraska are generally found along rivers and streams and their associated floodplains or at the margins of lakes and ponds. Wetlands can also occur in upland depressions, such as the prairie “potholes” of Iowa, or in seepage areas along slopes. Because of their location between land and water, wetlands function to improve water quality. They control erosion and trap the runoff from land carrying nutrients, waste, pollution, and sediment and filter the material from flooding waters. Thus ponds, lakes, rivers, streams and our drinking water remain clear and healthy.

Wetland ecosystems support a great diversity of vegetation, which provides food, water, cover, nesting, and wintering ground for many forms of wildlife that use them for all or parts of their life cycles. In fact, wetlands are some of the most biologically unique and productive areas on earth.

Problem:

Naturally occurring wetlands and constructed wetlands, for water quality improvement and wildlife habitat enhancement, require plants that respond to different water regimes and pollutant loads. Facets of these plants’ establishment, management and benefits must be explored. This information can then be used and recommended.

Objective:

Identify, establish, and evaluate for possible increase selected plant materials needed for wetland enhancement, restoration, and creation to meet resource conservation and related water quality program requirements.

Discussion:

1992-1999

Initially, seven wetland cells, 16 feet long by four feet wide and 18 inches deep were constructed using landscape ties, tarp and a double layer of plastic (8 mil). Eighteen inches of good topsoil was placed in each cell. Water was then added to saturate the soil before the planting operation. The following plant species were assembled at the PMC and transplanted in the cells during July 1992: *Scirpus validus,* softstem bulrush; *Sagittaria latifolia,* smooth-cone sedge*; Typha latifolia,* cattails; *Ascepias incarnata*, swamp milkweed and *Ludivigia peploides*, water primrose.

Each species was watered according to its need identified in a literature search. It became evident that each species required different quantities of water. When water was not provided to the smooth cone sedge in the suggested amount, the stand began to deteriorate. The other species reacted less dramatic than the smooth cone sedge to the reduction in water.

Plans are to release the *Carex laericonica,* smooth cone sedge in year 2003.

Table #1 contains information regarding sources for the different collections included in this study.

Table #2 reflects the plants' performance from 1992 – 1999.

2000

Evaluations were conducted during year 2000 along with the seed harvest of *Carex laericonica*, smooth cone sedge. Plant performance data can be found in Table #2 for years 1992 – 2000.

2001

This study was again evaluated for percent survival, flower date, seed production, spread, vigor, and insect and disease resistance. Seed was not harvested from the *Carex laericonica*, smooth cone sedge planting this year because the stand is getting thin and thoughts were that this year's seed production might thicken up the stand. Plant performance data can be found in Table #2 for years 1999 – 2001.

Study 29I1320 - Miscellaneous Wetland Plant Evaluation

Table #1

Genus/species	**Accession Number**	**Source**	**City/State**
Scirpus validus Softstem bulrush	9083201	Kester's Nurseries, Inc.	Omro, Wisconsin
Safittaria latifolia Arrowhead	9083202	Kester's Nurseries, Inc.	Omro, Wisconsin
Juncus offusus Soft rush	9083203	Kester's Nurseries, Inc.	Omro, Wisconsin
Carex laericonica Smoothcone sedge	9083204	Field #7, PMC	Elsberry, Missouri
Typha latifolia Cattail	9083205	County Route #79	Elsberry, Missouri
Ludwigia peplaides Water primrose	9083206	BK Leach Wildlife Area	Elsberry, Missouri
Ascepias incarnata Swamp milkweed	9083207	BK Leach Wildlife Area	Elsberry, Missouri

Study 29I1320 Miscellaneous Wetland Plant Evaluation									Table #2
	Year	Percent	Flower	Seed	End of			Insect	Disease
Genus/Species	Eval.	Survival	Date	Prod.	Season Ht	Spread	Vigor	Resist.	Resist
				\1			\1	\1	\1
Scirpus validus	1992	100	5/19/92	5	50 inches	solid	1	1	1
softstem bulrush	1993	100	5/21/93	5	53 inches	solid	1	1	1
9083201	1994	100	5/17/94	3	55 inches	solid	1	1	1
	1995	100	5/24/95	3	55 inches	solid	1	1	1
	1996	100	5/20/96	2	55 inches	solid	1	1	1
	1997	95	5/23/97	3	55 inches	solid	1	1	1
	1998	90	5/18/98	5	55 inches	solid	1	1	1
	1999	85	5/10/99	5	50 inches	solid	1	1	1
	2000	75	5/17/00	4	50 inches	solid	2	1	1
	2001	60	5/21/01	6	47 inches	solid	4	1	1
Sagittaria latifolia	1992	100	5/27/92	6	65 inches	solid	1	1	1
arrowhead	1993	100	5/25/93	6	68 inches	solid	1	1	1
9083202	1994	100	5/23/94	6	75 inches	solid	1	1	1
	1995	100	5/24/95	6	75 inches	solid	1	1	1
	1996	95	5/27/96	6	75 inches	solid	1	1	1
	1997	95	5/23/97	6	75 inches	solid	1	1	1
	1998	90	5/26/98	6	75 inches	solid	1	1	1
	1999	90	5/21/99	7	72 inches	solid	1	1	1
	2000	85	5/23/00	6	70 inches	solid	2	2	2
	2001	80	5/28/01	6	65 inches	solid	3	2	2
Juncus offusus	1992	100	5/19/92	5	38 inches	solid	1	1	1
soft rush	1993	100	5/25/93	5	45 inches	solid	1	1	1
9083203	1994	100	5/23/94	5	52 inches	solid	1	1	1
	1995	100	5/26/95	5	52 inches	solid	1	1	1
	1996	95	5/21/96	5	52 inches	solid	1	1	1
	1997	95	5/23/97	5	50 inches	solid	1	1	1
	1998	90	5/26/98	5	50 inches	solid	1	1	1
	1999	90	5/21/99	6	48 inches	solid	1	1	1
	2000	90	5/23/00	7	45 inches	solid	2	2	2
	2001	20	5/28/01	8	40 inches	solid	3	2	2
Carex laericonica	1992	100	6/3/92	6	24 inches	solid	4	1	1
smooth cone sedge	1993	100	6/6/93	5	30 inches	solid	3	1	1
9083204	1994	90	6/1/94	5	32 inches		3	1	1
	1995	85	5/31/95	6	32 inches		2	1	1
	1996	70	6/4/96	7	32 inches		2	1	1
	1997	60	6/6/97	7	32 inches		2	1	1
	1998	50	6/8/98	7	32 inches		2	1	1
	1999	50	6/4/99	7	30 inches		3	1	1
	2000	50	6/9/00	5	32 inches		3	1	1
	2001	45	6/11/01	5	30 inches		5	1	1
Typha latifolia	1992	100	5/5/92	2	60 inches	solid	1	1	1
cattail	1993	100	5/7/93	2	80 inches	solid	1	1	1
9083205	1994	100	5/3/94	2	80 inches	solid	1	1	1
	1995	100	5/1/95	2	80 inches	solid	1	1	1
	1996	100	5/8/96	2	80 inches	solid	1	1	1
	1997	100	5/2/97	2	75 inches	solid	1	1	1
	1998	100	5/4/98	2	70 inches	solid	1	1	1
	1999	100	5/7/99	1	68 inches	solid	1	1	1
	2000	100	5/10/00	2	65 inches	solid	1	1	1
	2001	50	5/14/01	2	60 inches	solid	1	1	1

Study 29I1320 Miscellaneous Wetland Plant Evaluation							Table #2 - continued		
	Year	**Percent**	**Flower**	**Seed**	**End of**			**Insect**	**Disease**
Genus/Species	**Eval.**	**Survival**	**Date**	**Prod.**	**Season Ht**	**Spread**	**Vigor**	**Resist.**	**Resist**
				\1			**\1**	**\1**	**\1**
Ludwigia peplaides	1992	90	6/21/92	0	3 inches		3	3	3
water primose	1993	80	6/24/93	0	6 inches		3	2	2
9083206	1994	70	6/21/94	0	6 inches		3	2	2
	1995	70	6/27/95	0	6 inches		3	2	2
	1996	60	6/24/96	0	6 inches		3	2	2
	1997	60	6/30/97	0	6 inches		3	2	2
	1998	60	6/26/98	0	6 inches		3	2	2
	2000	40	6/29/00	0	4 inches		4	3	3
Ascepias incarnata	1992	died 1992							
swamp milkweed									
9083207									
	Rating: Vigor, Insect & Disease Resist: 1 = Excellent, 9 = Poor								
	Rating: Seed Production: 1 = Excellent, 9 = Poor & 0 = No Seed Produced								

Study No. 29I134J

Study Title: Assembly and Evaluation of Eastern Redcedar**,** *Juniper virginiana L.*

Study Leader: Henry, J.

Introduction:

Eastern redcedar has the most uniform distribution of the four species of conifers native to Missouri. Although it is most common in the Ozark region, it is found throughout the state. Scale-like or awl-shaped leaves are opposite or ternate around a minute four-angled dark green central stem. The flowers are male and female on separate trees with the male flowers being conelike, with four to six scales. The female flower structure has fleshy scales. Fruits are bluish in color and about the size of a pea with a white frost-like bloom and contain one to four seeds. The flesh is sweet and resinous and twigs are slender, four-angled and become reddish-brown with inconspicuous buds. Its bark ranges in color from a tan to reddish-brown and shreddy.

Eastern redcedar flowers during March-May with fruit ripening during September-November.

Problem:

There is a lack of an available cultivar of eastern redcedar specifically for this area. NRCS and other conservation and wildlife agencies have identified a need for developing a selection and also source identified sources of redcedar for use as a native juniper for windbreaks and secondary benefits for wildlife habitat in the three states being served by the center.

Objective:

The objective is to assemble, comparatively evaluate, select and release a selected, tested and or cultivar of redcedar for the PMC service area. The selection criteria are for a columnar, upright selection with minimal production of seed.

Discussion:

1989 - 1992

Collections were received from Illinois and Missouri between 1989 and 1991. Forty-six collections were made (16 from Illinois and 30 from Missouri) and the seed was stratified the fall of 1992.

1993 - 1998

Thirty-four of the total 46 collections germinated and were grown out in the PMC greenhouse to a height ranging from 1.5 to 3.0 feet. The planting of the redcedar assembly was made in

Field #7 on the PMC on May 17 and 18, 1994. The plot design was a randomized complete block with six replications.

Table #1 reflects the different accessions, states, county or city where these collections were made; Tables #2, #3, #4, #5, and #6 reflect the plants' performance.

1999

Evaluations were made on November 22, 1999 for the following: height, spread, vigor, insect and disease resistance and form; this information was not added to Tables #2, #3, #4, #5, and #6.

2000

The evaluations documented on November 22, 1999 along with the evaluations made on October 10, 2000 were added to Tables #2, #3, #4, #5 and #6 reflecting plants' performance for years 1997, 1998 and 2000.

2001

The only evaluations made in 2001 regarding this study were insect and disease resistance. A severe infestation of bagworms completely defoliated more than half of the entire planting (Southern half). All accessions were documented as having bagworms, the southern half of the planting was completely defoliated. The northern half was not defoliated by the bagworms but there was a heavy infestation present. No pesticides were applied, as this was one of the criteria being evaluated. Evaluations on height, spread and form are scheduled for every 3-5 years.

Accessions of Eastern Redcedar Collected for this Study.

Table # 1

ACCESSION	STATE	COUNTY OR CITY
9057099	Illinois	Tazewell
9057105	Illinois	Tazewell
9057106	Illinois	Mason
9057115	Illinois	Grundy
9057116	Illinois	Jo Daviess
9057117	Illinois	Jo Daviess
9057136	Illinois	Kendall
9057156	Illinois	Mason
9057180	Illinois	Pope
9068488	Illinois	Jo Daviess
9068579	Illinois	Jo Daviess
9057196	Illinois	Henderson

Table #1 continued

ACCESSION	STATE	COUNTY OR CITY
9068498	Illinois	Ogle
9068497	Illinois	Henderson
9068495	Illinois	Carroll
9068531	Illinois	Cole
9068487	Missouri	Cooper
9068486	Missouri	Pettis
9057198	Missouri	Bates
9057199	Missouri	Cooper
9058476	Missouri	Pettis
9057187	Missouri	Johnson
9057190	Missouri	St. Clair
9057189	Missouri	Morgan
9068504	Missouri	Hickory
9068503	Missouri	Mercer
9068502	Missouri	Cooper
9068501	Missouri	St. Clair
9068500	Missouri	Mercer
9068499	Missouri	Camden
9068496	Missouri	Mercer
9068495	Missouri	Carroll
9068494	Missouri	Livingston
9068493	Missouri	Mercer
9068492	Missouri	Cooper
9068532	Missouri	Miller
9068530	Missouri	Vernon
9068554	Missouri	Phelps
9068551	Missouri	Lafayette
9068566	Missouri	Plattsburg/Clinton
9068569	Missouri	Lincoln
9068564	Missouri	Cole
9068582	Missouri	Warren
9068584	Missouri	Moniteau
9068583	Missouri	Dent
9068588	Missouri	Clinton

Table #1 continued

ACCESSION	STATE	COUNTY OR CITY
9068486	Missouri	Pettis
9057198	Missouri	Bates
9057199	Missouri	Cooper
9058476	Missouri	Pettis
9057187	Missouri	Johnson
9057190	Missouri	St. Clair
9057189	Missouri	Morgan
9068504	Missouri	Hickory
9068503	Missouri	Mercer
9068502	Missouri	Cooper
9068501	Missouri	St. Clair
9068500	Missouri	Mercer
9068499	Missouri	Camden
9068496	Missouri	Mercer
9068495	Missouri	Carroll
9068494	Missouri	Livingston
9068493	Missouri	Mercer
9068492	Missouri	Cooper
9068532	Missouri	Miller
9068530	Missouri	Vernon
9068554	Missouri	Phelps
9068551	Missouri	Lafayette
9068566	Missouri	Plattsburg/Clinton
9068569	Missouri	Lincoln
9068564	Missouri	Cole
9068582	Missouri	Warren
9068584	Missouri	Moniteau
9068583	Missouri	Dent
9068588	Missouri	Clinton

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L.

Height in Feet

Table #2

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068493	7.60	8.00	6.60	8.00	10.00	5.80	7.67	**10.20**	R5
9068486	9.70	8.00	9.00	7.00	7.00	9.30	8.33	**9.70**	R1
9068566	8.60	9.60	7.90	8.00	6.20	6.60	7.82	**9.60**	R2
9057106	8.60	6.30	9.40	6.00	7.00	8.10	7.57	**9.40**	R3
9057196	9.40	6.00	5.00	7.50	7.20	8.00	7.18	**9.40**	R1
9057198	8.00	9.30	7.50	6.00	7.00	7.20	7.50	**9.30**	R2
9057199	9.30	8.70	7.00	7.40	7.00	7.00	6.20	**9.30**	R1
9068530	9.20	8.20	8.20	8.20	8.00	8.10	8.32	**9.20**	R1
9068500	9.00	8.80	9.10	8.00	5.10	4.20	7.37	**9.10**	R3
9068499	8.60	9.10	4.60	5.60	6.50	6.80	6.87	**9.10**	R2
9057105	8.30	9.00	6.80	8.30	7.40	8.50	8.05	**9.00**	R2
9057136	9.00	7.60	8.00	7.60	5.40	2.50	6.68	**9.00**	R1
9068531	9.00	6.80	6.60	8.20	7.10	7.40	7.52	**9.00**	R1
9057190	8.90	8.50	6.90	7.80	8.20	8.60	8.15	**8.90**	R1,6
9068532	8.90	5.90	7.30	6.00	8.40	8.10	7.43	**8.90**	R1
9068496	7.30	8.80	6.70	6.30	5.20	4.10	6.40	**8.80**	R2
9068501	8.70	8.20	8.40	7.60	6.10	7.00	7.67	**8.70**	R1
9068495	6.80	7.40	8.70	5.20	7.00	6.00	6.85	**8.70**	R3
9057099	8.00	8.60	6.70	6.40	6.80	6.30	7.13	**8.60**	R2
9057189	7.80	7.80	7.00	8.60	7.10	8.20	7.75	**8.60**	R4
9068583	5.00	8.60	8.00	7.20	7.00	7.80	7.27	**8.60**	R2
9068588	8.60	8.50	5.90	5.70	6.70	7.80	7.20	**8.60**	R1
9057117	7.20	8.50	6.00	7.00	7.90	6.20	7.13	**8.50**	R2
9057193	8.00	8.50	7.40	7.40	8.10	7.80	7.87	**8.50**	R2
9068503	8.30	8.50	7.50	7.60	6.80	6.90	7.60	**8.50**	R2
9068504	7.80	8.20	7.20	6.30	6.20	7.30	7.17	**8.20**	R2
9068492	8.20	8.20	5.30	7.20	8.10	7.10	7.35	**8.20**	R1,2
9068502	7.70	8.10	6.20	5.50	6.20	5.80	6.58	**8.10**	R2
9068554	7.80	7.00	8.10	7.70	8.00	7.00	7.60	**8.10**	R3
9068584	7.00	8.10	5.60	7.30	8.00	6.80	7.13	**8.10**	R2
9057116	8.00	6.00	6.50	5.50	6.50	8.00	6.75	**8.00**	R1,6
9068476	6.60	7.80	6.70	7.30	7.60	8.00	7.33	**8.00**	R6
9057180	7.60	6.90	7.80	7.50	6.70	7.20	7.28	**7.80**	R3
9057115	6.30	4.50	4.70	7.50	4.50	5.60	5.52	**7.50**	R4

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068493	8.00	8.20	7.00	8.40	10.60	6.20	8.07	**10.60**	R5
9068532	10.60	6.30	8.40	6.60	8.60	8.60	8.18	**10.60**	R1
9057106	9.00	6.60	10.00	6.60	7.70	8.60	8.08	**10.00**	R3
9068486	10.00	8.20	9.50	7.80	7.20	10.00	8.78	**10.00**	R1,6
9057196	10.00	7.50	5.60	8.00	7.60	8.50	7.87	**10.00**	R1
9057198	8.50	10.00	8.60	7.20	7.30	7.50	8.18	**10.00**	R2
9068530	10.00	8.70	8.00	8.60	9.00	8.60	8.82	**10.00**	R1
9068566	9.00	10.00	9.20	8.70	6.60	7.00	8.42	**10.00**	R2
9068583	5.50	9.00	8.80	8.00	7.80	10.00	8.18	**10.00**	R6
9057136	9.90	8.20	8.50	8.00	6.20	3.00	7.30	**9.90**	R1
9057099	9.00	9.60	6.70	7.00	8.00	7.20	7.92	**9.60**	R2
9068499	9.00	9.60	6.50	5.00	8.00	5.20	7.22	**9.60**	R2
9068496	8.00	9.60	8.20	6.50	5.70	4.50	7.08	**9.60**	R2
9057105	8.60	9.50	7.00	8.50	9.00	9.00	8.60	**9.50**	R2
9068500	9.50	9.00	9.20	8.20	5.80	4.60	7.72	**9.50**	R1
9057190	9.40	8.00	7.20	8.00	Dead	8.80	8.28	**9.40**	R1
9068504	8.00	8.50	7.70	9.40	6.80	8.00	8.07	**9.40**	R4
9068531	9.40	7.10	7.00	7.80	6.70	6.80	7.47	**9.40**	R1
9057117	8.00	9.00	6.50	7.30	8.00	7.00	7.63	**9.00**	R2
9057193	8.50	9.00	8.00	8.00	9.00	7.60	8.35	**9.00**	R2,5
9057199	9.00	8.00	7.30	6.40	7.60	6.40	7.45	**9.00**	R1
9068503	8.80	9.00	7.80	6.60	7.50	8.00	7.95	**9.00**	R2
9068501	9.00	9.00	8.60	8.00	6.50	7.80	8.15	**9.00**	R1,2
9068588	9.00	9.00	6.20	6.00	7.00	8.20	7.57	**9.00**	R1,2
9057180	8.00	8.60	8.80	8.00	8.80	8.20	8.40	**8.80**	R3,5
9057116	8.60	6.30	7.00	6.00	7.70	8.20	7.30	**8.60**	R1
9057189	8.00	8.40	8.00	8.60	8.00	7.50	8.08	**8.60**	R2
9068502	8.00	8.60	6.50	5.50	6.50	7.60	7.12	**8.60**	R2
9068492	8.60	8.60	6.20	8.40	8.00	7.20	7.83	**8.60**	R1,2
9068495	8.00	8.00	8.60	5.60	7.40	6.20	7.30	**8.60**	R3
9068554	7.00	7.30	8.50	8.00	8.40	7.40	7.77	**8.50**	R3
9068476	7.00	8.00	7.10	8.20	8.00	8.40	7.78	**8.40**	R6
9068584	7.50	8.60	6.00	8.30	8.40	7.20	7.67	**8.40**	R5
9057115	6.80	5.00	5.40	7.80	5.70	6.00	6.12	**7.80**	R4

Height measured in feet

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. **Table #2 - continued**

Height in Feet

\				2000					
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Ave.**	**Best**	**Location**
9068532	11.20	7.00	8.90	7.00	9.30	9.20	8.77	**11.20**	R1
9068493	8.50	8.90	7.40	9.00	11.00	6.90	8.62	**11.00**	R5
9068566	9.70	10.80	10.80	9.40	7.10	7.60	9.23	**10.80**	R2,3
9068583	6.00	9.80	9.30	8.60	8.40	10.70	8.80	**10.70**	R6
9057198	9.00	10.60	9.20	7.90	8.00	8.90	8.93	**10.60**	R2
9057106	9.50	7.20	10.50	7.40	8.20	8.50	8.55	**10.50**	R3
9068486	10.50	8.70	10.20	8.30	7.90	10.50	9.35	**10.50**	R1,6
9068530	10.50	9.30	8.70	9.30	9.60	9.20	9.43	**10.50**	R1
9057136	10.30	8.80	9.00	8.40	7.00	7.90	8.57	**10.30**	R1
9057196	10.30	8.20	6.10	8.30	8.10	9.00	8.33	**10.30**	R1
9057099	9.50	10.20	7.50	7.50	8.40	7.90	8.50	**10.20**	R2
9068504	8.50	9.00	8.20	10.20	7.30	8.40	8.60	**10.20**	R4
9068499	9.30	10.20	7.00	5.40	8.60	8.00	8.08	**10.20**	R2
9068496	8.50	10.20	8.80	7.00	6.20	5.00	7.62	**10.20**	R2
9057105	9.00	10.10	7.40	9.20	9.40	9.60	9.12	**10.10**	R2
9068500	10.10	9.50	9.70	8.80	6.20	8.40	8.78	**10.10**	R1
9057190	10.00	8.45	7.80	8.50	Dead	9.30	7.34	**10.00**	R1
9068531	10.00	7.90	7.40	8.30	7.20	7.30	8.02	**10.00**	R1
9068588	9.80	9.50	6.80	6.50	7.60	9.70	8.32	**9.80**	R1
9057117	8.40	9.50	7.00	8.00	8.40	8.20	8.25	**9.50**	R2
9068501	9.40	9.50	9.00	8.50	7.00	8.20	8.60	**9.50**	R2
9057193	9.00	9.40	8.40	8.50	9.30	8.00	8.77	**9.40**	R2
9068503	9.20	9.40	8.30	7.10	8.00	9.30	8.55	**9.40**	R2
9057199	9.30	8.50	7.90	7.10	8.20	8.30	8.22	**9.30**	R1
9068584	8.00	9.30	6.70	8.90	9.20	7.90	8.33	**9.30**	R2
9057116	9.20	6.90	7.40	6.50	8.20	9.00	7.87	**9.20**	R1
9057180	8.40	9.00	9.20	8.50	9.30	8.90	8.88	**9.20**	R3
9068492	9.20	9.10	6.80	9.20	8.30	7.80	8.40	**9.20**	R1,4
9068495	8.60	8.50	9.10	6.20	8.10	8.00	8.08	**9.10**	R3
9068476	7.50	8.40	7.80	8.90	9.00	8.50	8.35	**9.00**	R5
9057189	8.30	9.00	8.40	9.00	8.30	8.50	8.58	**9.00**	R2,6
9068502	8.30	9.00	7.20	6.00	7.00	7.80	7.55	**9.00**	R2
9068554	7.50	7.90	9.00	8.70	9.10	8.20	8.40	**9.00**	R5
9057115	7.20	5.50	5.90	8.20	6.30	6.50	6.60	**8.20**	R4

