UPPER COLORADO ENVIRONMENTAL PLANT CENTER

TECHNICAL ADVISORY MEETING

SEPTEMBER 27 – 28, 2004

Photos Courtesy of Manuel Rosales

Upper Colorado Environmental Plant Center

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2004 Administrative Board of Directors

2004 UCEPC
Technical Advisory Meeting
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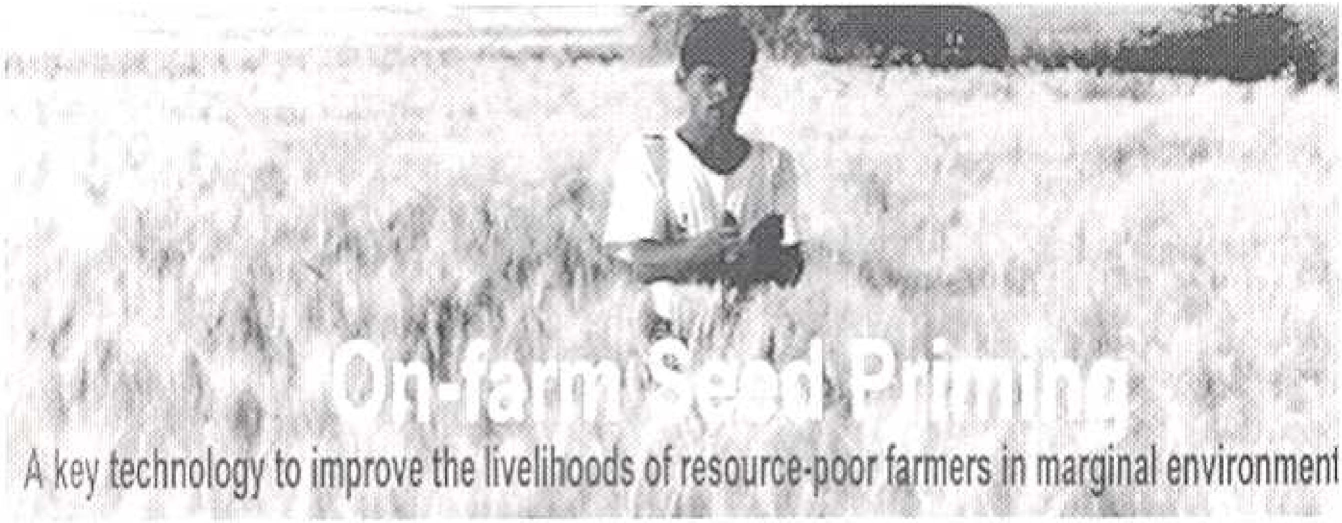
September 27, 2004



Introduction

Poor crop establishment: a common problem in a developing world

Every year, mankind relies on the miraculous transformation of seeds into plants and back into seeds again. About 60% of all food crops (excluding fruit and tree crops and garden vegetables) are grown anew from seed each year, producing more than 2.3 billion tonnes of grain.

Yet few people realise how fragile this transition from seed to seedling can be. To fulfil their genetic potential, seeds must germinate and seedlings emerge, quickly and uniformly throughout the field so that light, water and soil nutrients may be used with maximum efficiency.

Crops are like children - give them a good start in life and they usually grow tall, strong and healthy. But if crops emerge and grow slowly after germination, they often become stunted and sickly. Because such plants are more susceptible to damage by pests and diseases, they

Seeing is believing - the contrast is striking

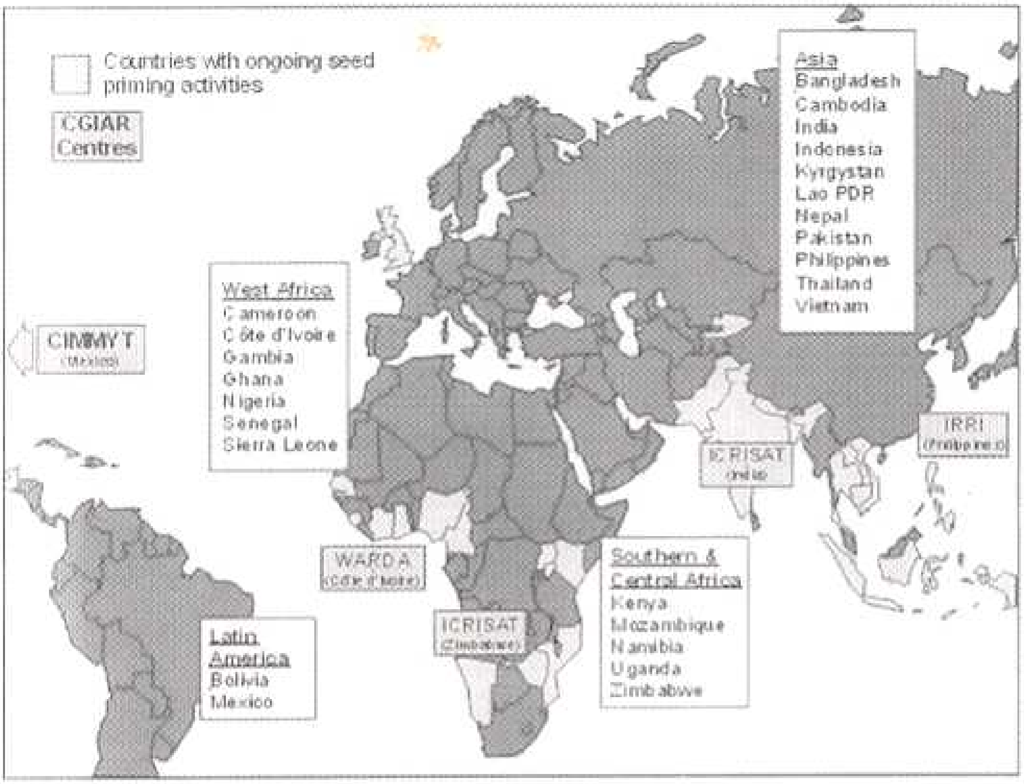


Figure 1. Countries where on-farm seed priming is being investigated or promoted.