Height measured in feet

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. Table #3

Spread in Feet

			1997											1998				
Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location	Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9057115	4.70	4.60	5.00	5.60	4.00	4.20	4.68	**5.60**	R4	9057115	5.10	5.00	5.80	6.10	4.70	4.80	5.25	**6.10**	R4
9068503	6.00	5.50	5.10	5.00	5.60	5.00	5.37	**6.00**	R1	9068503	6.40	6.00	5.60	5.60	6.10	5.90	5.93	**6.40**	R1
9068493	6.00	5.00	5.60	5.20	4.90	5.30	5.33	**6.00**	R1	9068493	6.60	5.40	6.00	5.80	5.30	5.90	5.83	**6.60**	R1
9068476	4.60	6.50	5.70	6.70	5.10	5.30	5.65	**6.50**	R2	9068530	6.80	6.90	6.00	6.50	6.00	5.50	6.28	**6.70**	R2
9068495	6.60	6.10	4.90	4.00	5.70	4.30	5.27	**6.60**	R1	9068495	6.80	6.70	5.20	4.40	6.20	4.90	5.70	**6.80**	R1
9068530	6.20	6.60	5.70	6.00	5.60	5.00	5.85	**6.60**	R2	9057106	7.00	6.00	7.60	5.40	6.60	5.80	6.40	**7.00**	R1
9068584	5.70	5.50	5.40	5.70	4.20	6.60	5.52	**6.60**	R6	9068476	5.00	7.00	6.30	7.00	5.70	5.90	6.15	**7.00**	R2
9068492	6.30	5.80	5.90	6.70	5.80	6.00	6.08	**6.70**	R4	9068492	7.00	6.20	6.30	6.90	6.20	6.50	6.52	**7.00**	R1
9068499	5.50	6.90	5.10	5.80	5.30	4.00	5.43	**6.90**	R2	9068554	7.00	7.00	7.00	6.90	6.90	5.30	6.68	**7.00**	R1,2,3
9068554	6.70	6.80	6.90	6.70	6.60	5.00	6.45	**6.90**	R3	9068584	7.00	6.00	4.90	5.40	5.90	5.20	5.73	**7.00**	R1
9057106	6.70	5.50	7.00	5.00	6.10	5.20	5.92	**7.00**	R3	9068588	7.90	7.30	7.40	5.90	6.60	4.60	6.62	**7.00**	R1,2
9057193	7.00	6.10	5.80	5.80	6.70	5.40	6.13	**7.00**	R1	9068499	6.00	7.20	5.60	6.20	5.90	4.80	5.95	**7.20**	R2
9057116	7.10	5.70	4.80	5.80	6.20	5.20	5.80	**7.10**	R1	9057193	7.50	6.60	6.30	6.50	6.00	5.30	6.37	**7.50**	R1
9057199	5.30	7.10	5.80	6.00	5.90	5.00	5.85	**7.10**	R2	9068504	7.50	7.50	6.80	6.40	5.60	5.70	6.58	**7.50**	R1,2
9068504	7.00	7.10	6.30	6.00	5.00	5.10	6.08	**7.10**	R2	9057116	7.60	6.00	5.30	6.00	6.80	6.00	6.28	**7.60**	R1
9068502	6.60	7.20	5.20	3.10	5.20	5.00	5.38	**7.20**	R2	9057199	6.00	7.60	6.20	6.50	6.30	5.40	6.33	**7.60**	R2
9068500	6.10	7.20	6.20	5.10	4.20	2.20	5.17	**7.20**	R2	9068500	6.50	7.60	6.60	5.90	4.90	2.80	5.72	**7.60**	R2
9068501	5.70	7.30	5.10	5.70	7.10	4.60	5.92	**7.30**	R2	9068501	6.00	7.70	5.60	6.00	7.60	5.20	6.35	**7.70**	R2
9057099	7.60	6.50	3.90	6.80	3.80	6.90	5.92	**7.60**	R1	9057180	7.00	6.00	6.20	7.80	7.00	5.90	6.65	**7.80**	R4
9057180	6.60	5.70	5.80	7.60	6.50	5.30	6.25	**7.60**	R4	9068502	7.00	7.80	5.80	3.60	5.70	5.40	5.88	**7.80**	R2
9057189	5.70	7.60	7.40	6.30	5.00	5.90	6.32	**7.60**	R2	9057099	8.00	7.00	4.30	7.10	4.10	7.30	6.30	**8.00**	R1
9068532	7.60	6.20	6.50	6.70	6.50	6.30	6.63	**7.60**	R1	9057189	6.00	7.00	8.00	7.20	5.40	6.20	6.63	**8.00**	R3
9068566	6.80	7.70	7.20	5.90	6.00	4.90	6.42	**7.70**	R2	9068566	7.40	7.90	8.00	6.30	6.40	5.20	6.87	**8.00**	R3
9068588	7.70	7.00	7.10	5.30	6.20	4.10	6.23	**7.70**	R1	9068532	8.20	6.60	6.80	7.20	6.80	6.80	7.07	**8.20**	R1
9057196	8.00	7.10	5.20	6.10	6.80	4.70	6.32	**8.00**	R1	9068496	7.50	8.40	6.80	4.40	5.30	4.40	6.13	**8.40**	R2
9068496	7.00	8.00	6.30	4.00	4.80	4.00	5.68	**8.00**	R2	9057196	8.50	7.60	6.00	6.60	7.30	5.80	6.97	**8.50**	R1
9068531	8.30	6.50	5.60	6.00	5.50	6.60	6.42	**8.30**	R1	9068583	6.00	8.60	7.20	7.00	5.20	6.00	6.67	**8.60**	R2
9057105	8.50	7.30	5.50	6.60	5.70	6.60	6.70	**8.50**	R1	9068531	8.90	7.00	6.00	6.40	6.00	7.00	6.88	**8.90**	R1
9068486	8.50	5.70	6.70	7.00	5.00	5.40	6.38	**8.50**	R1	9057105	9.00	8.00	6.70	7.00	6.00	7.00	7.28	**9.00**	R1
9057190	8.50	5.70	4.60	5.80	0.00	5.20	5.96	**8.50**	R1	9057117	6.60	9.00	5.80	6.90	5.30	5.70	6.55	**9.00**	R2
9068583	6.80	8.50	7.60	7.00	5.10	6.40	6.90	**8.50**	R2	9068486	9.00	6.20	7.00	7.50	5.70	6.00	6.90	**9.00**	R1
9057136	8.60	5.90	6.50	7.20	6.60	4.80	6.60	**8.60**	R1	9057190	9.00	6.00	5.20	6.00	0.00	5.70	6.38	**9.00**	R1
9057117	6.10	8.80	5.20	6.30	4.80	5.10	6.05	**8.80**	R2	9057136	9.30	7.00	6.50	6.60	5.40	9.00	7.30	**9.30**	R1
9057198	5.40	9.80	5.50	4.60	3.80	5.80	5.82	**9.80**	R2	9057198	6.00	10.60	5.90	5.00	4.20	6.20	6.32	**10.60**	R2

Spread measured in feet

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. — Table #3 - continued

Spread in Feet

Accession	Rep 1	Rep 2	Rep 3	2000 Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068500	7.00	8.40	7.30	6.40	5.40	3.50	6.33	**3.50**	R6
9068502	7.70	8.30	6.20	4.30	6.20	6.40	6.52	**4.30**	R4
9057099	8.70	7.40	5.00	7.70	4.70	8.20	6.95	**4.70**	R5
9057198	6.40	11.20	6.60	5.40	4.90	6.90	6.90	**4.90**	R5
9068496	8.00	9.20	7.50	5.00	6.00	5.00	6.78	**5.00**	R4,6
9068499	6.40	8.00	6.10	6.80	6.40	5.30	6.50	**5.30**	R6
9057115	5.90	5.70	6.20	6.90	5.40	5.60	5.95	**5.40**	R5
9068476	5.40	7.60	6.80	7.60	6.30	6.60	6.72	**5.40**	R1
9068495	7.50	7.20	5.80	5.00	6.90	5.40	6.30	**5.40**	R6
9068584	7.50	6.40	5.50	6.00	6.40	6.50	6.38	**5.50**	R3
9057190	9.70	6.50	5.70	6.40	Dead	6.20	5.75	**5.70**	R3
9068583	6.30	9.00	7.80	7.50	5.70	6.60	7.15	**5.70**	R5
9057189	6.60	7.50	8.50	7.90	5.80	7.20	7.25	**5.80**	R5
9068501	6.40	8.40	6.20	6.50	8.30	5.80	6.93	**5.80**	R6
9068554	7.50	7.50	7.50	7.30	7.40	5.80	7.17	**5.80**	R6
9057116	8.40	6.60	5.90	6.80	7.40	6.70	6.97	**5.90**	R3
9057117	7.30	9.70	6.30	7.50	5.90	6.40	7.18	**5.90**	R5
9068493	7.30	6.00	6.40	6.20	5.90	6.30	6.35	**5.90**	R5
9057106	7.70	6.50	8.00	6.00	7.20	6.30	6.95	**6.00**	R4
9057136	10.00	7.80	7.00	7.10	6.00	9.60	7.92	**6.00**	R5
9057193	8.00	7.20	6.80	7.00	6.00	7.10	7.02	**6.00**	R5
9068504	8.20	8.00	7.20	7.10	6.00	7.30	7.30	**6.00**	R5
9068566	8.20	8.60	8.80	7.00	7.10	6.00	7.62	**6.00**	R6
9068503	7.10	6.50	6.10	6.10	6.80	6.50	6.52	**6.10**	R3,4
9068486	9.70	6.80	7.50	8.00	6.20	6.50	7.45	**6.20**	R5
9068588	8.50	8.10	8.20	6.30	7.40	7.70	7.70	**6.30**	R4
9068531	9.50	7.40	6.50	7.00	6.40	7.70	7.42	**6.40**	R5
9057105	9.70	8.60	7.30	7.60	6.50	7.70	7.90	**6.50**	R5
9057180	7.60	6.50	6.90	8.30	7.50	7.30	7.35	**6.50**	R2
9057196	9.00	8.30	6.50	7.10	8.00	7.50	7.73	**6.50**	R3
9068530	7.30	7.40	6.50	7.20	6.70	6.90	7.00	**6.50**	R3
9057199	6.60	8.40	6.80	7.00	6.90	6.80	7.08	**6.60**	R1
9068492	7.60	6.80	6.90	7.40	7.00	7.10	7.13	**6.80**	R2
9068532	9.00	7.20	7.40	8.00	7.50	7.50	7.77	**7.20**	R2

Spread measured in feet

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. **Table #4**

Vigor

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068486	1.00	2.00	2.00	2.00	3.00	2.00	2.00	**1.00**	R1
9068554	3.00	4.00	4.00	5.00	1.00	2.00	3.17	**1.00**	R5
9068566	3.00	3.00	3.00	3.00	2.00	2.00	2.67	**1.00**	R6
9068584	4.00	2.00	5.00	1.00	3.00	2.00	2.83	**1.00**	R4
9057106	2.00	4.00	3.00	4.00	3.00	3.00	3.17	**2.00**	R1
9057117	4.00	2.00	5.00	4.00	3.00	3.00	3.50	**2.00**	R2,4,5
9057136	2.00	3.00	2.00	2.00	5.00	4.00	3.00	**2.00**	R1,3,4
9057193	4.00	3.00	3.00	3.00	2.00	3.00	3.00	**2.00**	R5
9057196	2.00	2.00	2.00	3.00	3.00	3.00	2.50	**2.00**	R1,2,3
9057198	3.00	2.00	2.00	5.00	3.00	4.00	3.17	**2.00**	R2,3
9057199	3.00	3.00	4.00	2.00	2.00	3.00	2.83	**2.00**	R4,5
9057190	2.00	3.00	4.00	3.00	3.00	3.00	3.00	**2.00**	R1
9068504	3.00	2.00	3.00	2.00	4.00	2.00	2.67	**2.00**	R2,4,6
9068503	3.00	2.00	4.00	3.00	2.00	4.00	3.00	**2.00**	R2,5
9068502	2.00	3.00	4.00	4.00	3.00	3.00	3.17	**2.00**	R1
9068501	4.00	3.00	2.00	3.00	3.00	2.00	2.83	**2.00**	R3,6
9068500	2.00	3.00	3.00	3.00	2.00	6.00	3.17	**2.00**	R2,5
9068499	2.00	3.00	3.00	4.00	6.00	4.00	3.67	**2.00**	R1
9068496	2.00	3.00	4.00	3.00	4.00	3.00	3.17	**2.00**	R1
9068495	3.00	2.00	2.00	4.00	3.00	3.00	2.83	**2.00**	R2,3
9068493	2.00	3.00	2.00	2.00	2.00	3.00	2.33	**2.00**	R1,3,4,5
9068530	3.00	4.00	3.00	3.00	2.00	2.00	2.83	**2.00**	R5,6
9068583	3.00	3.00	2.00	4.00	3.00	3.00	3.00	**2.00**	R3
9057099	3.00	3.00	5.00	3.00	6.00	4.00	4.00	**3.00**	R1,2,4
9057105	3.00	3.00	3.00	3.00	3.00	4.00	3.17	**3.00**	R1,5
9057115	5.00	3.00	4.00	3.00	3.00	4.00	3.67	**3.00**	R2,4,5
9057116	3.00	5.00	4.00	3.00	4.00	3.00	3.67	**3.00**	R1,4,6
9057180	4.00	5.00	3.00	4.00	3.00	4.00	3.83	**3.00**	R3,5
9068476	4.00	3.00	3.00	4.00	3.00	3.00	3.33	**3.00**	R2,3,5,6
9057189	4.00	3.00	3.00	3.00	6.00	3.00	3.67	**3.00**	R2,3,4,6
9068492	3.00	3.00	4.00	4.00	3.00	4.00	3.50	**3.00**	R1,2,5
9068532	3.00	4.00	4.00	5.00	3.00	3.00	3.67	**3.00**	R1,5,6
9068531	3.00	4.00	4.00	4.00	3.00	3.00	3.50	**3.00**	R1,5,6
9068588	3.00	4.00	4.00	3.00	3.00	3.00	3.33	**3.00**	R1,4,5,6

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068486	1.00	2.00	2.00	3.00	4.00	2.00	2.33	**1.00**	R1
9068554	3.00	4.00	3.00	3.00	3.00	1.00	2.83	**1.00**	R6
9057196	1.00	3.00	3.00	3.00	3.00	3.00	2.67	**1.00**	R1
9057199	2.00	3.00	3.00	3.00	1.00	2.00	2.33	**1.00**	R5
9068503	3.00	1.00	4.00	3.00	2.00	4.00	2.83	**1.00**	R2,4,5
9068496	1.00	3.00	3.00	3.00	4.00	4.00	3.00	**1.00**	R1
9068493	2.00	4.00	3.00	1.00	1.00	4.00	2.50	**1.00**	R4,5
9068566	3.00	3.00	2.00	3.00	3.00	3.00	2.83	**2.00**	R3
9057106	2.00	4.00	2.00	3.00	3.00	3.00	2.83	**2.00**	R1,3
9057117	4.00	3.00	5.00	3.00	2.00	3.00	3.33	**2.00**	R5
9057136	3.00	3.00	2.00	3.00	4.00	4.00	3.17	**2.00**	R2,4,5
9057193	3.00	3.00	3.00	3.00	2.00	3.00	2.83	**2.00**	R5
9057198	2.00	3.00	2.00	7.00	4.00	3.00	3.50	**2.00**	R1,3
9057190	2.00	3.00	4.00	3.00	0.00	3.00	3.00	**2.00**	R1
9068504	2.00	3.00	2.00	7.00	4.00	3.00	3.50	**2.00**	R1,3
9068501	3.00	3.00	3.00	3.00	3.00	2.00	2.83	**2.00**	R6
9068500	2.00	4.00	3.00	3.00	3.00	7.00	3.67	**2.00**	R1
9068499	2.00	2.00	3.00	4.00	3.00	5.00	3.17	**2.00**	R1,2
9068495	2.00	3.00	2.00	4.00	3.00	3.00	2.83	**2.00**	R1,3
9068583	4.00	3.00	3.00	2.00	3.00	2.00	2.83	**2.00**	R4,6
9057099	2.00	3.00	6.00	3.00	6.00	5.00	4.17	**2.00**	R1
9068476	6.00	2.00	3.00	3.00	3.00	3.00	3.33	**2.00**	R2,4,5
9057189	3.00	2.00	3.00	3.00	4.00	3.00	3.00	**2.00**	R2,4,5
9068532	2.00	4.00	3.00	7.00	3.00	3.00	3.67	**2.00**	R1
9068584	3.00	4.00	4.00	3.00	3.00	3.00	3.33	**3.00**	R1,4,5,6
9068502	3.00	3.00	4.00	4.00	4.00	3.00	3.50	**3.00**	R1,2,6
9068530	3.00	5.00	3.00	4.00	3.00	3.00	3.50	**3.00**	R1,3,5,6
9057105	3.00	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**	R1,6
9057115	4.00	3.00	4.00	3.00	3.00	4.00	3.50	**3.00**	R2,4,5
9057116	3.00	4.00	3.00	4.00	4.00	3.00	3.50	**3.00**	R1,3,6
9057180	3.00	3.00	3.00	3.00	3.00	4.00	3.17	**3.00**	R1,5
9068492	3.00	3.00	4.00	3.00	3.00	4.00	3.33	**3.00**	R1,2,4,5
9068531	3.00	3.00	4.00	4.00	3.00	3.00	3.33	**3.00**	R1,2,5,6
9068588	3.00	3.00	4.00	3.00	3.00	3.00	3.17	**3.00**	R1,2,4,5,6

Vigor Rating: 1= Excellent, 9=Poor

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. **Table #4 - continued**

Vigor

				2000					
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Ave.**	**Best**	**Location**
9068486	1.00	2.00	2.00	2.00	3.00	2.00	2.00	1.00	R1
9068554	3.00	4.00	3.00	4.00	1.00	2.00	2.83	1.00	R5
9068584	4.00	2.00	6.00	1.00	2.00	2.00	2.83	1.00	R3
9057106	2.00	3.00	3.00	3.00	3.00	3.00	2.83	2.00	R1
9057117	4.00	2.00	4.00	4.00	3.00	3.00	3.33	2.00	R2
9057136	2.00	3.00	2.00	2.00	4.00	4.00	2.83	2.00	R1,3,4
9057193	3.00	3.00	3.00	3.00	2.00	3.00	2.83	2.00	R5
9057196	2.00	2.00	2.00	3.00	3.00	3.00	2.50	2.00	R1-3
9057198	3.00	2.00	2.00	4.00	2.00	3.00	2.67	2.00	R2,3,5
9057199	2.00	2.00	3.00	2.00	2.00	3.00	2.33	2.00	R1,2,4,5
9068476	3.00	3.00	3.00	4.00	3.00	2.00	3.00	2.00	R6
9057190	2.00	2.00	4.00	3.00	3.00	3.00	2.83	2.00	R1,2
9068504	3.00	2.00	3.00	2.00	4.00	2.00	2.67	2.00	R2,4,6
9068503	2.00	2.00	3.00	3.00	2.00	4.00	2.67	2.00	R1,2,5
9068502	2.00	3.00	4.00	4.00	2.00	3.00	3.00	2.00	R5
9068501	4.00	3.00	2.00	3.00	3.00	2.00	2.83	2.00	R3,6
9068500	2.00	3.00	3.00	3.00	2.00	5.00	3.00	2.00	R1,5
9068492	3.00	3.00	4.00	4.00	2.00	4.00	3.33	2.00	R5
9068499	2.00	3.00	3.00	4.00	6.00	5.00	3.83	2.00	R1
9068496	2.00	3.00	4.00	3.00	2.00	3.00	2.83	2.00	R5
9068495	3.00	2.00	2.00	5.00	3.00	4.00	3.17	2.00	R2,3
9068493	2.00	3.00	2.00	2.00	2.00	3.00	2.33	2.00	R1,3-5
9068531	3.00	4.00	4.00	4.00	2.00	2.00	3.17	2.00	R5,6
9068530	3.00	4.00	3.00	3.00	2.00	2.00	2.83	2.00	R5,6
9068566	3.00	3.00	3.00	3.00	2.00	2.00	2.67	2.00	R5,6
9068583	3.00	3.00	2.00	5.00	3.00	3.00	3.17	2.00	R3
9057099	3.00	3.00	4.00	3.00	5.00	4.00	3.67	3.00	R1,2,4
9057105	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	R1-6
9057115	4.00	3.00	3.00	3.00	3.00	4.00	3.33	3.00	R2-5
9057116	3.00	4.00	4.00	3.00	3.00	3.00	3.33	3.00	R1,4,5,6
9057180	4.00	4.00	3.00	4.00	3.00	4.00	3.67	3.00	R3,5
9057189	3.00	3.00	3.00	3.00	5.00	3.00	3.33	3.00	R1-4,6
9068532	3.00	4.00	4.00	6.00	3.00	3.00	3.83	3.00	R1,5,6
9068588	3.00	4.00	4.00	3.00	3.00	3.00	3.33	3.00	R1,4,5,6

Vigor Rating: 1= Excellent, 9=Poor

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. Table #5

Insect/Disease

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068588								**0.00**	
9068486	1.00	2.00	1.00	1.00	2.00	2.00	1.50	**1.00**	R1,3,4
9057198	2.00	1.00	2.00	5.00	1.00	2.00	2.17	**1.00**	R2,5
9057199	2.00	1.00	3.00	2.00	3.00	1.00	2.00	**1.00**	R2,6
9068504	1.00	2.00	2.00	1.00	2.00	2.00	1.67	**1.00**	R1,4
9068503	2.00	2.00	3.00	3.00	1.00	3.00	2.33	**1.00**	R5
9068502	2.00	2.00	1.00	2.00	3.00	3.00	2.17	**1.00**	R3
9068501	2.00	2.00	2.00	1.00	2.00	2.00	1.83	**1.00**	R4
9068500	2.00	2.00	2.00	2.00	1.00	3.00	2.00	**1.00**	R5
9068499	1.00	2.00	3.00	2.00	6.00	3.00	2.83	**1.00**	R1
9068496	1.00	2.00	4.00	2.00	2.00	2.00	2.17	**1.00**	R1
9068495	1.00	1.00	1.00	-	2.00	2.00	1.40	**1.00**	R1-3
9068493	1.00	2.00	3.00	2.00	1.00	2.00	1.83	**1.00**	R1,5
9068554	2.00	4.00	2.00	4.00	1.00	1.00	2.33	**1.00**	R5,6
9068566	2.00	2.00	1.00	1.00	3.00	3.00	2.00	**1.00**	R3,4
9068584	2.00	2.00	4.00	2.00	1.00	1.00	2.00	**1.00**	R5,6
9057099	2.00	2.00	4.00	3.00	2.00	2.00	2.50	**2.00**	R1,2,5,6
9057105	2.00	2.00	2.00	3.00	3.00	4.00	2.67	**2.00**	R1-3
9057115	2.00	2.00	2.00	3.00	2.00	2.00	2.17	**2.00**	R1-3,5,6
9057116	2.00	2.00	2.00	2.00	2.00	3.00	2.17	**2.00**	R1-5
9057117	2.00	2.00	3.00	3.00	3.00	3.00	2.67	**2.00**	R1,2
9057136	2.00	2.00	2.00	3.00	5.00	2.00	2.67	**2.00**	R1-3,6
9057180	3.00	2.00	3.00	2.00	3.00	3.00	2.67	**2.00**	R2,4
9057193	4.00	2.00	2.00	3.00	2.00	2.00	2.50	**2.00**	R2,3,5,6
9057196	2.00	2.00	2.00	3.00	4.00	3.00	2.67	**2.00**	R1-3
9068476	4.00	3.00	2.00	2.00	2.00	2.00	2.50	**2.00**	R3-6
9057190	3.00	2.00	2.00	2.00	2.00	3.00	2.33	**2.00**	R2,5
9057189	3.00	3.00	3.00	2.00	4.00	3.00	3.00	**2.00**	R4
9068492	2.00	2.00	3.00	3.00	2.00	3.00	2.50	**2.00**	R1,2,5
9068532	3.00	2.00	3.00	5.00	2.00	3.00	3.00	**2.00**	R2,5
9068531	3.00	2.00	2.00	2.00	2.00	4.00	2.50	**2.00**	R2-5
9068530	3.00	4.00	3.00	3.00	2.00	2.00	2.83	**2.00**	R5,6
9068583	3.00	2.00	2.00	3.00	3.00	3.00	2.67	**2.00**	R2,3
9057106	3.00	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**	R1-6

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9068531								**0.00**	
9057099	2.00	1.00	4.00	2.00	3.00	3.00	2.50	**1.00**	R2
9057106	1.00	3.00	2.00	2.00	3.00	3.00	2.33	**1.00**	R1
9057193	2.00	2.00	2.00	3.00	1.00	2.00	2.00	**1.00**	R5
9057196	1.00	2.00	3.00	2.00	3.00	3.00	2.33	**1.00**	R1
9057198	2.00	2.00	1.00	7.00	1.00	3.00	2.67	**1.00**	R3,5
9057199	1.00	1.00	2.00	2.00	1.00	1.00	1.33	**1.00**	R1,2,5,6
9068504	1.00	2.00	2.00	1.00	3.00	1.00	1.67	**1.00**	R1,4
9068503	3.00	1.00	3.00	2.00	2.00	3.00	2.33	**1.00**	R2
9068502	2.00	2.00	1.00	2.00	3.00	2.00	2.00	**1.00**	R3
9068500	1.00	3.00	2.00	2.00	1.00	3.00	2.00	**1.00**	R1,5
9068499	1.00	1.00	3.00	2.00	3.00	4.00	2.33	**1.00**	R1,2
9068496	1.00	3.00	2.00	1.00	1.00	3.00	1.83	**1.00**	R1,4,5
9068493	1.00	2.00	2.00	2.00	1.00	2.00	1.67	**1.00**	R1,5
9068554	1.00	3.00	2.00	2.00	1.00	1.00	1.67	**1.00**	R1,5,6
9068584	2.00	1.00	3.00	2.00	1.00	3.00	2.00	**1.00**	R2,5
9068583	5.00	2.00	1.00	1.00	3.00	1.00	2.17	**1.00**	R3,4,6
9057105	2.00	3.00	2.00	3.00	2.00	2.00	2.33	**2.00**	R1,3,5,6
9057115	3.00	3.00	3.00	2.00	2.00	2.00	2.50	**2.00**	R4-6
9057116	3.00	2.00	2.00	2.00	3.00	2.00	2.33	**2.00**	R2-4,6
9057117	3.00	2.00	3.00	3.00	2.00	3.00	2.67	**2.00**	R2,5
9057136	2.00	3.00	2.00	2.00	3.00	3.00	2.50	**2.00**	R2,5
9068486	2.00	3.00	2.00	2.00	3.00	3.00	2.50	**2.00**	R1,3,4
9057180	2.00	3.00	2.00	2.00	3.00	3.00	2.50	**2.00**	R1,3,4
9068476	6.00	3.00	2.00	3.00	2.00	3.00	3.17	**2.00**	R3,5
9057190	2.00	2.00	2.00	3.00	0.00	3.00	2.00	**2.00**	R1-3
9057189	2.00	2.00	3.00	2.00	3.00	3.00	2.50	**2.00**	R1,2,4
9068501	2.00	3.00	2.00	2.00	2.00	2.00	2.17	**2.00**	R1,3-6
9068492	2.00	2.00	3.00	3.00	2.00	3.00	2.50	**2.00**	R1,2,5
9068495	2.00	2.00	2.00	2.00	2.00	3.00	2.17	**2.00**	R1-5
9068532	3.00	2.00	2.00	7.00	2.00	3.00	3.17	**2.00**	R2,3,5
9068530	3.00	5.00	2.00	3.00	2.00	2.00	2.83	**2.00**	R3,5,6
9068566	2.00	3.00	2.00	2.00	4.00	4.00	2.83	**2.00**	R1,3,4
9068588	3.00	2.00	3.00	2.00	2.00	2.00	2.33	**2.00**	R2,4-6

Insect/Disease Ratings: 1=None, 9=Severe

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L.

Table # - 5 continued

Insect/Disease

					2000				
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Ave.**	**Best**	**Location**
9068486	1.00	2.00	1.00	1.00	2.00	2.00	1.50	**1.00**	R1,3,4
9057193	3.00	1.00	1.00	2.00	2.00	2.00	1.83	**1.00**	R2,3
9057196	1.00	1.00	2.00	3.00	4.00	3.00	2.33	**1.00**	R1,2
9057198	2.00	1.00	2.00	4.00	1.00	2.00	2.00	**1.00**	R2,5
9057199	2.00	1.00	2.00	3.00	1.00	2.00	1.83	**1.00**	R2,5
9068476	3.00	3.00	2.00	2.00	1.00	2.00	2.17	**1.00**	R5
9068504	1.00	1.00	2.00	1.00	2.00	2.00	1.50	**1.00**	R1,2,4
9068503	2.00	2.00	2.00	3.00	1.00	2.00	2.00	**1.00**	R5
9068502	2.00	2.00	1.00	2.00	2.00	3.00	2.00	**1.00**	R3
9068501	2.00	2.00	2.00	1.00	2.00	2.00	1.83	**1.00**	R4
9068500	2.00	2.00	2.00	2.00	1.00	2.00	1.83	**1.00**	R5
9068499	1.00	1.00	2.00	2.00	4.00	2.00	2.00	**1.00**	R1,2
9068496	1.00	2.00	3.00	2.00	2.00	3.00	2.17	**1.00**	R1
9068495	1.00	1.00	1.00	-	1.00	2.00	1.00	**1.00**	R1-3,5
9068493	1.00	2.00	2.00	2.00	1.00	2.00	1.67	**1.00**	R1,5
9068554	2.00	3.00	2.00	3.00	1.00	1.00	2.00	**1.00**	R5,6
9068566	2.00	2.00	1.00	1.00	2.00	2.00	1.67	**1.00**	R3,4
9068584	2.00	2.00	3.00	1.00	1.00	2.00	1.83	**1.00**	R4,5
9057099	2.00	2.00	3.00	2.00	2.00	2.00	2.17	**2.00**	R1,2,4,5,6
9057105	2.00	2.00	2.00	2.00	3.00	4.00	2.50	**2.00**	R1-4
9057106	2.00	2.00	2.00	2.00	2.00	2.00	2.00	**2.00**	R1-6
9057115	2.00	2.00	2.00	4.00	2.00	2.00	2.33	**2.00**	R1-3,5,6
9057116	2.00	2.00	2.00	2.00	2.00	3.00	2.17	**2.00**	R1-5
9057117	2.00	2.00	2.00	3.00	3.00	3.00	2.50	**2.00**	R1-3
9057136	2.00	2.00	2.00	2.00	4.00	2.00	2.33	**2.00**	R1-4,6
9057180	2.00	2.00	3.00	2.00	2.00	3.00	2.33	**2.00**	R1,2,4,5
9057190	3.00	2.00	2.00	2.00	2.00	2.00	2.17	**2.00**	R2-6
9057189	3.00	3.00	3.00	2.00	3.00	3.00	2.83	**2.00**	R4
9068492	2.00	2.00	2.00	2.00	3.00	2.00	2.17	**2.00**	R1-4,6
9068532	2.00	2.00	2.00	3.00	2.00	3.00	2.33	**2.00**	R1-3,5
9068531	2.00	2.00	2.00	2.00	2.00	3.00	2.17	**2.00**	R1-5
9068530	3.00	3.00	3.00	2.00	2.00	2.00	2.50	**2.00**	R4-6
9068583	2.00	2.00	2.00	2.00	3.00	3.00	2.33	**2.00**	R1-4
9068588	2.00	2.00	2.00	2.00	3.00	2.00	2.17	**2.00**	R1-4,6

Insect/Disease Ratings: 1=None, 9=Severe

Study 29I134J - Assembly and Evaluation of Eastern Redcedar, *Juniper virginia* L. **Table #6**

Seed Production

1998 Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location	2000 Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Ave.	Best	Location
9057099	9.00	5.00	9.00	9.00	9.00	5.00	7.67	**9.00**	R1,3,-5	9057099	9.00	4.00	9.00	9.00	9.00	5.00	7.50	**9.00**	R1,3,4,5
9057105	9.00	6.00	9.00	9.00	9.00	3.00	7.50	**9.00**	R1,3,-5	9057105	9.00	7.00	9.00	9.00	9.00	3.00	7.67	**9.00**	R1,3,4,5
9057106	6.00	9.00	5.00	9.00	7.00	7.00	7.17	**9.00**	R2,4	9057106	7.00	9.00	5.00	9.00	8.00	8.00	7.67	**9.00**	R2,4
9057115	9.00	8.00	9.00	5.00	5.00	4.00	6.67	**9.00**	R1,3	9057115	9.00	9.00	9.00	4.00	4.00	4.00	6.50	**9.00**	R1,2,3
9057116	9.00	9.00	9.00	6.00	9.00	7.00	8.17	**9.00**	R1-3,5	9057116	9.00	9.00	9.00	7.00	9.00	7.00	8.33	**9.00**	R1-3,5
9057117	9.00	8.00	9.00	8.00	9.00	9.00	8.67	**9.00**	R1,3,5,6	9057117	9.00	8.00	9.00	8.00	9.00	9.00	8.67	**9.00**	R1,3,5,6
9057136	9.00	9.00	4.00	6.00	9.00	9.00	7.67	**9.00**	R1,2,5,6	9057136	9.00	9.00	3.00	5.00	9.00	9.00	7.33	**9.00**	R1,2,5,6
9068486	9.00	3.00	9.00	6.00	9.00	6.00	7.00	**9.00**	R1,3,5	9068486	9.00	2.00	9.00	5.00	9.00	9.00	7.17	**9.00**	R1,3,5,6
9057180	9.00	5.00	9.00	9.00	9.00	8.00	8.17	**9.00**	R1,3-5	9057180	9.00	4.00	9.00	9.00	9.00	8.00	8.00	**9.00**	R1,3-5
9057193	9.00	9.00	9.00	4.00	6.00	9.00	7.67	**9.00**	R1,3,6	9057193	9.00	9.00	9.00	3.00	6.00	9.00	7.50	**9.00**	R1-3,6
9057196	9.00	8.00	9.00	9.00	9.00	4.00	8.00	**9.00**	R1,3-5,6	9057196	9.00	8.00	9.00	9.00	9.00	3.00	7.83	**9.00**	R1,3-5
9057198	5.00	9.00	9.00	6.00	9.00	4.00	7.00	**9.00**	R2,3,5	9057198	4.00	9.00	9.00	6.00	9.00	3.00	6.67	**9.00**	R2,3,5
9057199	9.00	6.00	9.00	4.00	1.00	9.00	6.33	**9.00**	R1,3,6	9057199	9.00	5.00	9.00	4.00	1.00	9.00	6.17	**9.00**	R1,3,6
9068476	9.00	9.00	4.00	1.00	4.00	8.00	5.83	**9.00**	R1,2	9068476	9.00	9.00	3.00	1.00	3.00	8.00	5.50	**9.00**	R1,2
9057190	9.00	6.00	2.00	8.00	9.00	9.00	7.17	**9.00**	R1,5,6	9057190	9.00	5.00	2.00	8.00	9.00	9.00	7.00	**9.00**	R1,5,6
9057189	9.00	9.00	8.00	9.00	9.00	9.00	8.83	**9.00**	R1,2,4-6	9057189	9.00	9.00	7.00	9.00	9.00	9.00	8.67	**9.00**	R1,2,4-6
9068504	9.00	9.00	9.00	9.00	9.00	3.00	8.00	**9.00**	R1-5	9068504	9.00	9.00	9.00	9.00	9.00	2.00	7.83	**9.00**	R1-5
9068503	9.00	9.00	1.00	4.00	9.00	4.00	6.00	**9.00**	R1,2,5	9068503	9.00	9.00	1.00	4.00	9.00	3.00	5.83	**9.00**	R1,2,5
9068502	9.00	9.00	9.00	9.00	9.00	9.00	9.00	**9.00**	R1-6	9068502	9.00	9.00	9.00	9.00	9.00	9.00	9.00	**9.00**	R1-6
9068501	9.00	7.00	4.00	1.00	9.00	9.00	6.50	**9.00**	R1,5,6	9068501	9.00	8.00	3.00	1.00	9.00	9.00	6.50	**9.00**	R1,5,6
9068500	6.00	9.00	1.00	4.00	8.00	9.00	6.17	**9.00**	R2,6	9068500	7.00	9.00	1.00	3.00	8.00	9.00	6.17	**9.00**	R2,6
9068492	9.00	6.00	9.00	4.00	9.00	9.00	7.67	**9.00**	R1,3,5,6	9068492	9.00	5.00	9.00	3.00	9.00	9.00	7.33	**9.00**	R1,3,5,6
9068499	6.00	8.00	9.00	9.00	9.00	1.00	7.00	**9.00**	R3,4,5	9068499	7.00	9.00	9.00	9.00	1.00	7.00	7.00	**9.00**	R2,-4
9068496	9.00	6.00	9.00	3.00	6.00	9.00	7.00	**9.00**	R1,3,9	9068496	9.00	5.00	9.00	3.00	5.00	9.00	6.67	**9.00**	R1,3,6
9068495	9.00	9.00	9.00	9.00	9.00	8.00	8.83	**9.00**	R1-5	9068495	9.00	9.00	9.00	9.00	9.00	8.00	8.83	**9.00**	R1-6
9068493	9.00	8.00	9.00	9.00	-	9.00		**9.00**	R1,3,4,6	9068493	9.00	7.00	9.00	9.00	-	8.00	7.00	**9.00**	R1,3,4
9068532	9.00	9.00	6.00	9.00	9.00	3.00	7.50	**9.00**	R1,2,4,5	9068532	9.00	9.00	7.00	9.00	9.00	4.00	7.83	**9.00**	R1,2,4,5
9068531	6.00	9.00	1.00	1.00	3.00	9.00	4.83	**9.00**	R2,6	9068531	7.00	9.00	1.00	1.00	2.00	9.00	4.83	**9.00**	R2,6
9068530	9.00	9.00	3.00	9.00	6.00	9.00	7.50	**9.00**	R1,2,4,6	9068530	9.00	9.00	2.00	9.00	5.00	9.00	7.17	**9.00**	R1,2,4,6
9068554	6.00	9.00	3.00	1.00	4.00	9.00	5.33	**9.00**	R2,6	9068554	7.00	9.00	3.00	9.00	7.00	9.00	7.33	**9.00**	R2,4,6
9068566	6.00	6.00	6.00	3.00	4.00	4.00	4.83	**6.00**	R1-3	9068566	7.00	7.00	7.00	2.00	4.00	4.00	5.17	**7.00**	R1-3
9068584	9.00	8.00	8.00	9.00	6.00	9.00	8.17	**9.00**	R1,6	9068584	9.00	9.00	9.00	9.00	7.00	9.00	8.67	**9.00**	R1-4,6
9068583	9.00	3.00	8.00	3.00	1.00	9.00	5.50	**9.00**	R1,R6	9068583	9.00	5.00	9.00	4.00	1.00	9.00	6.17	**9.00**	R1,3,6
9068588	9.00	9.00	3.00	3.00	8.00	9.00	6.83	**9.00**	R1,2,6	9068588	9.00	9.00	4.00	4.00	9.00	9.00	7.33	**9.00**	R1,2,5,6

Study: 29I135J

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

Study Leader: Henry, J.

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 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. Only 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 the rate of growth seems to be slow, which seems to be 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. 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 was 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**
9057169	1.6 Pounds	11/16/00
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

Discussion

This year, just as last year, the entire assembly of plants was severely infested with the caterpillar tent worm, *Malacosoma americanum*. All accessions were affected to some degree. The pesticide Malathion 57 EC liquid was used following the label recommendations. The control was very effective.

The following is the plant performance evaluations for 1997 through 2001.

Table #1

Acc. Number	**1997 (Feet)**	**1998**	**1999**	**2000**	**2001**	**Averages**
9057168						
Height	4.3	5.4	5.7	6.0	6.5	5.6
Spread	4.2	7.0	7.3	7.5	8.0	6.8
Ins/Disease	2	2	2	2	2	2
Form	3	3	3	3	3	3
Nut Prod.		1.8 lbs.	1.3 lbs.	2.0 lbs.	2.3 lbs.	1.9 lbs.
9068562						
Height	5.2	7.0	7.4	8.0	8.2	7.2
Spread	6.5	7.4	7.6	8.0	8.5	7.6
Ins/Disease	2	3	2	2	2	2.2
Form	2	2	2	1	2	1.8
Nut Prod.		1.67 lbs.	1.60 lbs.	1.7 lbs.	1.9 lbs.	1.72 lbs.
9068573						
Height	4.6	6.3	6.5	6.7	7.1	6.2
Spread	5.0	6.0	6.3	6.5	7.0	6.2
Ins/Disease	2	2	2	2	2	2
Form	3	3	3	3	3	3
Nut Prod.		1.5 lbs.	1.9 lbs.	2.6 lbs.	4.3 lbs.	2.6 lbs.
9068574						
Height	6.8	6.9	7.0	7.3	7.5	7.1
Spread	4.5	5.8	6.0	6.3	6.5	5.8
Ins/Disease	2	3	2	2	2	2.2
Form	3	4	3	3	3	3.2
Nut Prod.		1.3 lbs.	1.8 lbs.	1.3 lbs.	2.1 lbs.	1.6 lbs.
9057188						
Height	5.1	6.4	6.7	6.8	7.0	6.4
Spread	3.7	7.0	7.5	7.8	8.0	6.8
Ins/Disease	2	2	2	2	2	2
Form	3	3	3	3	3	3
Nut Prod.		1.0 lbs.	0.5 lb.	1.4 lbs.	1.9 lbs.	1.2 lbs.
9068528						
Height	3.1	4.0	4.3	4.5	5.0	4.2
Spread	2.9	4.4	4.9	5.2	5.5	4.6
Ins/Disease	3	3	3	3	3	3
Form	5	4	3	3	3	3.6
Nut Prod.		1.0 lbs.	2.2 lbs.	1.0 lbs.	2.6 lbs.	1.7 lbs.
9057168						
Height	4.3	5.4	5.7	6.0	6.5	5.6
Spread	4.2	7.0	7.3	7.5	8.0	6.8
Ins/Disease	2	2	2	2	2	2
Form	3	3	3	3	3	3
Nut Prod.		1.2 lbs.	1.3 lbs.	2.0 lbs.	2.3 lbs.	1.7 lbs.

Table #1 reflects Summary of plant performance for selected accessions.

Table #2 reflects the accession information.

Tables #3 - #6 reflect the plants' performance 1995-1998.

Table #2

Accession Information		
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

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Table #3

Height in Feet

1995

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
9057188	2.6	4.0	1.6	3.1	2.6	2.0	2.3	2.2	2.6	**4.0**	R2
9068573	3.6	2.7	3.2	1.5	3.0	2.2	2.5	3.2	2.7	**3.6**	R1
9068508	2.0	3.0	2.2	2.3	1.3	1.0	1.6	1.5	1.9	**3.0**	R2
9068574	1.7	2.0	1.7	3.0	2.3	2.2	1.3	2.0	2.0	**3.0**	R4
9057169	2.9	1.6	1.4	1.7	0.8	1.0	1.4	1.6	1.6	**2.9**	R1
9068507	1.7	1.0	2.6	Dead	Dead	2.0	1.3	1.8	1.7	**2.6**	R 3
9068565	2.3	2.6	2.5	2.0	2.4	2.2	1.6	Dead	2.2	**2.6**	R2
9068558	1.5	2.2	1.7	1.3	2.0	1.5	2.5	Dead	1.8	**2.5**	R7
9057168	1.3	1.3	2.1	1.0	1.9	2.2	1.4	0.9	1.5	**2.2**	R6
9068510	0.6	1.3	2.1	1.7	1.5	1.4	0.6	2.2	1.4	**2.2**	R8
9068528	1.3	1.2	Dead	2.1	Dead	1.7	2.0	1.4	1.6	**2.1**	R4
9068586	Dead	Dead	1.2	1.7	2.0	2.0	1.0	1.3	1.5	**2.0**	R5,6
9068525	1.3	1.2	1.0	1.0	1.0	1.5	Dead	1.7	1.2	**1.7**	R8

1996

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	2.0	3.8	1.7	1.0	2.7	2.8	3.2	4.1	2.7	**3.8**	R2
9068586	Dead	Dead	2.9	2.6	3.7	3.0	2.0	2.0	2.7	**3.7**	R5
9068573	2.6	3.7	3.4	2.1	3.6	3.0	2.8	3.3	3.1	**3.7**	R2
9068574	3.2	2.3	2.4	3.7	3.5	2.6	2.7	2.0	2.8	**3.5**	R5
9068508	2.3	3.4	3.3	2.5	1.7	1.4	2.5	2.3	2.4	**3.4**	R2
9057168	2.3	1.3	3.3	1.8	3.3	3.0	1.8	1.3	2.3	**3.3**	R3, 5
9068528	3.0	3.2	Dead	3.3	Dead	2.5	2.5	2.1	2.8	**3.3**	R4
9068507	2.1	1.3	3.2	Dead	Dead	2.9	2.0	1.5	2.2	**3.2**	R3
9068558	2.0	Dead	2.1	2.1	2.4	3.2	2.7	Dead	2.4	**3.2**	R6
9057169	2.9	3.1	2.3	2.7	1.6	2.2	2.1	1.9	2.4	**3.1**	R2
9068565	2.3	2.9	2.3	2.3	2.6	2.3	1.4	Dead	2.3	**2.9**	R2
9068510	1.8	2.2	1.7	2.2	2.7	2.3	1.3	2.7	2.1	**2.7**	R5,8
9068525	2.2	1.6	1.7	2.5	1.6	1.9	Dead	2.5	2.0	**2.5**	R4,8

1997

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Tallest	Location
9068574	4.9	4.3	3.8	3.9	6.8	3.8	3.2	2.2	4.1	**6.8**	R5
9068562	3.3	5.2	2.7	2.7	3.4	4.6	4.2	4.5	3.8	**5.2**	R2
9057188	4.0	5.0	2.9	4.2	5.1	3.7	4.7	4.0	4.2	**5.1**	R5
9057169	5.0	4.1	3.4	3.5	2.3	3.6	3.2	2.8	3.5	**5.0**	R1
9057168	3.8	1.2	4.6	2.4	4.3	4.1	3.0	2.0	3.2	**4.6**	R3
9068573	4.2	4.5	4.0	3.4	4.6	3.1	2.5	3.4	3.7	**4.6**	R4
9068528	4.5	4.2	Dead	4.0	3.1	3.2	3.0	2.8	3.5	**4.5**	R1
9068510	3.1	2.0	3.0	4.5	4.3	2.8	2.0	4.0	3.2	**4.5**	R4
9068558	3.6	Dead	2.4	3.5	2.8	4.3	3.9	Dead	3.4	**4.3**	R6
9068507	2.3	Dead	3.5	Dead	Dead	4.0	2.0	2.3	2.8	**4.0**	R6
9068565	2.7	3.3	2.3	3.0	4.0	2.8	1.6	Dead	2.8	**4.0**	R5
9068525	3.3	2.3	4.0	3.6	Dead	3.1	Dead	3.2	2.8	**4.0**	R3
9068508	3.2	3.6	3.9	3.3	3.4	2.8	3.5	3.3	3.4	**3.9**	R3
9068586	Dead	Dead	2.9	2.6	3.7	3.0	2.0	3.1	2.9	**3.1**	R8

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Tallest	Location
9068562	4.7	7.0	4.0	4.6	5.1	4.1	4.6	5.4	4.9	**7.0**	R2
9068558	4.6	Dead	5.0	4.3	4.1	5.0	6.4	Dead	4.9	**6.4**	R7
9057188	4.0	5.8	6.0	5.0	6.4	5.8	5.0	5.7	5.5	**6.4**	R5
9068573	6.3	4.9	5.2	5.0	6.3	5.0	6.0	4.0	5.3	**6.3**	R5
9068574	5.2	5.3	5.0	4.0	6.3	3.2	3.6	3.0	4.5	**6.3**	R5
9057169	5.9	5.2	5.0	5.0	3.2	4.4	3.2	3.3	4.4	**5.9**	R1
9057168	5.0	1.8	5.4	3.8	5.4	5.1	4.2	3.0	4.2	**5.4**	R5
9068528	5.4	4.4	Dead	4.2	4.0	4.0	4.8	3.2	4.3	**5.4**	R1
9068510	3.9	4.8	4.0	4.6	5.4	3.0	4.0	4.6	4.3	**5.4**	R5
9068507	2.3	Dead	4.3	Dead	Dead	5.2	2.8	4.0	3.7	**5.2**	R6
9068525	4.2	3.5	5.2	4.9	Dead	3.4	Dead	4.6	3.7	**5.2**	R3
9068586	Dead	Dead	4.2	4.0	5.0	4.6	3.5	4.1	4.2	**5.0**	R5
9068508	3.5	3.8	3.2	4.8	4.7	3.8	4.2	4.0	4.0	**4.8**	R4
9068565	2.9	4.8	3.2	Dead	4.4	4.0	3.4	Dead	3.8	**4.8**	R2

Height Measured in Feet

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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

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

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,

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

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
9068562	0.0	7.0	0.0	0.0	0.0	3.0	9.0	7.0	6.5	**3.0**	R6
9057168	9.0	9.0	3.0	0.0	7.0	9.0	0.0	0.0	7.4	**3.0**	R3
9057188	3.0	7.0	Dead	9.0	9.0	9.0	7.0	7.0	7.3	**3.0**	R1, R7
9068574	6.0	0.0	0.0	8.0	3.0	0.0	0.0	0.0	5.7	**3.0**	R5
9068573	3.0	6.0	9.0	0.0	6.0	0.0	0.0	0.0	6.0	**6.0**	R2, R5
9068528	9.0	6.0	0.0	9.0	0.0	6.0	8.0	0.0	7.6	**6.0**	R2,6
9068510	0.0	7.0	0.0	0.0	6.0	0.0	0.0	0.0	6.5	**6.0**	R5
9068507	0.0	Dead	7.0	Dead	Dead	0.0	0.0	0.0	7.0	**7.0**	R3
9068565	8.0	0.0	9.0	7.0	9.0	9.0	0.0	Dead	8.4	**7.0**	R4
9068508	9.0	Dead	9.0	0.0	9.0	0.0	9.0	8.0	8.8	**8.0**	R8
9068558	9.0	Dead	0.0	0.0	0.0	0.0	9.0	Dead	9.0	**9.0**	R1, R7
9068525	0.0	0.0	0.0	0.0	0.0	0.0	Dead	9.0	9.0	**9.0**	R8
9068586	Dead	Dead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**-**	-

1=Heavy Fruit Production; 9=Poor Fruit Production

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068507	5.0	Dead	5.0	Dead	Dead	2.0	0.0	0.0	4.0	**2.0**	R6
9068586	Dead	Dead	7.0	7.0	7.0	7.0	5.0	2.0	5.8	**2.0**	R8
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
9057168	7.0	5.0	2.0	0.0	2.0	5.0	7.0	0.0	4.7	**2.0**	R3,5
9068558	2.0	Dead	5.0	2.0	0.0	5.0	5.0	Dead	3.8	**2.0**	R2,4
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
9068573	7.0	2.0	2.0	5.0	2.0	7.0	5.0	7.0	4.6	**2.0**	R2,3,5
9068565	7.0	7.0	2.0	7.0	0.0	2.0	5.0	0.0	5.0	**2.0**	R3,6
9057169	7.0	7.0	2.0	7.0	0.0	2.0	5.0	0.0	5.0	**2.0**	R3,6
9068528	2.0	2.0	Dead	5.0	2.0	5.0	5.0	2.0	3.3	**2.0**	R1,2,5,8
9068510	7.0	2.0	7.0	7.0	7.0	5.0	0.0	5.0	5.7	**2.0**	R2
9068574	5.0	7.0	7.0	2.0	2.0	5.0	5.0	0.0	4.7	**2.0**	R4,5
9068525	5.0	5.0	7.0	7.0	2.0	7.0	Dead	2.0	5.0	**2.0**	R5,8
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

Insect/Disease

1997

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
9068562	3.0	2.0	4.0	5.0	4.0	2.0	3.0	2.0	3.1	**2.0**	R2
9057168	3.0	4.0	3.0	3.0	2.0	3.0	4.0	4.0	3.3	**2.0**	R5
9068558	2.0	Dead	3.0	5.0	7.0	3.0	3.0	Dead	3.8	**2.0**	R1,3,6
9068508	3.0	3.0	3.0	3.0	2.0	3.0	4.0	5.0	3.3	**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	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
9068565	3.0	2.0	7.0	6.0	3.0	5.0	4.0	5.0	4.4	**2.0**	R2
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	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	3.0	5.0	4.0	2.0	5.0	3.0	3.0	3.5	**2.0**	R5
9068525	2.0	3.0	2.0	7.0	Dead	3.0	Dead	2.0	3.2	**2.0**	R 1,3,8
9068507	3.0	Dead	3.0	Dead	Dead	3.0	4.0	4.0	3.4	**3.0**	R1,3,6
9068528	3.0	3.0	Dead	3.0	3.0	4.0	4.0	4.0	3.4	**3.0**	R1,2,4,5

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

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068507	4.0	Dead	6.0	Dead	Dead	2.0	9.0	3.0	4.8	**2.0**	R6
9068586	Dead	Dead	4.0	3.0	3.0	3.0	4.0	2.0	3.2	**2.0**	R8
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	3.0	Dead	4.0	3.0	3.0	2.0	2.0	Dead	2.8	**2.0**	R6,7
9068573	5.0	3.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0	**2.0**	R5
9057188	7.0	3.0	3.0	2.0	3.0	2.0	2.0	4.0	3.3	**2.0**	R4,6,7
9057169	2.0	4.0	4.0	3.0	2.0	3.0	2.0	3.0	2.9	**2.0**	R1,5,7
9068528	3.0	4.0	Dead	3.0	3.0	3.0	2.0	2.0	2.9	**2.0**	R7,8
9068510	6.0	4.0	3.0	3.0	5.0	3.0	3.0	2.0	3.6	**2.0**	R8
9068574	3.0	6.0	4.0	4.0	3.0	2.0	3.0	3.0	3.5	**2.0**	R6
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
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
9068565	7.0	3.0	4.0	6.0	3.0	4.0	3.0	Dead	4.3	**3.0**	R2,5,7
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

Study: 29I136J

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

Study Leader: Henry, J.

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 tooth. 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'; 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 1/4", 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 twenty-seven 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 unrandomized 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 # 2, #3, #4, #5 and #6 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 and the assembly. The pesticide Malathion 57 EC liquid was used following the label recommendations. The control was very effective.

Tables #2, #3, #4, #5, and #6 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**
9062309	4.9 Ounces
9068580	11.5 Ounces
9068485	5.5 Ounces
9068545	1.7 Ounces
9068546	11.0 Ounces

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 is the summary of plant performance of the selected accessions of wild plum out of the initial assembly.

Table #3

Acc. Number	1995	1996	1997	1998	1999	2000	2001	Average
9062309								
Height	2.7 feet	4.7 feet	7.1 feet	8.2 feet	9.4 feet			6.4 feet
Spread	0.8 feet	3.2 feet	6.9 feet	7.7 feet	10.6 feet			
Ins/Dis	4	4	4	4	4	4	4	4.6
Form	4	4	4	4	4	4	4	4.0
Fruiting			4	4	5	2	1	3.2
9068580								
Height	3.1 feet	6.1 feet	9.0 feet	9.8 feet	10.4 feet			7.7 feet
Spread	0.93 feet	4.6 feet	9.3 feet	10.0 feet	11.3 feet			7.3 feet
Ins/Dis	2	2	2	3	3	4	4	2.9
Form	4	3	3	3	3	3	3	3.1
Fruiting			4	3	4	2	1	2.8
9068485								
Height	2.2 feet	3.9 feet	5.5 feet	6.3 feet	9.1 feet			5.4 feet
Spread	0.93 feet	4.6 feet	9.2 feet	10.5 feet	11.3 feet			
Ins/Dis	2	2	2	2	2	4	4	2.6
Form	4	3	3	2	2	2	2	2.6
Fruiting			4	3	4			
9068545								
Height	2.2 feet	3.9 feet	5.5 feet	6.3 feet	7.8 feet			5.4 feet
Spread	0.3 feet	3.0 feet	5.6 feet	6.8 feet	8.5 feet			4.8
Ins/Dis	3	3	3	3	3	5	4	3.4
Form	5	3	3	3	3	3	3	3.3
Fruiting			3	4	4	3	1	3.0
9068546								
Height	2.9 feet	5.2 feet	7.9 feet	16.6 feet	17.3 feet			10.0 feet
Spread	0.8 feet	4.2 feet	8.1 feet	8.5 feet	10.9 feet			6.5 feet
Ins/Dis	3	2	2	3	3	4	5	3.1
Form	4	4	3	3	3	3	3	3.3
Fruiting			3	2	2	2	2	2.2

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

Study 29I136J Assembly and Evaluation of *Prunus Americana*, Wild Plum — Table #4

Height in Feet

1995

Accssion	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
9068580	3.60	5.00	2.60	4.30	1.50	2.00	2.60	3.00	3.08	**5.00**	R2
9057088	4.30	3.10	3.10	4.80	2.50	2.50	2.60	3.50	3.30	**4.80**	R4
9068545	4.50	3.00	3.00	3.20	2.30	Dead	2.00	-	3.00	**4.50**	R1
9068546	3.70	4.30	3.60	2.30	2.60	1.80	2.10	2.40	2.85	**4.30**	R2
9068516	2.50	2.00	Dead	4.00	2.00	Dead	Dead	-	2.63	**4.00**	R4
9068515	2.50	0.60	3.80	2.70	1.50	2.50	2.30	2.30	2.28	**3.80**	R3
9057096	3.60	2.30	1.40	Dead	Dead	1.10	Dead	-	2.10	**3.60**	R1
9068485	3.30	2.00	2.30	2.70	1.50	Dead	1.20	-	2.17	**3.30**	R1
9068514	3.10	1.90	2.60	2.00	Dead	1.80	2.10	-	2.25	**3.10**	R1
9068480	2.60	3.10	2.40	3.00	1.60	Dead	Dead	Dead	2.54	**3.10**	R2
9068478	2.60	2.40	3.00	2.80	1.60	2.60	1.40	-	2.34	**3.00**	R3
9062309	2.80	Dead	2.00	3.00	2.60	2.90	Dead	-	2.66	**3.00**	R4
9057165	1.90	1.80	2.80	2.00	1.40	-	-	-	1.98	**2.80**	R3
9068543	2.40	2.70	2.50	2.00	Dead	Dead	Dead	-	2.40	**2.70**	R2
9062308	2.00	2.20	2.30	1.60	Dead	Dead	1.75	Dead	1.97	**2.30**	R3
9057146								1.60	1.60	**1.60**	R8
ND-286								Dead		**0.00**	

1996

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
9068545	7.70	6.40	6.80	6.20	5.70	Dead	5.40	-	6.37	**7.70**	R1
434240	7.10	7.30	6.30	6.00	5.10	Dead	6.00	-	6.30	**7.30**	R2
9057096	5.20	7.00	6.20	Dead	Dead	1.30	Dead	-	4.93	**7.00**	R2
9068514	7.00	6.50	5.10	4.50	Dead	4.10	4.50	-	5.28	**7.00**	R1
9068580	6.90	7.00	6.60	6.80	4.40	4.60	6.00	6.30	6.08	**7.00**	R2
9068480	4.70	3.10	5.10	6.80	2.90	Dead	Dead	Dead	4.52	**6.80**	R4
9057088	6.50	5.70	5.20	4.60	5.60	5.10	5.40	-	5.44	**6.50**	R1
9068546	5.50	6.20	6.50	5.60	4.70	3.60	4.40	5.20	5.21	**6.50**	R3
9062309	6.30	Dead	3.60	4.80	3.80	4.80	Dead	-	4.66	**6.30**	R1
9057165	5.30	5.00	6.20	6.00	5.10	-	-	-	5.52	**6.20**	R3
9068516	4.90	5.00	Dead	5.10	6.10	Dead	Dead	-	5.28	**6.10**	R5
9068543	4.20	6.00	5.30	4.70	Dead	Dead	Dead	-	5.05	**6.00**	R2
9068515	5.10	2.40	5.90	5.30	4.30	4.20	4.10	4.80	4.51	**5.90**	R3
9062308	4.40	5.00	3.10	4.80	Dead	Dead	2.60	Dead	3.98	**5.00**	R2
9068478	3.10	4.50	3.40	4.50	4.30	4.30	3.40	-	3.93	**4.50**	R2,4
9068485	4.10	4.10	4.00	4.50	4.00	Dead	2.60	-	3.88	**4.50**	R4
9057146								4.50	4.50	**4.50**	R8
ND-286								Dead		**0.00**	

1997

Accssion	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	11.00	9.80	6.60	9.10	8.00	Dead	7.00	-	8.58	**10.00**	R1
9068580	10.00	10.00	9.60	10.80	7.20	7.00	8.20		8.97	**10.00**	R1,2
9068546	7.20	9.70	9.00	8.40	7.00	6.00	7.60	8.00	7.86	**9.70**	R2
434240	9.50	9.00	9.50	7.60	7.30	Dead	8.20	-	8.52	**9.50**	R1,3
9068515	8.20	4.20	9.10	7.40	5.00	6.00	8.20	6.20	6.79	**9.10**	R3
9057096	7.30	7.20	8.00	Dead	Dead	2.50	Dead	-	6.25	**8.00**	R3
9062309	8.00	Dead	7.00	7.20	6.40	7.00	Dead	-	7.12	**8.00**	R1
9068516	7.80	7.20	Dead	6.00	7.20	Dead	Dead	-	7.05	**7.80**	R1
9062308	6.40	2.50	5.10	7.60	Dead	Dead	4.00	Dead	5.12	**7.60**	R4
9068514	7.60	6.40	7.40	6.30	Dead	7.00	6.60	-	6.88	**7.60**	R1
9068543	6.00	5.00	7.20	7.00	Dead	Dead	Dead	-	6.30	**7.20**	R3
9057146								7.20	7.20	**7.20**	R8
9068480	7.00	5.40	9.00	6.30	6.00	Dead	Dead	6.00	6.62	**7.00**	R1
9057165	5.30	5.10	6.10	7.00	5.70	-	-	-	5.84	**7.00**	R4
9068478	3.20	6.50	4.40	6.40	Dead	Dead	4.60	-	5.02	**6.80**	R6
9068485	5.70	6.30	5.00	6.80	6.30	Dead	2.70	-	5.47	**6.80**	R4
ND-286								Dead		**0.00**	

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
9068545	12.10	10.90	7.70	10.40	9.60	Dead	7.90	-	9.77	**12.10**	R1
9068580	11.30	11.00	10.90	11.80	9.00	8.80	9.40	-	10.31	**11.30**	R1
9057088	10.20	7.70	8.30	8.20	9.60	8.00	7.30	11.20	8.81	**11.20**	R8
434240	10.20	10.00	10.70	8.90	8.60	Dead	8.60	-	9.50	**10.70**	R3
9068515	8.90	5.80	10.30	8.10	6.00	7.00	9.90	7.10	7.89	**10.30**	R3
9068480	8.80	6.80	10.20	7.70	7.00	Dead	Dead	6.90	7.90	**10.20**	R3
9068546	8.70	10.20	10.00	9.90	8.20	67.90	8.20	9.80	16.61	**10.20**	R2
9057146								8.90	8.90	**8.90**	R8
9062309	8.90	Dead	8.10	8.40	7.10	8.30	Dead	-	8.16	**8.90**	R1
9068514	8.80	7.30	8.10	7.40	Dead	8.10	7.40	-	7.85	**8.80**	R1
9057096	7.90	7.70	8.60	Dead	Dead	4.50	Dead	-	7.18	**8.60**	R3
9068516	8.10	8.60	Dead	7.20	8.30	Dead	Dead	-	8.05	**8.60**	R2
9068543	7.00	6.00	8.30	8.10	Dead	Dead	Dead	-	7.35	**8.30**	R3
9062308	7.30	4.90	6.60	8.00	Dead	Dead	5.00	Dead	6.36	**8.00**	R4
9057165	6.60	6.80	7.40	8.00	6.80	-	-	-	7.12	**8.00**	R4
9068478	4.00	6.90	5.40	7.20	Dead	Dead	5.20	-	5.74	**7.20**	R4
9068485	6.10	7.20	6.00	7.40	7.10	Dead	3.80	-	6.27	**7.20**	R2
ND-286										**0.00**	

Height measured in feet

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

Table #4 - 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

Table #5

Spread in Feet

1995

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
9057096	0.70	0.30	0.20	Dead	Dead	0.20	Dead	-	0.35	**0.70**	R1
9068478	0.90	0.70	1.00	1.00	0.60	0.80	0.50	-	0.79	**1.00**	R3,4
9068515	1.00	0.30	0.80	0.60	0.40	0.60	0.40	0.20	0.54	**1.00**	R1
9062308	0.60	0.60	0.30	0.40	Dead	Dead	0.50	Dead	0.48	**0.60**	R1,2
9068485	0.30	0.30	0.50	0.30	0.20	Dead	0.10	-	0.28	**0.50**	R3
9057088	2.00	1.60	0.80	0.60	0.40	0.60	0.90	0.90	0.98	**1.60**	R2
9068545	2.30	1.50	0.80	1.00	1.00	Dead	0.40	-	1.17	**2.30**	R1
9068543	0.30	0.20	0.60	0.20	Dead	Dead	Dead	-	0.33	**0.60**	R3
9068516	1.30	0.20	Dead	0.80	0.60	Dead	Dead	-	0.73	**0.60**	R3
9068514	0.80	0.70	1.00	0.30	Dead	0.40	0.30	-	0.58	**1.00**	R3
9068580	1.80	2.00	1.10	0.80	0.40	0.50	0.40	0.40	0.93	**2.00**	R2
9057146								0.20		**0.20**	R8
9068546	1.30	1.30	1.40	0.90	0.20	0.40	0.50	0.50	0.81	**1.40**	R3
434240	2.50	2.50	2.00	1.40	0.60	Dead	1.00	-	1.67	**2.50**	R1,2
ND-286								Dead		**0.00**	
9062309	0.50	Dead	0.30	0.10	0.40	0.20	Dead	-		**0.50**	R1
9057165	0.60	0.40	0.50	0.30	0.40	-	-	-	0.44	**0.60**	R1

1996

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068480	3.00	2.60	3.70	3.20	3.50	Dead	Dead	Dead	3.20	**3.70**	R3
9057096	3.80	4.00	3.40	Dead	Dead	0.60	Dead	-	2.95	**4.00**	R2
9068478	2.40	3.80	1.80	4.70	4.50	4.50	2.50	-	3.46	**4.70**	R4
9068515	3.80	2.60	4.00	4.00	4.50	3.70	3.50	2.60	3.59	**4.50**	R5
9062308	3.80	3.00	1.80	3.30	Dead	Dead	3.20	Dead	3.02	**3.80**	R1
9068485	3.00	3.20	3.40	3.60	2.30	Dead	2.00	-	2.92	**3.60**	R4
9057088	5.50	5.00	5.00	2.80	4.40	4.50	4.30	5.80	4.66	**5.80**	R8
9068545	7.00	5.00	5.20	5.80	5.00	Dead	2.60	-	5.10	**7.00**	R1
9068543	3.00	3.50	4.40	3.40	Dead	Dead	Dead	-	3.58	**4.40**	R3
9068516	3.00	3.00	Dead	3.50	3.50	Dead	1.40	-	2.88	**3.50**	R4,5
9068514	4.00	3.40	3.30	2.70	Dead	2.80	5.00	-	3.53	**5.00**	R7
9068580	5.40	6.00	4.80	5.60	3.30	3.00	4.50	4.00	4.58	**6.00**	R2
9057146								3.00	3.00	**3.00**	R8
9068546	4.20	5.00	5.00	4.80	2.60	4.40	3.40	4.00	4.18	**5.00**	R2,3
434240	6.40	5.00	5.20	4.80	3.70	Dead	4.90	-	5.00	**6.40**	R1
ND-286								Dead	-	**0.00**	
9062309	3.40	Dead	2.70	3.70	3.00	3.30	Dead	-	3.22	**3.70**	R4
9057165	3.50	2.80	4.20	3.70	2.80	-	-	-	3.40	**4.20**	R3

1997

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
9057096	7.60	8.60	7.40	Dead	Dead	3.00	Dead	-	6.65	**8.60**	R2
9068478	3.00	6.20	4.00	7.30	Dead	7.80	4.60	-	5.48	**7.80**	R6
9068515	8.30	4.00	7.20	7.50	7.80	6.70	7.40	6.80	6.96	**8.30**	R1
9062308	6.20	2.80	4.30	8.30	Dead	Dead	4.60	Dead	5.24	**8.30**	R4
9068485	5.00	6.20	5.50	7.50	6.00	Dead	3.20	-	5.57	**7.50**	R4
9057088	10.00	6.50	8.30	8.30	8.50	7.50	8.00	11.00	8.51	**11.00**	R8
9068545	12.80	9.00	9.00	9.30	9.00	Dead	3.90	-	8.83	**12.80**	R1
9068543	6.60	9.00	6.40	7.70	Dead	Dead	Dead	-	7.43	**9.00**	R2
9068516	6.80	7.00	Dead	7.40	7.50	Dead	3.60	-	6.46	**7.50**	R5
9068514	7.20	6.50	7.10	6.50	Dead	6.40	6.50	-	6.70	**7.20**	R1
9068580	12.00	10.60	10.10	11.30	7.70	6.20	8.00	8.00	9.24	**12.00**	R1
9057146								8.10	8.10	**8.10**	R8
9068546	6.00	11.00	8.00	10.00	7.60	6.20	8.00	7.70	8.06	**11.00**	R2
434240	10.30	7.60	10.00	7.40	7.80	Dead	8.00	-	8.52	**10.30**	R1
ND-286								Dead	-	**0.00**	
9062309	8.20	Dead	6.60	7.00	6.40	6.50	Dead	-	6.94	**8.20**	R1
9057165	6.20	6.40	7.10	7.30	6.00	-	-	-	6.60	**7.10**	R4

1998

Accession	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Average	Best	Location
9068480	7.70	6.50	7.90	6.50	6.50	Dead	Dead	4.75	6.64	**7.90**	R3
9057096	8.00	9.10	7.90	Dead	Dead	4.00	Dead	-	7.25	**9.10**	R2
9068478	5.00	6.80	5.30	8.10	Dead	8.50	5.70	-	6.57	**8.50**	R6
9068515	9.10	5.30	8.10	8.50	8.70	7.60	8.10	7.20	7.83	**8.70**	R5
9062308	7.70	4.90	5.90	9.20	Dead	Dead	5.90	Dead	6.72	**9.20**	R4
9068485	6.10	6.90	6.50	8.30	7.10	Dead	5.70	-	6.77	**8.30**	R4
9057088	11.10	7.30	9.20	8.90	9.10	8.20	8.90	11.80	9.31	**11.80**	R8
9068545	13.20	10.10	10.00	10.80	10.00	Dead	5.30	-	9.90	**13.20**	R1
9068543	7.40	10.00	7.20	8.10	Dead	Dead	Dead	-	2.03	**10.00**	R2
9068516	7.20	8.10	Dead	8.80	8.30	Dead	5.10	-	4.44	**8.80**	R4
9068514	8.10	7.30	8.30	7.00	Dead	7.40	7.40	-	3.63	**8.30**	R3
9068580	13.00	11.90	11.00	12.60	8.60	7.90	9.50	9.40	6.00	**13.10**	R1
9057146								9.30	9.30	**9.30**	R8
9068546	7.20	12.10	9.30	11.30	8.70	7.40	9.20	8.50	5.64	**11.30**	R4
434240	10.90	8.30	11.20	8.70	8.90	Dead	9.10	-	4.45	**11.20**	R3
ND-286								Dead	Dead	**0.00**	
9062309	8.90	Dead	7.30	7.90	7.00	7.20	Dead	-	4.42	**8.90**	R1
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 #5 - continued

Spread in Feet

				1999							
Accession	**Rep 1**	**Rep 2**	**Rep 3**	**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 — **Table #6**

Form

1995

Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								Dead	-	**0.00**	
434240	1.00	2.00	2.00	2.00	4.00	Dead	5.00	-	2.67	**1.00**	R1
9057088	2.00	4.00	5.00	4.00	4.00	4.00	2.00	4.00	3.63	**2.00**	R1, 7
9068545	2.00	3.00	3.00	5.00	2.00	Dead	6.00	-	3.50	**2.00**	R1, 5
9068516	2.00	8.00	Dead	7.00	2.00	Dead	Dead	-	4.75	**2.00**	R1 ,5
9068478	4.00	7.00	4.00	3.00	5.00	4.00	4.00	-	4.43	**3.00**	R3
9068515	4.00	6.00	5.00	5.00	7.00	3.00	5.00	6.00	5.13	**3.00**	R6
9062308	5.00	3.00	6.00	6.00	Dead	Dead	6.00	Dead	5.20	**3.00**	R2
9068580	5.00	3.00	5.00	3.00	5.00	5.00	5.00	5.00	4.50	**3.00**	R2, 4
9068546	4.00	5.00	3.00	5.00	7.00	5.00	5.00	5.00	4.88	**3.00**	R3
9068480	4.00	8.00	5.00	7.00	6.00	Dead	Dead	Dead	6.00	**4.00**	R1
9068514	4.00	7.00	7.00	8.00	Dead	4.00	5.00	-	5.83	**4.00**	R1, 6
9057165	4.00	5.00	8.00	8.00	8.00	-	-	-	6.60	**4.00**	R1
9068485	7.00	7.00	8.00	7.00	5.00	Dead	8.00	-	7.00	**5.00**	R5
9068543	5.00	8.00	5.00	8.00	Dead	Dead	Dead	-	6.50	**5.00**	R1, 3
9062309	5.00	Dead	6.00	6.00	6.00	7.00	Dead	-	6.00	**5.00**	R1
9057096	6.00	7.00	6.00	Dead	Dead	8.00	Dead	-	6.75	**6.00**	R1, 3
9057146								7.00	7.00	**7.00**	R8

1996

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**	
9068478	3.00	4.00	2.00	6.00	6.00	4.00	3.00	-	4.00	**2.00**	R3
9068515	2.00	5.00	3.00	3.00	4.00	6.00	3.00	6.00	4.00	**2.00**	R1
9068514	2.00	5.00	4.00	5.00	Dead	5.00	8.00	-	4.83	**2.00**	R1
9068546	2.00	6.00	2.00	3.00	4.00	5.00	7.00	3.00	4.00	**2.00**	R1, 3
9068480	8.00	4.00	5.00	3.00	6.00	Dead	Dead	Dead	5.20	**3.00**	R4
9057096	4.00	3.00	3.00	Dead	Dead	6.00	Dead	-	4.00	**3.00**	R2, 3
9062308	3.00	5.00	3.00	5.00	Dead	Dead	6.00	Dead	4.40	**3.00**	R1, 3
9068485	5.00	3.00	3.00	3.00	4.00	Dead	3.00	-	3.50	**3.00**	R2,3,4,7
9057088	3.00	6.00	4.00	6.00	4.00	4.00	3.00	4.00	4.25	**3.00**	R1, 7
9068545	5.00	4.00	3.00	5.00	4.00	Dead	7.00	-	4.67	**3.00**	R3
9068516	4.00	4.00	Dead	5.00	3.00	Dead	5.00	-	4.20	**3.00**	R5
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
9057146								3.00	3.00	**3.00**	R8
434240	3.00	3.00	4.00	7.00	4.00	Dead	3.00	-	4.00	**3.00**	R1,2, 7
9062309	3.00	Dead	5.00	3.00	4.00	4.00	Dead	-	3.80	**3.00**	R1, 4
9068543	5.00	4.00	5.00	4.00	Dead	Dead	Dead	-	4.50	**4.00**	R2, 4
9057165	5.00	4.00	5.00	5.00	6.00	-	-	-	5.00	**4.00**	R2

Form

1997

Accssion	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Ave.	Best	Location
ND-286								Dead		**0.00**	
9068545	1.00	3.00	8.00	7.00	7.00	Dead	5.00	-	5.17	**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
434240	1.00	5.00	6.00	8.00	5.00	Dead	3.00	-	4.67	**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
9068546	5.00	3.00	2.00	2.00	5.00	5.00	3.00	5.00	3.75	**2.00**	R3,4
9068515	3.00	6.00	5.00	5.00	7.00	5.00	3.00	5.00	4.88	**3.00**	R1, 7
9068516	3.00	7.00	Dead	8.00	5.00	Dead	4.00	-	5.40	**3.00**	R1
9068514	6.00	8.00	5.00	Dead	6.00	8.00	3.00	-	6.00	**3.00**	R1
9068480	4.00	5.00	8.00	5.00	6.00	Dead	3.00	6.00	5.29	**4.00**	R1
9062308	4.00	9.00	7.00	8.00	Dead	Dead	7.00	-	5.83	**4.00**	R4
9057096	6.00	7.00	7.00	5.00	Dead	8.00	Dead	-	6.60	**5.00**	R4
9068478	8.00	6.00	7.00	7.00	Dead	5.00	6.00	-	6.50	**5.00**	R6
9068485	6.00	6.00	6.00	7.00	5.00	Dead	6.00	-	6.00	**5.00**	R5
9068543	6.00	7.00	5.00	5.00	Dead	Dead	Dead	-	5.75	**5.00**	R3,4
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
9057165	7.00	7.00	6.00	6.00	6.00	-	-	-	6.40	**6.00**	R4,5,6

Form

1998

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**	
9057088	1.00	6.00	5.00	7.00	5.00	Dead	4.00	-	4.67	**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	4.00	6.00	8.00	4.00	Dead	3.00	-	4.33	**1.00**	R1
9068545	1.00	2.00	6.00	5.00	6.00	3.00	3.00	-	3.71	**2.00**	R8
9068514	6.00	8.00	5.00	Dead	6.00	7.00	2.00	-	5.67	**2.00**	R7
9068546	5.00	3.00	2.00	2.00	4.00	4.00	3.00	4.00	3.38	**2.00**	R3,4,8
9068515	3.00	5.00	4.00	4.00	7.00	5.00	3.00	4.00	4.38	**3.00**	R1,7
9068516	3.00	6.00	Dead	8.00	5.00	Dead	4.00	-	5.20	**3.00**	R1
9068480	4.00	6.00	7.00	4.00	6.00	Dead	3.00	6.00	5.14	**4.00**	R1,4
9068478	8.00	6.00	7.00	6.00	Dead	4.00	6.00	-	6.17	**4.00**	R6
9062308	4.00	8.00	7.00	8.00	Dead	Dead	7.00	-	6.80	**4.00**	R1
9057096	5.00	6.00	6.00	5.00	Dead	8.00	Dead	-	6.00	**5.00**	R1,4
9068485	6.00	6.00	5.00	6.00	5.00	Dead	6.00	-	5.67	**5.00**	R3,5
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
9062309	5.00	Dead	5.00	5.00	7.00	6.00	Dead	-	5.60	**5.00**	R1,3,4
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 #6 - 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 #7

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 #8**

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: Henry, J.

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 indicates 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 use potential 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:

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, and #3 reflect the plants' performance.

2000

Discussion

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 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

Discussion

Began pumping water into wetland on April 24, 2001. The objective of the pumping was to flood the wetland to a depth of approximately thirty-two (32) inches of water; this was achieved by April 27, 2001. The water was allowed to remain in the wetland for seven days. Water was then allowed to drained out of the wetland starting on April 30, 2001. All the water was drained out of the wetland by May 1, 2001. On May 8th. evaluations ware conducted to document re-growth after flooding. Again on June 11th a quick flooding scenario was conducted in the wetland to simulate a flash flooding event. Thirty-four (34) inches of water was pumped into the wetland. Began draining the water out of the wetland on June 15th. The process of draining the water out of the wetland was completed on June 19th.

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

Genus/Species	Common Name	Accession No.	Vigor Rating	Date of Rating
Tripsacum dactyloides	**Eastern gamagrass**	**9098840**	**Good**	**6/26/01**
Tripsacum dactyloides	**Eastern gamagrass**	**9078844**	**Fair**	**6/26/01**
Tripsacum dactyloides	**Eastern gamagrass**	**9078842**	**Fair**	**6/26/01**
Tripsacum dactyloides	**Eastern gamagrass**	**9078846**	**Good**	**6/26/01**
Tripsacum dactyloides	**Eastern gamagrass**	**9078843**	**Fair**	**6/26/01**
Tripsacum dactyloides	**Eastern gamagrass**	**9078845**	**Fair/Good**	**6/26/01**
Panicum virgatum	**Switchgrass**	**9062193**	**Excellent**	**6/26/01**
Panicum virgatum	**Switchgrass**	**9062235**	**Excellent**	**6/26/01**
Panicum virgatum	**Switchgrass**	**9062213**	**Excellent**	**6/26/01**
Panicum virgatum	**Switchgrass**	**Cave-In-Rock**	**Good**	**6/21/01**
Panicum virgatum	**Switchgrass**	**Flood-Tolerant**	**Excellent**	**6/21/01**
Spartina pectinata	**Prairie cordgrass**	**Cuivre Island**	**Excellent**	**6/21/01**
Spartina pectinata	**Prairie cordgrass**	**Lost Creek**	**Excellent**	**6/21/01**
Cynondon dactylon	**Bermuda grass**	**Elsberry**	**Excellent**	**6/21/01**
Asclepias incarnata	**Swamp milkweed**	**Iowa**	**Good**	**6/26/01**
Lobelia cardinalis	**Cardinal flower**	**Forrest Keeling**	**Poor**	**6/21/01**

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC							Table #1
Plugs Planted 5-2-97 (Eastern Gamagrass)					**Date Evaluated: 9/19/00**		
2000 Data: Flood Event from 11-3-1999 - 3-30-2000							
	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	
Date Eval.							
7/9/98	20	20	severe	moderate	yes	good	2'5"
9/29/99	20	20	moderate	light rust	yes	good/exc	3'5"
5/11/00	19	17	moderate	moderate	none	poor	6"
9/19/00	13	13	mod/sev	light rust	none	good	2' 5"
6/26/01	20	20	light	none	yes	good	40"
Percent surviving as of 9/19/00 was 52%							
Eastern Gamagrass 9078844 Atchison, Missouri. 7' spacing, planted 5/2/97.							
						18 plants planted	
Dave Eval.							
7/9/98	12	12	severe	moderate rust	yes	poor	2'5"
9/29/99	12	12	moderate	moderate rust	yes	fair	2'5"
5/11/00	12	10	moderate	moderate	none	poor	6"
9/19/00	12	13	severe	light rust	Yes	fair	2' 0"
6/26/01	12	9	light	light rust	yes	fair	34"
Percent surviving as of 9/19/00 was 72%							
Eastern Gamagrass 9078842 Atchison, Missouri. 15' spacing, planted 5/2/97.							
						9 plants planted	
Date Eval.							
7/9/98	5	5	severe	none	yes	fair	2'0"
9/29/99	5	5	severe	none	yes	fair	2'5"
5/11/00	5	3		none	0	poor	6"
9/19/00	5	4	severe	none	none	fair	20"
6/26/01	3	3	light	none	yes	fair	26"
Percent surviving as of 9/19/00 was 44%							
Rating for Vigor: 1=Excellent; 9=Poor							
Rating for Weed Competition and Dis/Insect: 1=Excellent; 9=Severe							

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	
Date Eval.							
7/9/98	11	11	severe	none	yes	good	2'0"
9/29/99	11	11	moderate	none	yes	good	2'5"
5/11/00	8	8	moderate	none	none	poor	7"
9/19/00	10	10	severe	slight rust	none	fair	2' 0"
6/26/01	8	8	light	litht rust	yes	good	38"
Percent surviving as of 9/19/00 was 63%							
Eastern Gamagrass 9078843 Atchison, Missouri. 15' spacing, planted 5/2/97.							
						9 plants planted	
Date Eval.							
7/9/98	13	13	severe	none	yes	poor	2'5"
9/29/99	13	13	moderate	none	yes	moderate	3'0"
5/11/00	5	5		none	none	poor	7"
9/19/00	10	10	severe	slight rust	none	fair	2' 0"
6/26/01	4	4	light	light	none	fair	30"
Percent surviving as of 9/19/00 was 100%							
Eastern Gamagrass 9078845 Holt, Missouri. 8' spacing, planted 5/2/97.							
						16 plants planted	
Date Eval.							
7/9/98	12	12	severe	none	yes	good	3'5"
9/29/99	12	12	severe	none	yes	good	3'0"
5/22/00	12	9	severe	none	none		8"
9/19/00	16	16	severe	slight rust	yes	good	2' 5"
6/26/01	10	10	light	none	yes	good	38"
Percent surviving as of 9/19/00 was 100%							
Rating for Vigor: 1=Excellent; 9=Poor							
Rating for Weed Competition and Dis/Insect: 1=Excellent; 9=Severe							

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #1-continued	
	Total Plant #	**Active Growing**	**Weed Comp.**	**Disease/ Insect**	**Developed Seed Head**	**Vigor**	**Ave. Ht.**
Pete Eastern Gamagrass 5' spacing, 25 total planted 5/2/97.							
						25 plants planted	
Date Eval.							
7/9/98	21	21	severe	light	21/21	good	3' 5"
9/29/99	21	21	severe	light	21/21	good	3'0"
5/11/00	21	20		light		fair	10"
9/19/00	21	21	severe	light rust	17/21	excellent	3' 0"
6/26/01	19	19	light	none	none	excellent	52"
Percent surviving as of 9/19/00 was 84%							
Rating for Vigor: 1=Excellent; 9=Poor							
Rating for Weed Competition and Dis/Insect: 1=Excellent; 9=Severe							

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC							**Table #2**	
Plugs Planted 6-24-97 (Flood Tolerant Switchgrass)								
2000 Data: Flood Event from 11-3-1999 to 3-30-2000								
	% Cover/ Plant #	**Active Growing**	**Weed Comp.**	**Disease/ Insect**	**Developed Seed Head**	**Vigor**	**Ave. Ht.**	
Switchgrass 9062213 3' spacing, 41 total planted (plugs) 6/24/97.								
Date Eval.								
7/9/98		35 plants	moderate	none	all plants	poor/fair	2'.0"	
9/29/99		35 plants	moderate	none	all plants	fair	2'.5"	
4/26/00		35 plants	moderate	none	none	excellent	5" regrowth	
9/19/00	85% row	85% row	moderate	none	all plants	excellent	4'.5"	
6/26/01		33%	light	none	none	excellent		
Percent surviving as of 9/19/00 was 85%								
Switchgrass 9062235 4' spacing, 31 total planted (plugs) 6/24/97.								
Date Eval.								
7/9/98		22 plants	moderate	none	all plants	poor/fair	5'.5"	
9/29/99		22 plants	moderate	none	all plants	fair	5'.0"	
4/26/00		26 plants	moderate	none	none	excellent	6.5"	
9/19/00		26 plants	moderate	none	All plants	excellent	4' 5"	
6/26/01		24%	light	none	none	excellent	35"	
Percent surviving as of 9/19/00 was 84%								
Switchgrass 9062193 5' spacing; 25 total planted (plugs) 6/24/97.								
Date Eval.								
7/9/98		17 plants	moderate	none	all plants	fair	3'5"	
9/29/99		17 plants	moderate	none	all plants	good	4'5"	
4/26/00		21 plants	moderate	none	all plants	excellent	6'5"	
9/19/00		21 plants	moderate	none	all plants	excellent	5'0"	
6/26/01		20%	light	none	none	excellent	42"	
Percent surviving as of 9/19/00 was 84%								

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #2 - continued		
	% Cover/ Plant #	**Active Growing**	**Weed Comp.**	**Disease/ Insect**	**Developed Seed Head**	**Vigor**	**Ave. Ht.**	
Evaluation Date:		September 19, 2000						
Cave-In-Rock Switchgrass 23 plants planted.								
Date Eval.								
4/18/00	23	23	severe	none	none	good	5"	
9/19/00	9	growing weak	severe	none	yes	poor	2'. 0"	
6/21/01	21	21	light	light	none	good	30"	
Percent surviving as of 9/19/00 was 39%								
Flood Tolerant Switchgrass, seeded 50' row plus 3' wide.								
Date Eval.								
Seeded 6/1/00 50' x 40" plot - .0038 ac. Rate 6# PLS/ac.								
9/19/00	15%- 20% of 50' row	fair	moderate	none	6/5 5%	good	8"	
6/21/01	22	22	light	none	none	excellent	36"	
Flood tolerant switchgrass plugs block, 63 plants planted 5/25/99.								
Date Eval.								
4/26/00	92%	58 plants	none	none	6/5 100%	excellent	6'5"	
9/19/00	95%	95%	none	none	6/5 100%	excellent	4' 5"	
6/21/01	80%	66%	light	none	none	excellent	36"	
Bermudagrass block plugs, planted 5/25/99.								
Date Eval.								
9/28/99	35%	100%	light	none	50%	excellent	3"	
4/26/00		100%	light	none	none	excellent	3-5"	
9/19/00	100%	100%	light	none	100%	excellent	9"	
6/21/01	100%	100%	none	none	none	excellent	6"	

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC						Table #2 - continued		
	% Cover/ Plant #	Active Growing	Weed Comp.	Disease/ Insect	Developed Seed Head	Vigor	Ave. Ht.	
Swamp milkweed block 8 rows plugs, 1' center planted 5/25/99.								
Date Eval.								
9/28/99	8 plants		severe foxtail	none	none	poor	9"	
5/11/00	46 plants		moderate	none	none	poor	8"	
9/19/00	30%	30%	moderate	none	30%	fair	14"	
6/26/01	54	54	light	none	none	good	26"	
Cardinal flower, planted 8 plants on 4/17/01 and on 5/1/01								
4/24/01	BFE		8	none	8	good	2"	
5/8/01	AFE		8	none	8	good	3"	
6/11/01	BFE		16	none	16	good	10"	
6/26/01		7	moderate	none	none	poor	10"	

Study 29A1370 - Wetland Species in Wetland at Elsberry PMC							Table #3	
Prairie Cordgrass								
2000 Data: Flood Event from 11-3-1999 - 3-30-2000								
	Total # Planted	**Active Growing Spreading**	**Weed Comp.**	**Disease/ Insect**	**Developed Seed Head**	**Vigor**	**Ave. Ht. Seed Head**	**Average Forage Height**
							10' x 10'	
Prairie Cordgrass Collection, planted 9/29/97							3 | 2 | 1	
East →							6 | 5 | 4	
							9 | 8 | 7	
7/9/98	9	6" average	severe	none	NA	exc.	-	-
8/1/99	9	30" average	moderate	none	9/9	good	-	-
9/19/00	9	4'.5" ave.	none	none	9/9	exc.	6'.5"	5'.0 forage
6/21/01	9	6'	light	none	none	excellent	6'	45"
Percent surviving as of 9/19/00 was 100%								
Cuivre Island Prairie Cordgrass Collection, planted 5/15/98					↑		3' x 3'	
					North		4 |3 | 2| 1	
							8 | 7| 6| 5	
7/9/98	8	5.'5"	severe	none	6 plants	good/exc.	4'.0"	4'.0"
5/25/99	8	1'.5" each direction	moderate	none	none	exc.	none	
Lost Creek Prairie Cordgrass Collection, planted 5/15/98							3'x3'	
							12|11|10|9	
							16|15|14|13	
7/9/98	8	6"	severe	none	4 plants	good/exc.	4'.0"	4'.0"
5/25/99	8	1'.5" each direction	moderate	none	none	exc.	none	
9/19/00								
Total block for both collections			none	none	35%	exc.	6' 0"	5' 0" More lodging Cuivre Island collection
9/19/00								
14' x 13'5" total spread of blocks			none	none	35%	exc.	6'.0"	More lodging Cuivre Island collection
9/19/00								
3' x 3' block is filled in total prairie cordgrass			none	none	35%	exc.	6'.0"	More lodging Cuivre Island collection
6/26/01		solid	none	none	none	excellent	6',0"	50"

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, 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 (see 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 serve as a breeder's block for improved selections. Plants selected for each region can be found in Table #5.

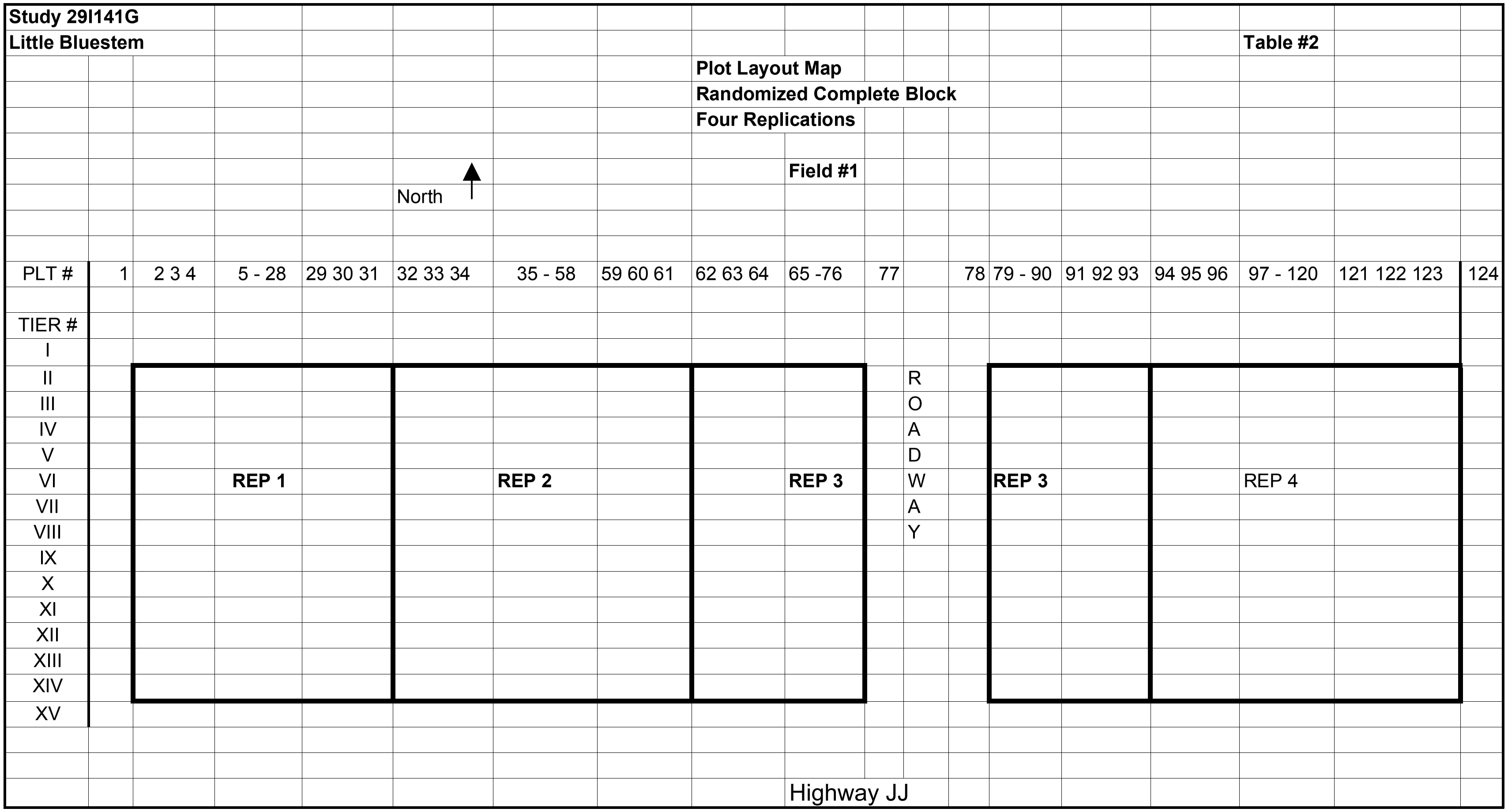
Study 29I141G - Assembly and Evaulation of Little Bluestem, *Schizachyrium scoarium*, Nichx.

Little Bluestem					**Table #1**
ACCESSION	**REFERENCE 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**	
ACCESSION	REFERENCE 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-27	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
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
REP 1
REP 2
REP 3
ROADWAY
REP 3
REP 4
Highway JJ

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

IL-8 ONLY ONE PLANT

3 PLANTS/PLOT (MO-9)

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 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 29I141G **Vigor Rating: 8/9/99** **Table #4**

Little Bluestem

1 = High **9 = Low**

Local Number	**Rep 1** P1	P2	P3	**Rep 2** P4	P5	P6	**Rep 3** P7	P8	P9	**Rep 4** P10	P11	P12	**Percent Survival**	**Living Plants** Ave.	**Best Plant**	**Location/s**
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 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
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 scoarium*, Nichx.					
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 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: Bruckerhoff, S. B.

Study Coordinator: Erickson, R. Audubon Missouri

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 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 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.

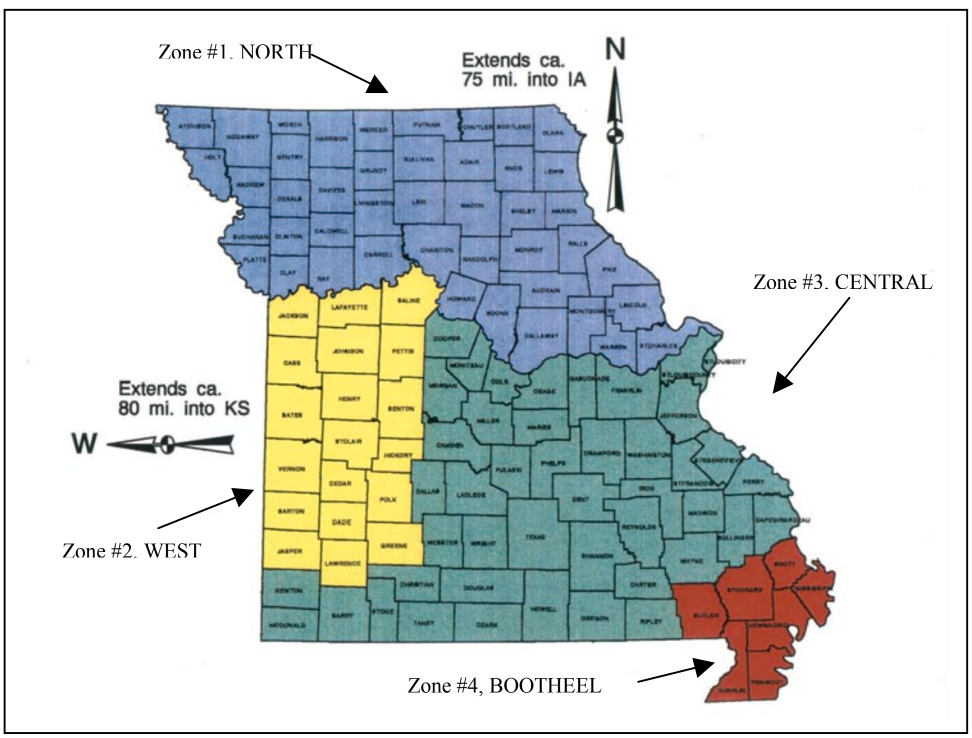
Cooperators:

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, Missouri Department of Conservation, University of Missouri 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 Missouri Department of Conservation (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.

A list of species to collect was developed by the cooperators and seed collection, cleaning, and some fall-dormant planting started the fall of 1997. See list of species and amount of collections in Table # 2. Most species had a substantial amount of seed except for pale purple coneflower, *Echinacea pallida;* finger coreopsis, *Coreopsis palmata*; and butterfly weed, *Asclepias tuberosa*. These three species had lost the bulk of their seed by the time collections were made. Since there was a limited amount of seed, they were grown in the greenhouse for transplanting in the spring of 1998.

1998

As of January 1, 1998, blazing star was the only plot that was planted. In mid-March a second planting of blazing star was made. Five of the eight species were seeded in the greenhouse and transplanted into plots during spring and summer. They were *Echinacea pallida, Liatris pycnostachya, Asclepias tuberosa, Desmodium* spp., and *Coreopsis palmata*. Problems with the soil media containing gnat larvae caused complications as larvae fed on plant roots. *Echinacia pallida* and *Liatris pycnostachya* were damaged the most as more than 90% were lost. Many different approaches were taken to eradicate the larvae, but changing the soil mix was the only solution. Bush clover, *Lespedeza capitata,* was planted in mid April and big bluestem, *Andropogon gerardii,* and little bluestem, *Schizachyrium scoparium,* were planted in early May. Weed control was a problem with most of the plots and will need to be replanted in 1999.

Goals were established for 1998 collections. Some species from 1997 were recollected and some new species were added.

1999

The Missouri Ecotype program continued during 1999 and the species released listed in Table #3.

2000

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

2001

The Missouri Ecotype program is growing increase plots at Elsberry and also at the Charles Greer 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.

29I142G - Missouri Native Ecotype Collection								**Table #2**
			Missouri Ecotypes at PMC					
		Accession	**Field**			**Percent**		
Item	**Common Name Zone #**	**No.**	**No.**	**Plot Size**	**Disc.**	**Stand**	**Date Planted**	**Clean Seed**
				sq. ft. or	no. of			Bulk/no test
				ft X ft.	plants			in pounds
1	big bluestem MO Zone 1	9079000	7f	25x215		85	5/19/98	10.4
2	butterfly milkweed MO Z 1	9079024	1v	7x100	500	80	5/98-99	1.3
3	desmodium MO Zone 1	9079012	14i	25x110	1500	90	5/27/98	2.2
4	grayhead coneflower Z1	9079060	1	20x75	500	95	5/00	3.6
5	grayhead coneflower Z1	9079060	2	12x175	1000	98	5/01	small amount
								inc. w above
6	little bluestem MO Zone 1	9079004	4b	30x110		95	Apr-97	19.5
6a	little bluestem MO Zone 1	9079004	6a	35x50		90	5/19/98	mixed w above
7	little bluestem MO Zone 2	9079005	12b	5x90		90	4/29/97	1.3
8	little bluestem MO Zone 3	9079006	14e	20x130		90	4/29/97	10.6
9	horsemint MO Zone 1	9079056	6a	9x30	5	<5	5/11/00	27gms
10	pale purple coneflower Z 1	9079032	1f	18x75	700	75	12/17/98	1.8
11	pale purple coneflower Z 2	9079033	14L	22x100	1000	80	5/18/99	5.8
12	Penstemon digitalis Z 1	9079064	6a	10x110	500	85	6/6/00	5.8
13	prairie blazing star Z 1	9079020	2g	10x120	250	60	5/10/99	3.9
14	prairie coreopsis MO Z 1	9079028	1w	15x80	500	95	5/18/98	5.4
15	prairie coreopsis MO Z 2	9079029	14m	25x40	500	90	5/20/99	5.8
16	purple prairie clover MO Z1	9079048	9	25x80	100-1	<20	May-01	0
17	Rough blazing star MO Z1	9079068	14k	10x40	150	75	5/24/00	5.6
18	roundhead bush clover Z+E	9079008	11h	32x100	2000	60	4/00	3.3
19	tall dropseed MO Zone 1	9079040	7f	20x240		80	5/27/99	14.3
20	Virginia wildrye MO Z 1	9079044	7d	15x475		90	3/30/99	43.5
21	White prairie clover MO Z1	9079052	2	12x175	900	90	5/01	1
	Not in Production							
22	Indiangrass MO Zone 1	9079036						
23	Indiangrass MO Zone 2+B	9079037						

								Table #2- cont.
	Missouri Ecotypes at Charles Greer Conservation Area							
		Accession	**Field**			**Percent**		
Item	**Common Name Zone #**	**No.**	**No.**	**Plot Size**	**Disc.**	**Stand**	**Date Planted**	**Clean Seed**
				sq. ft. or	no. of			Bulk/no test
				ft X ft.	plants			in pounds
1	Largeleaf wild indigo 1				620		5/01	
2	largeleaf wild indigo 2				520		5/01	
3	Creamy longbract wild indigo 1				130		5/01	
4	Creamy longbract wild indigo 2				150		6/01	
5	White prairie clover 1			7x90	0		6/01	
6	White prairie clover 2				400		6/01	
7	Purple prairie clover 1			7x135	900		6/01	
8	Purple prairie clover 2				400		6/01	
9	Tall tickseed			7x250	1200	95	5/01	
10	Roundhead bush clover				500		5/01	
11	Rough blazing star			7x200	1400		6/01	
12	Horsemint 1			7x180	1400	100	5/01	
13	Horsemint 2			7x180	1200	100	6/01	
14	Grahead coneflower			7/220	1020	100	6/01	

Releases from the Elsberry Plant Materials Center

Scientific Name	Release Name	Common Name	Accession Number	Cooperating Agency(ies)	Type of Release	Year of Release
Elymus virginicus L.	Northern MO	Virginia wild rye	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. compositus	Northern MO	tall dropseed	9079040	MOPMC, MDC, NAS	N	2001
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 coneflower	9068611	MOPMC, MDC, NAS	N	2001
Echinacea pallida	Western MO	pale purple coneflower	9068612	MOPMC, MDc, NAS	N	2001

Cooperating Agencies: MOPMC=Missouri Plant Materials; 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: 29I143G

Study Title: Seed Coating/Seeding Rates Study

Study Leader: Bruckerhoff, S. B.

Introduction:

There is little information available comparing coated seed, versus non-coated seed, and various seeding rates of commonly used forage species used in the Midwest region. Studies done have been short lived (one or two years) and have looked only at emergence, plants at the end of the seedling year, or plants at the end of the first year following seeding.

Evaluations will be made on emergence, stems at the end of the seeding year, and stems at the end of the first through the fourth year following planting. The study will be repeated for five consecutive planting seasons to compensate for changes in yearly weather patterns.

Problem:

There is a need to compare coated seed to non-coated seed for selected legumes to determine if a significant difference exists. Disagreement of seeding rates between coated versus non-coated legume seed is quite common. The results of this study could improve on the seeding rate recommendations for legume species being tested.

Can seeding rates of selected legumes and forage grasses be reduced to one-half the current rate or increase to one and a half times the current rate and provide similar results in long term stand density. Selected grass/legume species will be monitored for the emergence date, emergence density, and stand density.

Objective:

The objectives of this project is to determine if a significant difference exists between coated versus non-coated seed of selected legume species and determine if the seeding rates of selected legume and forage grasses can be reduced or increased from current rates and provide the same results in stand density.

Location:

Selected field on the Freeman Farm at Lincoln University, Jefferson City, Missouri.

A. Description: Township 44N, Range 10N, and Section 19

B. MLRA: 115

C. Soils: Grable silt loam

Procedure:

A. Assembly of Materials:

1. A list of species to be tested was developed and approved by cooperators. (See Table #1)
2. Species that were coated, both coated and uncoated lots, were provided by Seedbiotics and CelPril. Grass seed and other non-coated species were provide by USDA-Natural Resources Conservation Service, Plant Materials Center. (See Table #1)

B. Planting Plan:

1. Plot Design: Randomized split plot design with four replications. (See Table #2 and #3) This study is planned to last a total of ten years.

2. Plot size: (See Table #3)

   a. Length: 20 feet; 20' between reps.
   b. Width: 15 feet; 21 rows: 30' between blocks
   c. Redtop and tall fescue between blocks.

3. Seeding Method and Rate: (See Table #4)

   The plots will be seeded with a plot seeder. Seeding rates will be .5, 1.0, and 1.5 X those listed in the current Pasture and Hay-land Planting Specifications, NRCS MOFOTG, March, 1997.

4. Dates of Establishment:

Plots #1 - #13 (Legume Plots) Planted	5/5/98	4/13/99	4/19/00
Plots #14-#19 (Cool Season Grass Plots)	4/23/98	4/13/99	4/20/00
Plot #20 (Untr / GT* Eastern Gama Plot)	3/26/98	4/21/99	4/27/00
Plot #21 (Wet Tr Eastern Gama Plot)	4/23/98	4/21/99	4/27/00
Plots #22&#23 (Warm Season Grass Plots)	5/5/98	4/21/99	4/27/00

- * Plot #20 was a dormant planting using untreated seed in 1998.
- Germtech treated seed was used in 1999 and 2000.

C. Evaluation Measurement:

1. Climatic Data: The data from the nearest weather station will be used to report precipitation and temperatures. (See Table # 7)

2. Measurements: 1998-2002 (See Tables # 5 & # 6)

   a. Emergence dates; when 25 plants have emerged.
   b. Emergence density; conduct emergent density counts by counting the number of plants/foot of row, three counts/plot X number of plots, 3 weeks after planting for legumes, 4 weeks after planting for cool season grasses and 5 weeks after planting for warm season grasses.
   c. Stem counts; conduct stem counts as same procedure using plants/foot of row, 3 counts/ plot X plots at the end of their first, second, third, fourth, and fifth growing seasons (for the three seeding rates and coated versus non-coated seed).

Cooperators:

The following is a listing of cooperators involved with this study: Lincoln University, Jefferson City, Missouri; Seedbiotics, CelPril, and USDA-Natural Resources Conservation Service, Plant Materials Center, Elsberry, Missouri.

Discussion:

1998

Signatures of all cooperators with the study were received by March of 1998. Seed lots were received for accessions to be planted and new seed tests were secured when necessary.

This study was seeded with a cone type plot planter for all species except eastern gamagrass that was planted with a corn planter using soybean seedcups. Due to a planter malfunction, the legume plots were replanted in the YEAR TWO block and the warm season plots are planted partially in the YEAR ONE block and YEAR TWO block (see Table #2).

The study consists of two comparisons, coated verses non coated seed, and three different seeding rates.

The comparison of coated verses non-coated seed was done by planting equal bulk rates. For example, if a bag of seed has a test of 95% purity and 90% germination, it is 85.5% pure live seed (PLS). If you want to plant 10# PLS per acre you need to plant 11.7# (10 / .855) BULK. A 50# bag of seed with this test has 95% (47.5#) seed and 5% (2.5#) other (dirt, chaff, weed seed, etc.). The 95% seed has a germination of 90% so the seed portion contains 42.75# Pure Live Seed (PLS) and 4.75# non viable seed.

When seed is coated, the coating generally accounts for 25 to 40 percent of the weight according to the seed industry that coats seed. If the above bag of seed was coated and 30% of the total weight was coating, the composition of the coated and uncoated seed would be as follows:

	Coating	Pure Live Seed	Non-viable Seed	Other (Dirt, etc.)
50# coated seed	15# (30%)	29.9# (59.8%)	3.3#	1.8#
50# uncoated seed	0#	42.75# (85.5%)	4.75#	2.5#

When coating is added to seed, the amount of pure live seed goes down and that weight is replaced by coating. This coating is comprised of compounds that are designed to aid in seed germination and seedling development. Discussion from the seed industry suggests that coated seed is equal to or more beneficial than the loss of pure live seed. In a situation where 10.0# PLS is recommended, using the above test of 85.5% PLS, a bulk seeding rate of 11.7# of seed is required. To get 10.0# PLS of the above coated seed you would need 16.7#. The objective of this part of the study is to determine if 11.7# of the coated seed is equal to or better than 11.7# of the uncoated seed.

This study compared bulk weights of coated and uncoated seed. Using the above rates and seed tests, the comparison is as follows:

Uncoated seed 11.7# Bulk Rate containing 10.0# Pure Live Seed

Compared to:

Coated seed 11.7# Bulk Rate containing 7.0# Pure Live Seed and 3.5# coating

The seeding rate portion of the study uses a split plot design (see Table #3) to compare different rates of all species in the study including both the coated and uncoated seed. Seeding rates were calculated as both pounds per acre and pure live seeds per square foot. Seed size and seeding rates vary considerably between species (see Table #4). Pure live seed per square foot is not calculated for coated seed because the exact percentage of coating is not known. It is generally about one third. Measurements of emergence density and cover density were done on a row foot basis rather than square foot because the plots were seeded in rows rather than broadcast. Seeding rates can be converted from pure live seed per square foot (100 sq. ft per plot) to row foot (140 row foot per plot) by using a conversion factor of .714 to determine how many seeds it took in correlation to the emergence and cover density evaluations.

Weed control on the plots became somewhat of a problem by mid season due to wet weather. The ladino seed had an incorrect test so both coated and uncoated plots only had about a third of the intended rate but the ratios stayed the same.

The 1998 data from the legume plots indicate most of the coated plots were about the same or slightly better than the uncoated at the lower (.5 full rate) and full seeding rates. The higher seeding rate(1.5 X full rate) had about the same or slightly lower emergence density. It also varied between species. Treated seed of the eastern gamagrass showed a considerable increase over untreated seed.

Differences in the seeding rates was also quite evident in the data but not always as much as expected. The 1.5 seeding rate was not always a lot better than the half rate. This indicates the amount of seed may not be the problem of a week stand.

1999

Data taken in 1998 and 1999 is averaged in Tables #5 and #6. The data showed a significant difference between coated and uncoated for 1999 emergence density that is an important criterion. Coated alfalfa is equal or slightly better at standard rates. Red clover is better at the lower rates but the other rates vary both ways. Coating did not show improvement for birdsfoot trefoil and in some cases was a disadvantage. Coated ladino clover seed was not equal to uncoated and in some cases was a disadvantage. The summary did not show any significant difference between coated and uncoated seed in 1998 indicating that for this year the coating was just as good as having the additional seed.

2000

This study was designed for plots to be established for five consecutive years. Local weather patterns are quite variable from year to year and 1998 through 2000 were no exceptions (See Table #7). 1998 was dryer than average in the spring, was well above average during June and July and barely rained at all in August. Weed control became a problem during the summer. 1999 was about the opposite, starting out wetter than average causing ponding on some of the plots and then becoming very dry during the summer. Year 2000 started out extremely dry with the drought of 1999 continuing through April 2000. April 2000 was one of the driest April's on record at 0.84" precipitation. The rest of the growing season in 2000 was wet.

Data for each year was averaged and can be found in Tables #5 and #6.

Table #5 is spring evaluations that are three-year averages of the following evaluation criteria.

1. Days to Emerge: This is the number of days it took for 25 seedlings to emerge in each plot.
2. Emergence Density: This is a count of how many plants per row foot emerged three weeks after planting for legumes, four weeks after planting for cool season grasses, and five weeks after planting for warm season grasses.
3. Percent Stand: This is a visual rating of the percent of the plot that has complete rows of plants and is done at the same time as emergence density.

Table #6 is fall evaluations that are averages of the following evaluation criteria.

4. Cover Density: This is a count of stems per row foot done at the end of the growing season.
5. Percent Cover: This is a visual rating of the percent of the plot that has groundcover from the planted species.

SUMMARY

The following summary will note differences and relative indifferences between coated and uncoated seed and also seeding rates for each individual species. Differences between species will not be compared.

Alfalfa

(1) Days to Emerge - There was no advantage or disadvantage of coated seed or the different seeding rates.

(2) Emergence Density - The coated seed was less than the uncoated. The higher seeding rate did not always result in many more plants with the coated seed. Higher seeding rates with uncoated seed resulted in more plants but not in proportion to the amount of extra seed planted.

(3) Percent Stand - Percent stand was about equal for the uncoated and Celpril coated but the Seed Biotics was less. Percent stand increased with increase in seeding rate for both the coated and uncoated.

(4) Cover Density - Stems per row foot was less at the end of the first year for the coated seed. By the end of the second year there was very little difference between coated and uncoated except the full standard rate Seed Biotics which was considerably higher. By the end of the third year, there was little difference between the uncoated and the Celpril coated and the Seed Biotics coated was slightly higher. Cover density increased with an increased seeding rate at the end of the first year, but showed no difference by the end of the second year.

(5) Percent Cover - Percent cover was about the same for the uncoated and Seed Biotics coated but Celpril coated was less. The differences became less the second year after planting. The differences in the seeding rates are inconsistent.

Overall the data shows no clear advantage or disadvantage for coated seed after the establishment year. Coated seed plots were thinner the establishment year. The higher seeding rates only showed an advantage the first year.

Red Clover

(1) Days to Emerge - There was no advantage or disadvantage of coated seed or the different seeding rates.

(2) Emergence Density - The Celpril coated seed was about equal to the uncoated but the Seed Biotics coated seed was less. The higher seeding rates did produce more plants but not close in proportion to the extra seed.

(3) Percent Stand - Seed Biotics coated seed was less than the uncoated at all rates and Celpril coated seed was less only at the standard rate. There was no increase when the seeding rate increased from full standard rate to 1.5 rate except the Celpril coated seed, which had no increase from the half rate to the full rate.

(4) Cover Density - Cover density of the coated seed plots at the end of the establishment year was less than the uncoated plots except for the high rate Celpril. By the end of the second year, the coated plots at all seeding rates were less than the uncoated. The higher seeding rates produced more stems per row foot the year of establishment but by the second year, only the uncoated seed indicated an advantage to having more seed.

(5) Percent cover - The uncoated seed provided higher percent cover than the coated except at the highest rate which was about the same. By the end of the second year, the differences were less. Percent cover was not consistently higher with higher seeding rates.

Overall the data indicates the uncoated seed did better than the coated. By the end of the second year, the only advantage to higher seeding rates was with uncoated seed.

Birdsfoot trefoil

(1) Days to Emerge - There was no advantage or disadvantage of coated seed or the different seeding rates.

(2) Emergence Density - Emergence densities were lower for coated seed compared to uncoated except the Seed Biotics coated at the standard rate. Higher seeding rates did result in more plants but not in proportion to the extra seed planted.

(3) Percent Stand - The uncoated and Celpril plots were similar and somewhat higher than the Seed Biotics plots. There was usually only a small increase in percent stand with each increase in seeding rates.

(4) Cover Density - At the end of the establishment year cover density was higher for the uncoated seed. By the end of the second year there was very little difference between the coated and uncoated for the low and full rates. The uncoated was a little higher in the high rate. Increases in cover density was apparent when seeding rates went from low to full. There was very little difference and sometimes a slightly negative response when seeding rates went from the full rate to the high rate.

(5) Percent Cover - At the end of the establishment year there was very little difference between the uncoated and Celpril coated seed. Seed Biotics seed was less. By the end of the second year the Celpril plots were better than the uncoated at the full and high rates. The Celpril

high rate plot increased to equal the uncoated. There was only a small increase in percent cover with increased seeding rates in comparison to the extra seed.

Overall the data indicates the uncoated seed did better the establishment year but by the end of the second year there was very little difference between the uncoated and the Celpril coated. The Seed Biotics coated did not do as well. Response to higher seeding rates was minimal in comparison to the extra seed.

Ladino clover

(1) Days to Emerge - There was no advantage or disadvantage of coated seed or the different seeding rates.

(2) Emergence Density - The coated seed was less than the uncoated. Higher seeding rates resulted in more plants but not close to the same increase as the increased seed applied.

(3) Percent Stand - Seed Biotics coated seed was higher at the full and high rates than the uncoated and Celpril coated. There was good response between the half rate to the full rate and no response between the full rate and the high rate for the uncoated and the Seed Biotics coated. Celpril had more response between the half rate and the full rate.

(4) Cover Density - The uncoated seed had higher cover density at the end of the first year. By the end of the second year the coated seed had higher cover density than the uncoated at the half rate and high rate but not at the standard full rate. Cover density in general had an increase as seeding rates increased but was very small in comparison to the amount of extra seed.

(5) Percent Cover - The uncoated seed was higher than the coated seed at the end of the first year. By the end of the second year there was very little difference. Their was slight to moderate increase in percent cover with the increase in seeding rates at the end of the first year. By the end of the second year there was no difference between seeding rates.

Overall the data does not indicate an advantage or disadvantage to coated seed by the end of the second year. Uncoated seed rates were higher at the end of the first year. By the end of the second year, there was little difference between seeding rates.

Annual Lespedeza

(1) Days to Emerge - There was little difference between seeding rates.

(2) Emergence Density - Emergence density was low for all rates when compared to the amount of seed planted. The response from the half rate to the full standard rate was much greater than the response from the full standard rate to the high rate.

(3) Percent Stand - There was a slight increase with increased seeding rates.

(4) Cover Density - Cover Density was extremely low for all seeding rates.

(5) Percent Cover - Percent Cover was extremely low for all seeding rates and lowest for the standard full rate.

Overall the data indicates the amount of seed was not the problem with stand establishment but with other unknown factors.

Tall Fescue

(1) Days to Emerge - The endophyte infected variety emerged approximately two days sooner than Endophyte free varieties.

(2) Emergence Density - The endophyte infected variety had much higher emergence density than the endophyte free varieties. Emergence density increased considerably between the low and standard rates but not nearly as much between the full standard rate and the high rate.

(3) Percent Stand - The endophyte infected was extremely higher than the endophyte free. The difference in seeding rates was not very evident.

(4) Cover Density - Cover density was extremely greater for the endophyte infected variety than the endophyte free variety. The different seeding rates resulted in little difference in cover density in the first or second years.

(5) Percent Cover - The endophyte infected was extremely higher than the endophyte free. There was little difference between seeding rates at the end of the establishment year and none after the second year.

Overall the endophyte infected variety established much better and developed into an excellent stand and the endophyte free varieties did not. The difference in seeding rates was not very evident after the first year.

Orchardgrass

(1) Days to Emerge - There was little difference between seeding rates.

(2) Emergence Density - Emergence density increased along with seeding rates but at a slower rate.

(3) Percent Stand - There was no difference in percent stand between the low and standard full rate and a slight increase in the high rate.

(4) Cover Density - There was a small increase from the low to full standard to high rates the first year. By the end of the second year there was no difference between the low and standard rates and a small decline in the high rate.

(5) Percent Cover - The percent cover data showed small increases as the rates increased at the end of the first and second years.

Overall the data indicates small differences between seeding rates. Even at the high seeding rate, the stand was not filled in a lot more than the low rate.

Smooth Brome

(1) Days to Emerge - There was no difference between seeding rates.

(2) Emergence Density - There was very little difference between the three seeding rates.

(3) Percent Stand - There was moderate increases with increased seeding rates.

(4) Cover Density - There was little difference between the low and full standard rates and more of an increase between the full standard and high rate the end of the first year. By the end of the second year there was little difference between rates.

(5) Percent Cover - Percent cover was low at the end of the first year with very little difference between rates. By the end of the second year the percent cover was high but still very little difference between seeding rates.

Overall the data indicates very little difference between seeding rates.

Timothy

(1) Days to Emerge - The lower seeding rate plots took longer to emerge.

(2) Emergence Density - There was a small increase between the low and standard full rate and a larger increase between the standard full and high rate.

(3) Percent Stand - There was very small increases in proportion to the increase of seed.

(4) Cover Density -There was almost no difference between seeding rates the year of establishment but cover density increased along with seeding rates the year after planting.

(5) Percent Cover - There was no difference between low and standard full rate and a small increase between standard full and high rate for the end of the year of planting. By the end of the second year the trends were similar only much less. This species is decreasing at all rates.

Overall the data indicates the seeding rate is not the problem with poor stands.

Canada Wildrye

(1) Days to Emerge - There was no difference between the different seeding rates.

(2) Emergence Density - There is a large difference between the low and standard full seeding rates. There is little difference between the standard full and the high rate.

(3) Percent Stand - There is twice the difference between the low and standard full rate as there is between the standard full and the high rate.

(4) Cover Density - There was very little difference between rates at the end of the first year. By the end of the second year there was a considerable difference between the low and standard rates but little difference between the standard and high rates.

(5) Percent Cover - Percent cover increased along with seeding rates but much more between the low and standard than the standard and high for both the first and second years..

Overall the data indicates that additional seed above the standard seeding rate did not improve the stand very much.

Eastern Gamagrass

(1) Days to Emerge - Plot 21 was wet treated stratification. Plot 20 was a dormant untreated planting in 1998 and Germtech treated seed was used in 1999 and 2000. Emergence was consistant between rates but quite variable between years. The Germtech seed came up quicker in 1999 but could not be found in 2000.

(2) Emergence Density - Emergence density was similar for Germtech and wet treated seed and higher than the one year data for the untreated dormant planting. There was very little difference between seeding rates.

(3) Percent Stand - The three year average of the wet treated for percent stand was higher than the two year average for the Germtech. The one year data for the untreated dormant was higher than the averages for either treated but lower when compared to the same one year data for the wet treated.

(4) Cover Density - Cover density at the end of the first year averaged about the same for the treated seed except for the standard full rate wet treated which was higher. Treated seed averaged higher than the one year data for the untreated dormant planting. By the second year the high rate Germtech was better and the standard rate wet treated was better.

(5) Percent Cover - At the end of the first year, percent cover is highest for the wet treated seed. By the end of the second year, the one year data for the dormant planting is higher than the Germtech or the two year average of the wet treated, but the dormant planting is lower when just compared to the same year planting data for the wet treated. Seeding rates show little advantage to the higher rates and some disadvantage to the lower rates.

Overall the data is quite variable when comparing one year's data of a dormant seeded planting to two years data of Germtech seed to three years data of wet treated seed. The wet treated seed is doing somewhat better.

Switchgrass

(1) Days to Emerge - There was no difference between the different seeding rates.

(2) Emergence Density - The three year average of emergence density increased as the seeding rates increased.

(3) Percent Stand - There was no difference in percent stand for the different seeding rates.

(4) Cover Density - There was very little difference between seeding rates for the three year average at the end of the establishment year. By the end of the second and third years, the higher seeding rates actually produced fewer stems.

(5) Percent Cover - there is a difference between the half rate and the full standard rate at the end of the first second and third years. There is very little difference between the full standard and high rate.

Overall the data indicates there is a difference between rates the first year during emergence. There continued to be a difference between the low and standard full rates during October evaluations but not between the standard full rate and the high rate. Seeding above the Standard full rate indicated no benefit.

Caucasian Bluestem

(1) Days to Emerge - There was no difference between different seeding rates.

(2) Emergence Density - There was no difference between the low rate and standard full rate for the three year average. The high rate had a large increase in comparison to the other rates.

(3) Percent Stand - Percent stand was highest at the low rate and the standard full rate and high rate was the same.

(4) Cover Density - There was not large differences between rates.

(5) Percent Cover - Percent cover was similar for the three seeding rates. The biggest difference was between the low and full standard rates at the end of the first year.

Overall the data does not indicate a consistent trend at this time.

Big Bluestem

Big bluestem was only planted two years.

(1) Days to Emerge - There was no difference in the seeding rates.

(2) Emergence Density - There was a large difference between rates and the standard full rate was the highest.

(3) Percent Stand - The standard full rate was the highest although all were low.

(4) Cover Density - Stems per row foot increased slightly with increased seeding rates at the end of the first year. At the end of the second year the results were mixed.

(5) Percent Cover - There was not a big difference in percent cover for the different seeding rates at the end of the first year. The standard full rate was somewhat higher. By the end of the second year the standard full rate was lower.

Overall the data does not indicates a consistent trend at this time.

2001

No additional plantings were made in 2001. The plots planted in 1999 and 2000 were evaluated for cover density (stems/row foot) and percent cover (visual observation).

Study 29I143G – Seed Coat/Seeding Rates Study			**Table #1**
List of Species Evaluated			
Genus	**Species**	**Common Name**	**Standard Full Seed Rate (MOFOTG March 1997)**
Medicago	*sativa*	Alfalfa	9.4# PLS/Ac
Trifolium	*pratense*	Red clover	7.6# PLS/Ac
Lotus	*corniculatus*	Birdsfoot trefoil	6.2# PLS/Ac
Lespedeza		Lespedeza (annual)	9.5# PLS/Ac
Trifolium	*repens*	Ladino clover	3.7# PLS/Ac
Festuca	*arundinacea*	Tall fesuce	12.0# PLS/Ac
Dactylus	*glomerata*	Orchardgrass	5.2# PLS/Ac
Bromus	*inermus*	Smooth bromegrass	10.0# PLS/Ac
Phyleum	*pratense*	Timothy	3.9# PLS/Ac
Elymus	*canadensis*	Canada wildrye	10.0# PLS/Ac
Tripsacum	*dactyloides*	Eastern gamagrass	10.0# PLS/Ac
Panicum	*virgatum*	Switchgrass	5.9# PLS/Ac
Bothriochloa	*ischaemun*	Caucasian bluestem	3.1# PLS/Ac
Andropogon	*gerardii*	Big bluestem	10.0# PLS/Ac

	STUDY 29I143G		**PLOT LAYOUT**	**PLOT SIZE 15' X 20'**			**Table #2**
		----- county road ------		SUB-PLOT SIZE 5' X 20'			
		30'		445'			
	30'	REP 1 LEGUMES	20'	COOL S. G	20'	WARM S. G	30'
		20'					
		REP 2 LEGUMES		COOL S. G		WARM S. G	
200'		20' YEAR	**ONE**				
		REP 3 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 4 LEGUMES		COOL S. G		WARM S. G	
		30'					
		REP 1 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 2 LEGUMES		COOL S. G		WARM S. G	
170'		20' YEAR	**TWO**				
		REP 3 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 4 LEGUMES		COOL S. G		WARM S. G	
880'		30'					
←	North	REP 1 LEGUMES		COOL S. G		WARM S. G	South →
		20'					
		REP 2 LEGUMES		COOL S. G		WARM S. G	
170'		20' YEAR	**THREE**				
		REP 3 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 4 LEGUMES		COOL S. G		WARM S. G	
		30'					
		REP 1 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 2 LEGUMES		COOL S. G		WARM S. G	
170'		20' YEAR	**FOUR**				
		REP 3 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 4 LEGUMES		COOL S.G		WARM S. G	
		30'					
		REP 1 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 2 LEGUMES		COOL S. G		WARM S. G	
170'		20' YEAR	**FIVE**				
		REP 3 LEGUMES		COOL S. G		WARM S. G	
		20'					
		REP 4 LEGUMES		COOL S.G		WARM S. G	
		30'		* S.G. = SEASON GRASSES			

STUDY 29I143G - SEED COAT/SEEDING RATES STUDY **Table # 3**

LEGUMES planted 5/5/98

Y E A R # 1

R E P # 1

P#		4			10			7			1			11			2			9			5			13			8			3			12			6	
S#	2	3	1	2	1	3	2	1	3	2	1	3	3	1	2	3	2	1	2	1	3	1	3	2	1	3	2	2	1	3	3	2	1	2	1	3	3	2	1

R E P # 2

P#		2			7			13			8			4			1			11			3			6			12			5			9			10	
S#	1	3	2	3	2	1	1	3	2	1	2	3	3	1	2	1	2	3	2	1	3	2	1	3	1	2	3	3	2	1	2	1	3	3	2	1	3	1	2

R E P # 3

P#		9			12			8			3			10			2			13			7			4			11			5			1			6	
S#	1	3	2	2	1	3	3	1	2	3	1	2	1	2	3	3	2	1	3	2	1	3	2	1	1	2	3	1	3	2	1	3	2	1	2	3	2	1	3

R E P # 4

P#		1			10			9			2			13			6			7			11			8			4			5			12			3	
S#	1	3	2	3	1	2	1	2	3	3	2	1	2	1	3	1	2	3	3	2	1	1	2	3	1	2	3	1	3	2	3	1	2	1	3	2	1	3	2

P# is Plot Number
S# is SubPlot Number

Plot Size = 5' x 20'
Subplot Size = 15' x 20'

Study 29I143G - Seed Coat/Seeding Rates Study **Table # 3 - continued**

COOL SEASON GRASSES — **Y E A R # 1**

WARM SEASON GRASSES — **Y E A R # 1 & 2**

REP # 1																														
P #		16			18			14			17			15			19			23			21			22			20	
																				99			98			99			98	
S #	2	1	3	2	1	3	1	2	3	2	3	1	3	2	1	3	1	2	3	1	2	3	2	1	1	3	2	3	1	2
	planted 4/23/98																				planted 5/5/98 and 4/21/99									
REP # 2																														
P #		16			18			17			14			19			15			21			20			23			22	
																				98			98			99			99	
S #	3	2	1	1	2	3	3	1	2	1	2	3	3	1	2	3	2	1	3	1	2	3	2	1	3	2	1	2	3	1
REP # 3																														
P #		16			19			17			18			14			15			20			22			21			23	
																				98			99			98			99	
S #	2	1	3	3	1	2	2	3	1	1	2	3	2	1	3	2	1	3	2	3	1	1	3	2	2	1	3	3	2	1
REP # 4																														
P #		19			15			17			18			16			14			20			22			21			23	
																				98			99			98			99	
S #	3	2	1	2	1	3	2	1	3	3	1	2	3	1	2	1	3	2	2	3	1	1	2	3	2	1	3	3	2	1

P # is Plot Number
S # is SubPlot Number

Plot Size = 5' x 20'
Subplot Size = 15' x 20'

STUDY 29I143G - SEED COAT/SEEDING RATES STUDY **Table # 3 - continued**

LEGUMES Planted 4/13/99

Y E A R # 2

R E P # 1

P#	5	11	2	4	13	10	8	12	6	1	7	9	3
S#	2 3 1	2 1 3	2 1 3	2 1 3	3 1 2	3 2 1	2 1 3	1 3 2	1 3 2	2 1 3	3 2 1	2 1 3	3 2 1

R E P # 2

P#	12	6	10	5	3	1	9	7	2	13	11	8	4
S#	1 3 2	3 2 1	1 3 2	1 2 3	3 1 2	1 2 3	2 1 3	2 1 3	1 2 3	3 2 1	2 1 3	3 2 1	3 1 2

R E P # 3

P#	6	4	13	1	7	9	5	11	8	12	3	10	2
S#	1 3 2	2 1 3	3 1 2	3 1 2	1 2 3	3 2 1	3 2 1	3 2 1	1 2 3	1 3 2	1 3 2	1 2 3	2 1 3

R E P # 4

P#	10	3	7	12	5	2	1	9	4	6	8	11	13
S#	1 3 2	3 1 2	1 2 3	3 2 1	2 1 3	1 2 3	3 2 1	1 2 3	1 2 3	1 3 2	3 1 2	1 3 2	1 3 2

P# is Plot Number
S# is SubPlot Number

Plot Size = 5' x 20'
Subplot Size = 15' x 20'

STUDY 29I143G - SEED COAT/SEEDING RATES STUDY **Table # 3 - continued**

COOL SEASON GRASSES planted 4/13/99

Y E A R # 2

R E P # 1						
P #	17	14	19	15	18	16
S #	2 1 3	2 1 3	1 2 3	2 3 1	3 2 1	3 1 2
R E P # 2						
P #	19	15	18	14	17	16
S #	3 2 1	1 2 3	3 1 2	1 2 3	3 1 2	3 2 1
R E P # 3						
P #	15	19	16	17	18	14
S #	2 1 3	3 1 2	2 3 1	1 2 3	2 1 3	2 1 3
R E P # 4						
P #	18	16	15	19	14	17
S #	3 2 1	2 1 3	2 1 3	3 1 2	3 1 2	1 3 2

WARM SEASON GRASSES planted 4/21/99 and 5/5/98

Y E A R # 1 & 2

R E P # 1					
P #	23	21	22	24	20
	98	99	98	99	99
S #	3 1 2	3 2 1	1 3 2	3 1 2	2 1 3
R E P # 2					
P #	24	20	23	22	21
	99	99	98	98	99
S #	3 1 2	3 2 1	3 2 1	2 3 1	1 3 2
R E P # 3					
P #	20	22	21	23	24
	99	98	99	98	99
S #	2 3 1	1 3 2	2 1 3	3 2 1	3 1 2
R E P # 4					
P #	24	22	21	23	20
	99	98	99	98	99
S #	2 3 1	1 2 3	2 1 3	3 2 1	1 2 3

P # is Plot Number
S # is SubPlot Number

Plot Size = 5' x 20'
Subplot Size = 15' x 20'

Study 29I143G - Seed Coat/Seeding Rates Study				Table #4
Plot Number	**Sub Plot Number**	**Forage - Seeds per LB - full seeding rate \4**	**Sub Plot Seeding Rates**	**PLS/square foot**
1	1	Alfalfa 200,000 seeds/lb	.5 rate	21.6 PLS / Square foot
"	2	Alfalfa 9.4# / ac	1.0 rate	43.2 PLS / Square foot
"	3	Alfalfa	1.5 rate	64.8 PLS / Square foot
2	1	Alfalfa (Cel-coated) \1	.5 rate	\3
"	2	Alfalfa (Cel-coated)	1.0 rate	\3
"	3	Alfalfa (Cel-coated)	1.5 rate	\3
3	1	Alfalfa (S.B.-coated) \2	.5 rate	\3
"	2	Alfalfa (S.B.-coated)	1.0 rate	\3
"	3	Alfalfa (S.B.-coated)	1.5 rate	\3
4	1	Red clover 275,000 seeds/lb	.5 rate	24.0 PLS / Square foot
"	2	Red clover 7.6# / ac	1.0 rate	48.0 PLS / Square foot
"	3	Red clover	1.5 rate	72.0 PLS / Square foot
5	1	Red clover (Cel-coated)	.5 rate	\3
"	2	Red clover (Cel-coated)	1.0 rate	\3
"	3	Red clover (Cel-coated)	1.5 rate	\3
6	1	Red clover (S.B.-coated)	.5 rate	\3
"	2	Red clover (S.B.-coated)	1.0 rate	\3
"	3	Red clover (S.B.-coated)	1.5 rate	\3
7	1	Birdsfoot trefoil 75,000 seeds/lb	.5 rate	26.7 PLS / Square foot
"	2	Birdsfoot trefoil 6.2# / ac	1.0 rate	53.4 PLS / Square foot
"	3	Birdsfoot trefoil	1.5 rate	80.1 PLS / Square foot
8	1	Birdsfoot trefoil (Cel-coated)	.5 rate	\3
"	2	Birdsfoot trefoil (Cel-coated)	1.0 rate	\3
"	3	Birdsfoot trefoil (Cel-coated)	1.5 rate	\3
9	1	Birdsfoot trefoil (S.B.-coated)	.5 rate	\3
"	2	Birdsfoot trefoil (S.B.-coated)	1.0 rate	\3
"	3	Birdsfoot trefoil (S.B.-coated)	1.5 rate	\3
10	1	Ladino clover 871,650 seeds/lb	.5 rate	37.0 PLS / Square foot
"	2	Ladino clover 3.7# PLS/Ac	1.0 rate	74.0 PLS / Square foot
"	3	Ladino clover	1.5 rate	111.1 PLS /Square foot

\1 CelPril coated
\2 Seed Biotics coated
\3 See discussion 1998
\4 Rates as per NRCS MOFOTG March 1997

Study 29I143G - Seed Coat/Seeding Rates Study				Table #4 - continued
Plot Number	**Sub Plot Number**	**Forage - Seeds per LB - full seeding rate \4**	**Sub Plot Seeding Rates**	**PLS/square foot**
11	1	Ladino clover (Cel-coated)	.5 rate	\3
"	2	Ladino clover (Cel-coated)	1.0 rate	\3
"	3	Ladino clover (Cel-coated)	1.5 rate	\3
12	1	Ladino clover (S.B.-coated)	.5 rate	\3
"	2	Ladino clover (S.B.-coated)	1.0 rate	\3
"	3	Ladino Clover (S.B.-coated)	1.5 rate	\3
13	1	Lespedeza (annual)	.5 rate	22.6 PLS / Square foot
"	2	Lespedeza (annual) 9.5# PLS / Ac	1.0 rate	45.3 PLS / Square foot
"	3	Lespedeza (annual)	1.5 rate	67.9 PLS / Square foot
14	1	Tall fescue(end. inf.) 227,000 seeds/lb	.5 rate	31.3 PLS / Square foot
"	2	Tall fescue(end. inf)12.0# PLS / Ac	1.0 rate	62.5 PLS / Square foot
"	3	Tall fescue (endophyte infested)	1.5 rate	93.8 PLS / Square foot
15	1	Tall fescue (endophyte free)	.5 rate	31.3 PLS / Square foot
"	2	Tall fescue (endophyte free)	1.0 rate	62.5 PLS / Square foot
"	3	Tall fescue (endophyte free)	1.5 rate	93.8 PLS / Square foot
16	1	Orchardgrass 654,000 seeds/lb	.5 rate	39.0 PLS / Square foot
"	2	Orchardgrass 5.2# PLS / Ac	1.0 rate	78.1 PLS / Square foot
"	3	Orchardgrass	1.5 rate	117.1 PLS /Square foot
17	1	Smooth bromegrass 136,000 seeds/lb	.5 rate	15.6 PLS / Square foot
"	2	Smooth bromegrass 10.0# PLS / Ac	1.0 rate	31.2 PLS / Square foot
"	3	Smooth bromegrass	1.5 rate	46.8 PLS / Square foot
18	1	Timothy 1,300,000 seeds/lb	.5 rate	58.2 PLS / Square foot
"	2	Timothy 3.9# PLS / Ac	1.0 rate	116.4 PLS /Square foot
"	3	Timothy	1.5 rate	174.6 PLS /Square foot
19	1	Canada wildrye 115,000 seeds/lb	.5 rate	13.2 PLS / Square foot
"	2	Canada wildrye 0.0# PLS / Ac	1.0 rate	26.4 PLS / Square foot
"	3	Canada wildrye	1.5 rate	39.6 PLS / Square foot
20	1	Eastern gamagrass (d. tr)	.5 rate	0.9 PLS / Square foot
		7,500 seeds/lb		
"	2	Eastern gamagrass (d. tr)	1.0 rate	1.7 PLS / Square foot
		10.0 # PLS seeds/ac		
"	3	Eastern gamagrass (drytreated)	1.5 rate	2.6 PLS / Square foot

\1 CelPril coated
\2 Seed Biotics coated
\3 See discussion 1998
\4 Rates as per NRCS MOFOTG March 1997

Study 29I143G - Seed Coat/Seeding Rates Study				Table #4-continued
Plot	Sub Plot	Forage - Seeds per LB	Sub Plot Seeding	
Number	Number	- full seeding rate \4	Rates	PLS/square foot
21	1	Eastern gamagrass (wettreated)	.5 rate	0.9 PLS / Square foot
"	2	Eastern gamagrass (wettreated)	1.0 rate	1.7 PLS / Square foot
"	3	Eastern gamagrass (wettreated)	1.5 rate	2.6 PLS / Square foot
22	1	Switchgrass 389,000 seeds/lb	.5 rate	26.3 PLS / Square foot
"	2	Switchgrass 5.9# PLS / Ac	1.0 rate	52.7 PLS / Square foot
"	3	Switchgrass	1.5 rate	79.0 PLS / Square foot
23	1	Caucasian bluestem	.5 rate	38.1 PLS / Square foot
"	2	Caucasian bluestem 3.1# PLS /	1.0 rate	76.3 PLS / Square foot
"	3	Caucasian bluestem	1.5 rate	114.4 PLS / Square foot
24	1	Big Bluestem 160,000 seeds/lb	.5 rate	18.4 PLS / Square foot
"	2	Big Bluestem 10.0# PLS/Ac	1.0 rate	36.7 PLS / Square foot
"	3	Big Bluestem	1.5 rate	55.1 PLS / Square foot

\1 CelPril coated
\2 Seed Biotics coated
\3 See discussion 1998
\4 Rates as per NRCS MOFOTG March 1997

Study 29I143G - Seed Coat/Seeding Rates Study										Spring Evaluations			Table #5
Plot													
Sub-	Common Name	Days to Emerge *				Emergence Density				Percent Stand **			
plot #	Source					Plants/Row Foot							
Legume Plots #1 - #13		1998	1999	2000	Ave	1998	1999	2000	Ave	1998	1999	2000	Ave
1/1		6.25	9.25	15.50	**10.33**	4.92	22.08	22.83	**16.61**	65.00	73.75	26.25	**55.00**
1/2	Alfalfa	6.25	8.00	14.50	**9.58**	9.84	19.67	30.17	**19.89**	83.75	78.75	27.50	**63.33**
1/3		6.25	9.25	15.00	**10.17**	17.67	25.58	26.16	**23.14**	87.50	84.50	37.50	**69.83**
2/1		6.50	9.25	19.50	**11.75**	6.92	18.34	10.41	**11.89**	47.50	88.75	26.25	**54.17**
2/2	Alfalfa	6.50	8.50	16.75	**10.58**	8.75	22.34	14.66	**15.25**	72.50	92.50	18.75	**61.25**
2/3	Celpril	6.50	9.75	16.75	**11.00**	15.25	22.50	12.16	**16.64**	81.25	93.25	23.75	**66.08**
3/1		6.00	8.50	19.75	**11.42**	4.42	17.83	6.00	**9.42**	62.50	70.00	8.75	**47.08**
3/2	Alfalfa	6.00	8.50	17.50	**10.67**	11.08	32.00	10.00	**17.69**	56.25	87.75	16.25	**53.42**
3/3	Seed Biotics	6.00	9.75	16.75	**10.83**	14.58	23.58	15.75	**17.97**	70.00	88.25	23.75	**60.67**
4/1		7.00	6.00	19.75	**10.92**	4.33	16.83	13.66	**11.61**	55.00	66.25	23.75	**48.33**
4/2	Red Clover	7.00	6.00	16.75	**9.92**	7.09	22.00	18.75	**15.95**	77.50	75.00	40.00	**64.17**
4/3		7.00	7.25	16.75	**10.33**	13.08	15.25	28.16	**18.83**	73.75	75.00	42.50	**63.75**
5/1		7.25	7.25	20.25	**11.58**	5.08	21.75	4.00	**10.28**	47.50	78.75	24.00	**50.08**
5/2	Red Clover	7.25	7.25	16.50	**10.33**	9.84	19.25	12.91	**14.00**	53.75	81.25	23.75	**52.92**
5/3	Celpril	7.25	8.50	16.75	**10.83**	11.50	19.08	18.25	**16.28**	76.25	83.75	26.25	**62.08**
6/1		7.25	8.50	22.50	**12.75**	6.08	19.92	8.17	**11.39**	50.00	63.75	16.50	**43.42**
6/2	Red Clover	7.25	7.25	18.25	**10.92**	9.83	12.17	12.66	**11.55**	58.75	72.00	30.25	**53.67**
6/3	Seed Biotics	7.25	9.75	17.00	**11.33**	11.42	14.92	15.25	**13.86**	70.00	71.25	12.50	**51.25**
7/1		8.50	13.25	21.00	**14.25**	5.50	14.50	10.33	**10.11**	47.50	70.00	15.75	**44.42**
7/2	Birdsfoot trefoil	8.50	11.25	18.75	**12.83**	7.67	21.68	18.42	**15.92**	58.75	68.75	26.50	**51.33**
7/3		8.50	10.50	25.18	**14.73**	10.67	19.50	29.57	**19.91**	77.50	72.50	35.00	**61.67**
8/1		7.75	12.50	22.50	**14.25**	4.17	11.58	7.08	**7.61**	43.75	68.75	31.25	**47.92**
8/2	Birdsfoot trefoil	7.75	12.50	19.50	**13.25**	10.25	8.75	15.08	**11.36**	63.75	68.75	26.25	**52.92**
8/3	Celpril	7.75	12.25	20.00	**13.33**	12.84	11.09	28.33	**17.42**	55.00	68.75	23.00	**48.92**
9/1		8.75	11.75	25.25	**15.25**	5.00	7.17	8.41	**6.86**	46.25	58.75	10.75	**38.58**
9/2	Birdsfoot trefoil	8.75	11.75	21.75	**14.08**	6.67	20.08	17.58	**14.78**	50.00	61.25	14.25	**41.83**
9/3	Seed Biotics	8.75	12.50	18.75	**13.33**	9.58	18.58	19.75	**15.97**	58.75	65.00	17.25	**47.00**
*	Number of days it took, from date planted, for 25 seedlings to emerge in that plot.												
**	Visual rating of percent of plot that has complete rows of plants.												

Study 29I143G - cont.										Spring Evaluations			Table #5
Plot													
Sub-	Common Name	Days to emerge *				Emergence density				Percent Stand **			
plot #	Source					Plants/Row Foot							
		1998	1999	2000	Ave	1998	1999	2000	Ave	1998	1999	2000	Ave
10/1		9.00	11.75	27.25	**16.00**	3.00	25.67	4.41	**11.02**	30.00	58.75	2.25	**30.33**
10/2	Ladino clover	9.00	9.75	21.75	**13.50**	5.09	27.09	14.57	**15.58**	38.75	70.00	10.25	**39.67**
10/3		9.00	9.75	21.00	**13.25**	9.50	28.58	20.33	**19.47**	30.00	72.50	15.25	**39.25**
11/1		8.50	12.00	26.75	**15.75**	2.42	11.08	5.25	**6.25**	17.50	56.25	3.75	**25.83**
11/2	Ladino clover	8.50	9.75	21.50	**13.25**	3.83	11.42	6.91	**7.39**	25.00	58.75	3.00	**28.92**
11/3	Celpril	8.50	9.75	22.75	**13.67**	8.00	20.00	10.33	**12.78**	38.75	66.25	5.50	**36.83**
12/1		9.00	11.75	26.25	**15.67**	4.08	14.33	5.08	**7.83**	20.00	57.50	12.50	**30.00**
12/2	Ladino clover	9.00	11.75	23.00	**14.58**	9.08	19.67	8.83	**12.53**	41.25	70.00	21.25	**44.17**
12/3	Seed Biotics	9.00	12.25	19.25	**13.50**	10.84	24.67	10.58	**15.36**	40.00	70.00	26.25	**45.42**
13/1		8.75	18.00	26.75	**17.83**	5.67	14.67	2.08	**7.47**	33.75	50.00	14.00	**32.58**
13/2	Annual Lespedeza	9.00	14.00	21.50	**14.83**	14.67	15.33	7.41	**12.47**	55.00	48.75	11.50	**38.42**
13/3		9.00	16.00	21.25	**15.42**	16.08	18.33	12.25	**15.55**	56.25	63.75	20.25	**46.75**
Cool Season Grasses Plots #14 - #19													
		1998	**1999**	**2000**	**Ave**	**1998**	**1999**	**2000**	**Ave**	**1998**	**1999**	**2000**	**Ave**
14/1		5.00	18.00	19.00	**14.00**	14.50	15.67	18.33	**16.17**	78.75	73.75	16.25	**56.25**
14/2	Tall fescue	5.00	18.00	18.50	**13.83**	28.67	32.08	33.00	**31.25**	88.75	86.67	20.00	**65.14**
14/3	Endophyte infected	5.00	18.00	18.00	**13.67**	33.59	39.50	36.33	**36.47**	95.00	82.50	21.25	**66.25**
15/1		19.00	0.00	33.25	**17.42**	1.42	0.00	1.41	**0.94**	7.50	0.00	2.00	**3.17**
15/2	Tall fescue	19.00	0.00	31.50	**16.83**	0.83	0.00	12.00	**4.28**	7.50	0.00	2.75	**3.42**
15/3	Endophyte free	19.00	0.00	26.75	**15.25**	3.33	0.00	6.67	**3.33**	11.25	0.00	1.00	**4.08**
16/1		8.00	19.50	23.50	**17.00**	8.92	22.84	7.83	**13.20**	77.50	61.25	9.00	**49.25**
16/2	Orchardgrass	8.00	18.00	21.25	**15.75**	19.50	21.67	12.16	**17.78**	80.00	61.25	7.50	**49.58**
16/3		8.00	18.00	20.25	**15.42**	41.25	16.00	21.91	**26.39**	87.50	71.25	12.50	**57.08**
17/1		8.00	18.75	25.00	**17.25**	9.33	21.67	5.50	**12.17**	63.75	38.75	6.50	**36.33**
17/2	Smooth brome	8.00	18.00	22.00	**16.00**	11.09	22.00	8.66	**13.92**	76.25	52.50	3.00	**43.92**
17/3		8.00	18.00	22.00	**16.00**	20.09	12.25	11.67	**14.67**	78.75	65.00	16.50	**53.42**
*	Number of days it took, from date planted, for 25 seedlings to emerge in that plot.												
**	Visual rating of percent of plot that has complete rows of plants.												

Study 29I143G - cont.										Spring Evaluations			Table #5
Plot													
Sub-	Common Name	Days to emerge *				Emergence density				Percent Stand **			
plot #	Source					Plants/Row Foot							
					Ave				Ave				Ave
		1998	1999	2000		1998	1999	2000		1998	1999	2000	
18/1		8.00	36.00	28.00	**24.00**	16.67	17.00	3.00	**12.22**	67.50	23.75	4.75	**32.00**
18/2	Timothy	8.00	23.25	24.50	**18.58**	28.33	8.09	7.33	**14.58**	73.75	31.25	3.00	**36.00**
18/3		8.00	23.25	25.00	**18.75**	47.58	14.09	7.66	**23.11**	86.25	31.25	5.50	**41.00**
19/1		8.00	22.00	22.50	**17.50**	7.59	2.42	13.75	**7.92**	68.75	18.75	2.25	**29.92**
19/2	Canada wildrye	8.00	22.00	20.25	**16.75**	16.50	7.00	17.00	**13.50**	82.50	27.50	7.50	**39.17**
19/3		8.00	22.00	20.25	**16.75**	20.50	3.59	23.50	**15.86**	90.00	33.75	8.75	**44.17**
Warm Season Grasses		**Plots #20 - #23**				not in							
						average							
20/1		N/A	33.75	0.00		1.17	5.75	1.00	**3.38**	17.50	23.75	0.00	**11.88**
20/2	Eastern gamagrass	N/A	33.75	0.00		0.92	6.08	0.25	**3.17**	20.00	21.25	0.00	**10.63**
20/3	untreated/Germtech	N/A	33.75	0.00		1.67	4.83	1.75	**3.29**	20.00	12.50	0.25	**6.38**
21/1		16.50	46.00	32.75	**31.75**	1.42	6.67	0.83	**2.97**	27.50	15.00	3.25	**15.25**
21/2	Eastern gamagrass	16.50	46.00	25.00	**29.17**	2.17	3.17	1.58	**2.30**	28.75	15.00	4.25	**16.00**
21/3	treated	16.50	46.00	26.50	**29.67**	3.58	6.17	1.42	**3.72**	38.75	15.00	5.25	**19.67**
22/1		20.75	46.00	18.25	**28.33**	12.17	1.00	6.08	**6.42**	27.50	10.00	35.00	**24.17**
22/2	Switchgrass	20.75	46.00	15.75	**27.50**	10.50	2.84	14.33	**9.22**	25.00	10.00	40.00	**25.00**
22/3		20.75	46.00	15.00	**27.25**	13.92	1.00	22.50	**12.47**	36.25	10.00	38.75	**28.33**
23/1		23.00	49.00	32.50	**34.83**	4.50	5.00	7.17	**5.56**	11.25	35.00	26.25	**24.17**
23/2	Caucasian bluestem	23.00	49.00	27.75	**33.25**	2.42	4.33	8.25	**5.00**	10.00	25.00	23.75	**19.58**
23/3		23.00	49.00	25.75	**32.58**	2.17	10.00	20.50	**10.89**	5.00	30.00	23.75	**19.58**
24/1			43.00	19.75	**31.38**		0.00	9.48	**4.74**		10.00	36.25	**23.13**
24/2			43.00	15.75	**29.38**		6.00	18.92	**12.46**		35.00	41.25	**38.13**
24/3			43.00	15.75	**29.38**		0.00	16.50	**8.25**		10.00	47.50	**28.75**
*	Number of days it took, from date planted, for 25 seedlings to emerge in that plot.												
**	Visual rating of percent of plot that has complete rows of plants.												

Study 29I143G - Seed Coat/Seeding Rates Study													
				October Evaluations									Table # 6A
Plot /		Cover Density (stems/row foot)				Cover Density (stems/row foot)				Cover Density (stems/row foot)			
Sub-	Common name	1st Year (Year of Planting)				2nd Year (Year after Planting)				3rd Year (2 Years after Planting)			
plot #	Source	**1998**	**1999**	**2000**	**Average**	**1999**	**2000**	**2001**	**Average**	**2000**	**2001**	**2002**	**Average**
		98 pltg	99pltg	00pltg	**3 Yr**	98 pltg	99pltg	00pltg	**3 YR**	98 pltg	99pltg	00pltg	**2 YR**
Legume Plots #1 - #13													
1/1		9.75	22.17	35.09	**22.33**	22.50	28.25	20.50	**23.75**	17.00	8.50		**12.75**
1/2	Alfalfa	9.4925	37.17	40.25	**28.97**	32.83	30.33	21.75	**28.31**	20.75	9.50		**15.13**
1/3		15.75	37.09	49.42	**34.08**	24.33	27.75	22.25	**24.78**	16.42	10.75		**13.58**
2/1		7.0025	21.75	19.67	**16.14**	23.92	31.17	17.25	**24.11**	19.50	19.75		**19.63**
2/2	Alfalfa	7.5	33.17	18.75	**19.81**	19.67	35.09	14.75	**23.17**	14.75	12.75		**13.75**
2/3	Celpril	9.3325	30.59	25.59	**21.83**	30.58	28.67	21.75	**27.00**	21.33	18.75		**20.04**
3/1		6.3325	18.08	21.67	**15.36**	28.83	21.92	18.00	**22.92**	21.17	13.00		**17.08**
3/2	Alfalfa	6.4975	17.25	32.34	**18.69**	34.42	40.75	17.75	**30.97**	19.00	12.50		**15.75**
3/3	Seed Biotics	10.333	22.84	25.42	**19.53**	20.42	29.92	18.25	**22.86**	25.00	8.00		**16.50**
4/1		43.25	35.00	39.67	**39.31**	29.42	39.58	20.00	**29.67**	25.58	25.00		**25.29**
4/2	Red Clover	54.803	36.50	71.42	**54.24**	85.00	31.25	29.75	**48.67**	24.67	22.00		**23.33**
4/3		54.583	39.67	61.00	**51.75**	90.00	42.67	31.75	**54.81**	21.83	22.25		**22.04**
5/1		31.333	32.92	22.33	**28.86**	40.75	44.34	14.50	**33.20**	20.92	38.75		**29.83**
5/2	Red Clover	42	38.50	30.17	**36.89**	51.75	43.34	11.50	**35.53**	20.92	24.25		**22.58**
5/3	Celpril	51.583	38.33	69.92	**53.28**	39.50	35.50	32.75	**35.92**	15.50	15.50		**15.50**
6/1		14.665	29.75	15.83	**20.08**	44.67	37.00	19.00	**33.56**	28.50	29.50		**29.00**
6/2	Red Clover	30.418	40.00	20.75	**30.39**	47.00	31.83	23.50	**34.11**	44.83	37.00		**40.92**
6/3	Seed Biotics	36.668	48.50	45.75	**43.64**	52.25	32.00	29.00	**37.75**	28.34	17.75		**23.04**
7/1		11.418	22.00	21.92	**18.45**	38.25	38.84	30.50	**35.86**	23.17	10.75		**16.96**
7/2	Birdsfoot trefoil	13.665	46.08	34.25	**31.33**	50.00	50.08	34.25	**44.78**	27.09	16.75		**21.92**
7/3		19.165	45.75	35.42	**33.44**	40.00	55.75	37.50	**44.42**	20.34	16.75		**18.54**
8/1		7.25	21.25	18.83	**15.78**	36.17	45.25	25.25	**35.56**	12.25	3.58		**7.92**
8/2	Birdsfoot trefoil	14.25	20.83	34.92	**23.33**	40.25	49.50	25.25	**38.33**	14.34	10.75		**12.54**
8/3	Celpril	10.918	26.50	38.58	**25.33**	29.33	45.34	25.75	**33.47**	17.42	15.00		**16.21**
9/1		9.4175	19.67	15.17	**14.75**	39.00	36.58	30.75	**35.44**	11.75	9.75		**10.75**
9/2	Birdsfoot trefoil	12.668	30.42	26.25	**23.11**	45.00	50.83	36.25	**44.03**	18.25	9.75		**14.00**
9/3	Seed Biotics	12.75	34.42	22.42	**23.20**	36.92	52.33	37.25	**42.17**	19.83	13.75		**16.79**

Study 29I143G - continued

Table #6A

Plot / Sub-plot #	Common name Source	1st Year (Year of Planting) 1998 98 pltg	1999 99pltg	2000 00pltg	Average 3 YR	2nd Year (Year after Planting) 1999 98 pltg	2000 99pltg	2001 00pltg	Average 3 YR	3rd Year (2 Years after Planting) 2000 98 pltg	2001 99pltg	2002 00pltg	Average 2 YR
		Cover Density (stems/row foot)				Cover Density (stems/row foot)				Cover Density (stems/row foot)			
10/1		15.918	31.33	51.75	**33.00**	47.09	52.75	46.25	**48.70**	32.84	35.25		**34.04**
10/2	Ladino clover	9.74	26.17	81.83	**39.25**	54.00	62.17	54.25	**56.81**	40.17	29.00		**34.58**
10/3		27.75	33.83	93.42	**51.67**	43.08	62.75	48.75	**51.53**	48.67	26.00		**37.33**
11/1		11.5	22.59	31.92	**22.00**	56.75	72.50	47.25	**58.83**	36.17	29.25		**32.71**
11/2	Ladino clover	3.6675	34.51	29.00	**22.39**	46.00	61.67	39.00	**48.89**	43.17	33.00		**38.08**
11/3	Celpril	28	36.08	34.67	**32.92**	72.25	68.58	46.00	**62.28**	39.08	16.25		**27.67**
12/1		9.4175	24.83	31.92	**22.06**	55.00	58.83	44.75	**52.86**	38.92	29.00		**33.96**
12/2	Ladino clover	20.085	36.75	51.42	**36.08**	40.50	53.92	47.25	**47.22**	46.92	27.75		**37.33**
12/3	Seed Biotics	18.5	36.75	71.92	**42.39**	64.17	55.92	52.25	**57.45**	30.67	33.50		**32.08**
13/1		0.915	7.83	4.25	**4.33**	10.08	5.75	4.25	**6.69**	3.50	5.00		**4.25**
13/2	Annual Lespedeza	3	4.08	4.92	**4.00**	3.00	2.92	5.75	**3.89**	6.42	3.25		**4.83**
13/3		2.75	9.83	15.17	**9.25**	19.42	4.08	6.00	**9.83**	3.50	1.75		**2.63**
Cool Season Grasses Plots #14 - #19													
14/1		33	35.58	18.42	**29.00**	55.09	58.58		**56.83**	60.17	34.25		**47.21**
14/2	Tall fescue	30.25	35.67	23.75	**29.89**	42.08	68.75		**55.42**	54.50	30.00		**42.25**
14/3	Endophyte infected	34.333	41.50	27.67	**34.50**	46.34	76.33		**61.33**	57.58	29.50		**43.54**
15/1		4.585	0.67	3.00	**2.75**	44.42	0.17		**22.29**	14.83	4.08		**9.46**
15/2	Tall fescue	4.1675	4.33	2.17	**3.56**	44.25	0.92		**22.58**	16.08	1.25		**8.67**
15/3	Endophyte free	9	1.33	0.92	**3.75**	37.00	4.17		**20.58**	16.42	1.33		**8.87**
16/1		19.665	23.17	13.75	**18.86**	41.67	54.25		**47.96**	47.59	32.75		**40.17**
16/2	Orchardgrass	23.25	28.17	21.59	**24.33**	44.50	53.17		**48.83**	40.17	37.50		**38.83**
16/3		25.583	28.42	29.00	**27.67**	43.17	41.83		**42.50**	45.33	45.00		**45.17**
17/1		12.168	21.34	11.25	**14.92**	44.33	39.92		**42.12**	39.25	33.00		**36.13**
17/2	Smooth brome	18	15.00	16.84	**16.61**	64.17	37.00		**50.59**	38.75	37.50		**38.13**
17/3		23.5	26.00	20.42	**23.31**	45.42	40.00		**42.71**	48.75	39.75		**44.25**

Study 29I143G - continued														Table #6A
Plot /		Cover Density (stems/row foot)				Cover Density (stems/row foot)				Cover Density (stems/row foot)			
Sub-	Common name	1st Year (Year of Planting)				2nd Year (Year after Planting)				3rd Year (2 Years after Planting)			
plot #	Source	**1998**	**1999**	**2000**	**Average**	**1999**	**2000**	**2001**	**Average**	**2000**	**2001**	**2002**	**Average**
		98 pltg	99pltg	00pltg	**3 YR**	98 pltg	99pltg	00pltg	**3 YR**	98 pltg	99pltg	00pltg	**2 YR**
18/1		12.083	6.42	13.00	**10.50**	41.17	11.25	33.50	**28.64**	33.00	19.50		**26.25**
18/2	Timothy	22.748	1.83	3.25	**9.28**	61.00	14.00	45.50	**40.17**	27.75	16.75		**22.25**
18/3		22.253	5.83	3.25	**10.45**	58.25	33.75	29.00	**40.33**	23.17	10.25		**16.71**
19/1		8.0825	3.25	18.50	**9.94**	30.59	37.58	21.75	**29.97**	33.75	4.75		**19.25**
19/2	Canada wildrye	12.918	3.42	19.67	**12.00**	32.92	64.17	17.75	**38.28**	28.08	3.75		**15.92**
19/3		13.25	7.09	15.25	**11.86**	36.92	57.92	28.75	**41.19**	38.17	3.75		**20.96**
Warm Season Grasses	**Plots #20 - #23**												
20/1		4.165	14.33	6.67	**10.50**	53.33	33.59	1.75	**29.56**	26.00	9.00		**17.50**
20/2	Eastern gamagrass	7.665	7.44	9.50	**8.47**	55.33	32.08	7.75	**31.72**	55.00	17.50		**36.25**
20/3	untreated/Germtech	7	4.67	19.84	**12.26**	24.72	39.00	23.75	**29.16**	25.42	16.25		**20.83**
21/1		12	8.11	12.58	**10.90**	31.42	31.42	8.00	**23.61**	32.25	24.25		**28.25**
21/2	Eastern gamagrass	18.335	12.78	18.08	**16.40**	53.08	23.67	17.50	**31.42**	39.50	24.25		**31.88**
21/3	treated - wet	14.833	3.78	19.67	**12.76**	49.08	7.25	11.25	**22.53**	44.17	14.75		**29.46**
22/1		8.915	14.84	11.00	**11.58**	16.25	38.59	25.25	**26.70**	58.67	15.75		**37.21**
22/2	Switchgrass	8.165	14.00	19.67	**13.94**	25.33	25.59	32.25	**27.72**	40.67	25.75		**33.21**
22/3		9.4175	14.50	18.50	**14.14**	18.17	20.17	26.00	**21.44**	30.00	21.50		**25.75**
23/1		23.665	13.50	88.50	**41.89**	40.17	66.42	49.25	**51.94**	75.92	57.00		**66.46**
23/2	Caucasian bluestem	26.748	7.33	85.08	**39.72**	70.92	53.42	43.00	**55.78**	100.33	43.75		**72.04**
23/3		30.918	12.00	92.83	**45.25**	65.00	42.09	54.00	**53.70**	91.33	36.00		**63.67**
24/1	Big bluestem		5.92	44.17	**16.69**		44.92	89.75	**67.33**		23.75		**23.75**
24/2			10.42	44.75	**18.39**		33.83	97.00	**65.42**		56.50		**56.50**
24/3			15.25	58.84	**24.70**		58.58	75.75	**67.17**		54.50		**54.50**

Study 29I143G - Seed Coat/Seeding Rates Study | Table #6B

October Evaluations

Plot / Sub-plot #	Common name Source	Percent Cover (Visual Observation) 1st Year (Year Planted) 1998 98 pltg	1999 99 pltg	2000 00 pltg	Average 3 Yr	Percent Cover (Visual Observation) 2nd Year (Year after Planted) 1999 98 pltg	2000 99 pltg	2001 00 pltg	Average 3 yr	Percent Cover (Visual Observation) 3rd Year (2nd Year after Planted) 2000 98 pltg	2001 99 pltg	2002 00 pltg	Average 2 YR
Legume Plots #1 - #13													
1/1		70.00	66.25	39.25	**58.50**	66.25	78.75	85.75	**76.92**	65.00	71.25		**68.13**
1/2	Alfalfa	78.75	72.50	42.50	**64.58**	72.50	78.75	80.00	**77.08**	70.00	75.25		**72.63**
1/3		70.00	62.50	50.00	**60.83**	62.50	81.50	89.25	**77.75**	61.25	63.25		**62.25**
2/1		52.50	63.75	25.00	**47.08**	63.75	66.25	86.25	**72.08**	41.25	76.25		**58.75**
2/2	Alfalfa	57.50	46.25	13.75	**39.17**	46.25	73.75	84.50	**68.17**	40.00	85.00		**62.50**
2/3	Celpril	62.50	58.75	20.00	**47.08**	58.75	77.50	89.00	**75.08**	45.00	68.75		**56.88**
3/1		51.25	76.25	22.75	**50.08**	76.25	65.00	70.25	**70.50**	51.25	68.75		**60.00**
3/2	Alfalfa	71.25	77.50	40.25	**63.00**	77.50	68.75	75.25	**73.83**	62.50	72.50		**67.50**
3/3	Seed Biotics	68.75	71.25	37.75	**59.25**	71.25	66.25	69.50	**69.00**	46.25	63.75		**55.00**
4/1		81.25	77.50	45.00	**67.92**	77.50	62.50	15.00	**51.67**	32.50	36.25		**34.38**
4/2	Red Clover	93.25	77.50	41.25	**70.67**	77.50	62.50	23.75	**54.58**	41.25	37.50		**39.38**
4/3		90.25	58.75	42.00	**63.67**	58.75	63.75	23.00	**48.50**	25.00	31.25		**28.13**
5/1		72.50	51.25	23.75	**49.17**	51.25	79.50	15.00	**48.58**	18.00	25.50		**21.75**
5/2	Red Clover	82.50	46.25	48.75	**59.17**	46.25	76.75	9.00	**44.00**	28.00	13.00		**20.50**
5/3	Celpril	91.50	56.25	55.00	**67.58**	56.25	77.50	21.75	**51.83**	17.50	25.00		**21.25**
6/1		61.25	78.75	25.00	**55.00**	78.75	51.25	16.25	**48.75**	38.75	43.25		**41.00**
6/2	Red Clover	73.75	73.75	35.00	**60.83**	73.75	61.25	17.50	**50.83**	41.25	23.25		**32.25**
6/3	Seed Biotics	81.25	61.25	42.50	**61.67**	61.25	61.25	35.00	**52.50**	45.00	31.25		**38.13**
7/1		37.50	60.00	37.75	**45.08**	60.00	67.50	53.75	**60.42**	25.75	22.50		**24.13**
7/2	Birdsfoot trefoil	53.75	51.83	40.75	**48.78**	51.83	62.50	68.75	**61.03**	32.50	28.75		**30.63**
7/3		55.00	67.50	45.00	**55.83**	67.50	68.25	67.50	**67.75**	27.50	53.75		**40.63**
8/1		36.25	57.50	33.00	**42.25**	57.50	66.25	46.25	**56.67**	25.50	10.50		**18.00**
8/2	Birdsfoot trefoil	56.25	58.75	40.00	**51.67**	58.75	72.50	63.75	**65.00**	31.25	18.75		**25.00**
8/3	Celpril	45.00	76.25	45.00	**55.42**	76.25	72.50	40.00	**62.92**	22.50	23.75		**23.13**
9/1		42.50	37.50	24.25	**34.75**	37.50	58.75	48.75	**48.33**	27.50	21.21		**24.36**
9/2	Birdsfoot trefoil	46.25	36.25	32.50	**38.33**	36.25	65.00	68.75	**56.67**	38.75	27.50		**33.13**
9/3	Seed Biotics	53.75	60.00	22.75	**45.50**	60.00	73.75	52.50	**62.08**	25.00	45.50		**35.25**

Study 29I143G - cont.													Table #6B
Plot /		Percent Cover (Visual Observation)				Percent Cover (Visual Observation)				Percent Cover (Visual Observation)			
Sub-	Common name	1st Year (Year Planted)				2nd Year (Year after Planted)				3rd Year (2nd Year after Planted)			
plot #	Source	1998	1999	2000	Average	1999	2000	2001	Average	2000	2001	2002	Average
		98 pltg	99 pltg	00 pltg	3 Yr	98 pltg	99 pltg	00 pltg	3 Yr	98 pltg	99 pltg	00 pltg	2 YR
10/1		36.25	37.50	41.25	**38.33**	73.75	90.00	65.00	**76.25**	67.50	61.25		**64.38**
10/2	Ladino clover	38.75	31.25	48.75	**39.58**	75.00	93.75	70.50	**79.75**	70.00	75.00		**72.50**
10/3		53.75	35.00	52.00	**46.92**	76.25	87.25	55.00	**72.83**	81.25	60.00		**70.63**
11/1		22.50	35.00	17.25	**24.92**	68.75	94.25	80.00	**81.00**	50.00	26.75		**38.38**
11/2	Ladino clover	30.00	26.25	25.00	**27.08**	71.25	94.00	75.00	**80.08**	46.25	31.25		**38.75**
11/3	Celpril	35.50	35.00	17.50	**29.33**	72.50	92.75	77.50	**80.92**	57.50	34.75		**46.13**
12/1		32.50	26.25	28.75	**29.17**	65.00	92.00	77.50	**78.17**	60.00	52.50		**56.25**
12/2	Ladino clover	55.00	33.75	32.50	**40.42**	61.25	93.00	81.25	**78.50**	63.75	53.00		**58.38**
12/3	Seed Biotics	53.75	28.75	28.75	**37.08**	65.00	93.75	83.00	**80.58**	51.25	56.25		**53.75**
13/1		6.25	25.00	9.75	**13.67**	19.00	4.25	3.50	**8.92**	3.75	17.50		**10.63**
13/2	Annual Lespedeza	10.00	0.00	4.75	**4.92**	8.75	1.00	1.75	**3.83**	3.75	6.50		**5.13**
13/3		10.00	10.00	14.25	**11.42**	22.75	2.75	2.50	**9.33**	4.00	9.00		**6.50**
Cool Season Grasses Plots #14 - #19													
14/1		86.25	62.50	31.25	**60.00**	95.50	96.50	92.50	**94.83**	98.00	88.75		**93.38**
14/2	Tall fescue	90.00	74.75	50.00	**53.69**	94.25	94.25	94.50	**94.33**	98.75	90.25		**94.50**
14/3	Endophyte infected	95.75	78.00	48.75	**55.63**	98.50	93.25	93.00	**94.92**	98.00	95.00		**96.50**
15/1		6.50	55.00	1.00		45.00	0.50	26.25	**23.92**	21.25	8.75		**15.00**
15/2	Tall fescue	16.75	50.00	1.50		48.75	1.50	31.25	**27.17**	22.50	8.00		**15.25**
15/3	Endophyte free	21.25	45.00	1.50		60.00	1.75	17.50	**26.42**	23.75	13.75		**18.75**
16/1		70.00	52.50	23.25	**48.58**	75.00	35.00	73.75	**61.25**	51.25	87.25		**69.25**
16/2	Orchardgrass	78.75	67.50	30.00	**58.75**	81.00	36.75	78.75	**65.50**	41.25	81.75		**61.50**
16/3		87.50	73.75	32.50	**64.58**	92.75	45.00	82.50	**73.42**	60.00	87.00		**73.50**
17/1		76.25	27.50	8.50	**37.42**	91.25	77.50	89.25	**86.00**	95.25	95.75		**95.50**
17/2	Smooth brome	82.50	28.75	20.75	**44.00**	93.25	87.50	93.75	**91.50**	96.75	95.00		**95.88**
17/3		87.75	42.50	20.00	**50.08**	94.50	84.75	96.00	**91.75**	97.75	99.25		**98.50**

Study 29I143G - cont.													Table #6
Plot /		Percent Cover (Visual Observation)				Percent Cover (Visual Observation)				Percent Cover (Visual Observation)			
Sub-	Common name	1st Year (Year Planted)				2nd Year (Year after Planted)				3rd Year (2nd Year after Planted)			
plot #	Source	1998	1999	2000	Average	1999	2000	2001	Average	2000	2001	2002	Average
		98 pltg	99 pltg	00 pltg	3 Yr	98 pltg	99 pltg	00 pltg	3 Yr	98 pltg	99 pltg	00 pltg	2 YR
18/1		43.75	30.25	2.50	**25.50**	47.50	5.50	37.50	**30.17**	27.50	19.25		**23.38**
18/2	Timothy	55.50	22.50	2.75	**26.92**	50.00	7.00	36.25	**31.08**	26.25	8.25		**17.25**
18/3		62.50	33.00	4.50	**33.33**	55.00	13.75	47.50	**38.75**	35.00	10.75		**22.88**
19/1		22.00	31.25	31.25	**28.17**	48.75	16.25	40.00	**35.00**	40.00	23.00		**31.50**
19/2	Canada wildrye	40.25	42.50	29.50	**37.42**	57.50	35.00	57.50	**50.00**	48.75	23.75		**36.25**
19/3		47.50	51.25	31.25	**43.33**	58.75	48.75	60.00	**55.83**	46.25	22.50		**34.38**
Warm Season Grasses	**Plots #20 - #23**												
20/1		15.00	26.67	3.75	**15.21**	63.75	38.50	13.75	**38.67**	26.25			**26.25**
20/2	Eastern gamagrass	21.25	41.67	5.00	**23.34**	55.00	39.25	32.50	**42.25**	52.50			**52.50**
20/3	untreated/Germtech	27.50	36.67	4.75	**20.71**	65.00	18.50	48.75	**44.08**	42.50			**42.50**
21/1		38.75	32.50	8.00	**26.42**	73.75	4.00	40.00	**39.25**	50.00			**50.00**
21/2	Eastern gamagrass	55.00	25.00	15.00	**31.67**	85.00	9.50	62.50	**52.33**	70.00			**70.00**
21/3	treated - wet	60.00	23.75	19.50	**34.42**	77.50	11.50	71.25	**53.42**	77.50			**77.50**
22/1		28.75	45.00	35.00	**36.25**	62.50	32.50	88.75	**61.25**	60.00			**60.00**
22/2	Switchgrass	40.00	45.00	55.00	**46.67**	68.75	52.50	96.75	**72.67**	68.75			**68.75**
22/3		51.25	48.75	47.50	**49.17**	70.00	35.00	92.00	**65.67**	72.50			**72.50**
23/1		56.25	21.25	57.50	**45.00**	56.25	82.50	70.75	**69.83**	80.00			**80.00**
23/2	Caucasian bluestem	63.75	28.75	75.00	**55.83**	78.75	75.00	91.50	**81.75**	80.00			**80.00**
23/3		73.75	36.25	67.50	**59.17**	75.00	73.75	83.50	**77.42**	72.50			**72.50**
24/1	Big bluestem		37.50	53.75	**45.63**		27.50	88.25	**57.88**		55.00		**55.00**
24/2			51.25	61.25	**56.25**		14.25	91.25	**52.75**		60.00		**60.00**
24/3			32.50	72.50	**52.50**		28.75	95.50	**62.13**		75.00		**75.00**

Study 29I143G - Seed Coating / Seeding Rates Study						Table # 7
Weather Data		**Monthly Precipitation (Inches)**				
	Year		**Year**		**Year**	
Month	**1998**		**1999**		**2000**	
April	3.32		4.18		0.84	
May	2.21		4.05		7.19	
June	5.57		2.00		6.23	
July	5.74		2.03		2.91	
August	0.31		0.45		6.01	
September	4.07		1.15		3.36	
October	2.7		1.88		3.3	
Total	**20.6**		**11.56**		**29.84**	

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

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

Study Leader: Henry, J.

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 is an 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, 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 25 collections were made from the PMC three state service area: eight 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 25 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.

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

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

Study Leader: Henry, J.

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 nut 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, 2001, 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.

Table #1 contains collection information.

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 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 for analysis. Evaluations will continue for three years.

Elsberry PMC Field #9 Pipeline D and ETable #1

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	 X
						\2	\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 acession	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 ID Code: MOPMC-T-0104

Study Title: Native Plant Identification

Study Leader: Henry, J.

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

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.

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	

Study ID Code: MOPMC-PA-0105

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.

D**iscussion:**

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 forty pure live seed per square foot with 60% being the grass component and 40% being the forb and legume component.

Table #1

Study MOPMC-PA-0105 Compatability Study

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.

Study ID Code: MOPMC-BU-0106

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

Study Leader: Henry, J.

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*; 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.

Study ID Code: MOPMC-P-0107-PA,WL

Study Title : Evaluation and Release of Big Bluestem, *Andropogon gerardii,* L.

Study Leader: Bruckerhoff, S. B.

Introduction:

Big bluestem, *Andropogon gerardi* L., is a tall, native warm season perennial grass with stiff, erect culms; flattened and kneeled 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. Big bluestem reaches a mature height of 3-4 feet in northern latitudes, and 6-8 feet 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 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, switchgrass, and little bluestem. 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:

The variety most commonly used in the PMC service area is Rountree with its origin being Iowa. It performs well although it's performance decreases as it is moved south.

Objectives:

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 from the southern part of the service area.

Cooperators:

NRCS Plant Materials Centers in Elsberry, Missouri and Booneville, Arkansas and the Agriculture Research Service (ARS) Southern Plains Range Research Station, Woodward, Oklahoma.

Procedure:

Accessions selected from previous work (Study 29I097G) at the Elsberry and Arkansas PMC's and the Southern Plains Range Research Station at Woodward, Oklahoma, will be assembled in 2001. Plants will be started in the greenhouse and planted in replicated plots the spring of 2002. 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 compared to Rountree, Kaw, and Woodward and be tested for forage quality and production twice a year for three years.

Discussion:

2001

Seed was not available from all accessions to be included in the study so establishment of plots for this study was postponed.

Releases from the Elsberry Plant Materials Center

Scientific Name	Release Name	Common Name	Accession Number	Secondary Agency(ies)	Type of Release	Year of Release
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	roughlef dogwood	9055667		N	1997
Cornus drummondii C.A. Meyer	Nicholson	roughleaf dogwood	9055594		N	1997
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

Scientific Name		Release Name	Common Name	Accession Number	Secondary Agency(ies)	Type of Release	Year of Release
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 Argicultural 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.

Studies/Projects at the Elsberry Plant Materials Center
Studies 1958 through 2001

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

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

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

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.

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

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	
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

Herbaceous and Woody Seed and Plant Production at the Elsberry PMC 2001

The plant and seed inventory at the Elsberry PMC is used for field plantings, special plantings, demonstration plantings, research studies and commercial release. The 2001 production of grass, legume, forb, and woody seed reflected a below average year.

Name	Seed Inventory as of December 2001 PLS (Pounds)
Herbaceous	
'Rountree' big bluestem *Andropogon gerardii*	187.00 Foundation
'Rumsey' indiangrass *Sorghastrum nutans*	1,547.76 Foundation
'Pete' eastern gamagrass *Tripsicum dactyloides* L.	488.50 Foundation
'Cave-In-Rock' switchgrass *Panicum virgatum*	1,310.20 Foundation
'Svalofs' field brome *Bromus arvensis*	230.00
'Elsberry' smoothbrome *Bromus inermis*	41.00
OH-370 big bluestem *Andropogon gerardii*	32.00 Foundation
'Niagara' big bluestem *Andropogon gerardii*	56.00
'Bobwhite' soybean *Glycine species*	50.00
'Aroostook' rye *Secale cereale*	1,000.00

Herbaceous and Woody Seed and Plant Production – continued

Name:	Seed Inventory as of December 2001 Bulk (Pounds)
Union tulip tree *Liriodendron tulipifera*	0.6
Nicholson Germplasm roughleaf dogwood *Cornus drummondii*	1.2
Corinth Germplasm roughleaf dogwood *Cornus drummondii*	1.4
Tazewell Germplasm roughleaf dogwood *Cornus drummondii*	0.2
Jefferson Germplasm roughleaf dogwood *Cornus drummondii*	1.4
American hazelnut (9057168) (Illinois) *Corylus americana*	4.4
American hazelnut (9057169) (Illinois) *Corylus americana*	3.4
American hazelnut (9068562) (Illinois) *Corylus americana*	5.3
American hazelnut (9057188) (Illinois) *Corylus americana*	14.2
American hazelnut (9068528) (Illinois) *Corylus americana*	25.5
American hazelnut (9068573) (Missouri) *Corylus americana*	6.2
American hazelnut (9068574) (Missouri) *Corylus americana*	4.8
American plum (9068546) (Missouri) *Prunus americana*	3.6
American plum (9068580) (Missouri) *Prunus americana*	1.6
American plum (9057088) (Illinois) *Prunus americana*	8.2
American plum (9062309) (North Dakota) *Prunus americana*	0.6
American plum (9068545) (Missouri) *Prunus americana*	1.0
Arrowwood (9062310 (Iowa) *Viburnum dentatum*	2.3