They calculated safe limits - the maximum length of time for which seeds can be soaked and which, if exceeded, could lead to seed or seedling damage - for a wide range of tropical and sub-tropical crops. By reducing the recommended soaking time (Table 1) to less than the safe limit, they were able to promote on farm seed priming as a low-cost, low-risk intervention.

Maize emerges faster and more completely when seed is primed overnight, as shown in this farmer's field in India.

Armed with appropriate safe limits, collaboratin farmers, researchers and extension workers implemented simple on-farm trials in which the performance of primed seed was compared with that of non-primed seed.

The results were remarkable. Farmers reported that primed crops emerged faster and grew mor vigorously. This alone is reason enough to adopt seed priming. In many cases, however, crops also matured earlier and gave higher yields.

They also flowered earlier - very important in drought-prone areas. In some cases - in chickpe and upland rice for example - less disease was reported.

Priming has become very popular with collaborating farmers, along with their friends and neighbours, because it is simple and cheap yet extremely effective.

Table 1 summarises the crops in which yield benefits from seed priming have been demonstrated, either in researcher-validated, farmer-participatory trials or in replicated on-station experiments. The crops listed in 1A have been extensively tested, while those in 1B have shown promise in initial trials and are undergoing further testing. Occasionally, within each series of the trials shown in the table, it appears that priming occasionally gives no benefit.

Table 1. Summary of crops responding positively to on-farm seed priming.

Crop	Soaking time (hours)	Countries	Largest yield benefits consistently observed to date (%)
A. Crops in which benefits have been repeatedly confirmed			
Wheat	12	India, Nepal Pakistan	37
Bailey	12	Pakistan	40
Upland rice	12 - 18	India, Nigeria, Sierra Leone, Gambia, Cameroon	70
Maize	12 - 18	India, Nepal, Pakistan, Zimbabwe	22
Sorghum	10	Pakistan, Zimbabwe	31
Pearl millet	10	Pakistan	56
Chick pea	8	Bangladesh, India, Nepal, Pakistan	50
Mungbean	8	Pakistan	206
B. Crops in which preliminary research has shown benefits			
Finger millet	8	India	
Cowpea	8	Zimbabwe	
Bambara groundnut	8	Zimbabwe	
Linseed	8	Bangladesh	
Pigeonpea	8	India	
Groundnut	8	India, Vietnam	

However, no cases were reported where priming was worse than not priming. This is significant because, since priming has essentially zero cost, the practice can be considered as reliable "insurance" for farmers. For practical purposes, overnight soaking has been shown to be effective in all the crops listed in the table although a superior response is often obtained from soaking rice and maize for 18 hours.

Proof positive: the primed chickpea on the right is mature and ready to harvest. The non-primed crop, still green in this photo, eventually ran out of water and produced no grain.

On-farm seed priming - what is it?

Standard methods of seed priming, in which seed is first soaked, then dried back to its original water content, were developed for temperate horticultural and agricultural crops. The approach is useful for crops where germination, emergence and seedling vigour are constrained by cool, wet soils.

Under these circumstances, priming advances germination by inducing a wide range of biochemical changes in the seed, the products of which persist following desiccation and are available quickly once seeds are re imbibed.

Such methods are energy- and technology-intensive and are generally provided by specialist companies in developed countries as 'value-added' services for seeds supplied through the formal sector. Priming is cost and largely unavailable to farmers in marginal tropical environments where the majority of seeds come from farmers' own stocks or are obtained through informal, local arrangements.

In addition, seeds in the semi-arid tropics are sown into hot, drying soils where potential metabolic rates are high but lack of water is the main constraint. In such situations the pre-hydration of seeds should be the main purpose of seed priming, although biochemical advantages may also be important.

Farmers can prime their own seed if they know the safe limits. These safe limits are calculated for each variety so that germination will not continue once seeds are removed from the water. Primed seed will only germinate if it takes up additional moisture from the soil after sowing. It is important to note this distinction between priming and pre-germination - sowing pre-germinated seed under dryland conditions ca be disastrous.

In most cases seed can be primed overnight and is simply surface-dried and sown the same day. Apart from swelling slightly and weighing more, primed seed can be treated in the same way as non-primed seed. Occasionally, sowing may be unavoidably delayed - by heavy rain for example. If primed seed is surface-dried and kept dry it can be stored for several days, then sown as usual and still perform better than non-primed seed.

Research suggests that some of the benefits of on-farm seed priming can be obtained by using sophisticated methods of seedbed preparation and sowing. Planters that ensure good seed-soil contact encourage good establishment. This may partly explain why the benefits from seed priming are often more evident in farmers' fields than on research stations.

Fast germination and emergence result in rapid development of seedling root systems while soil conditions the surface layers are still relatively favourable. Without early checks to growth, vigorous crops result.

The importance of participatory research

As mentioned earlier, on-farm seed priming is not a new technology. But farmers cannot appreciate the wid range of benefits from this low-cost, low-risk practice unless they are given the opportunity to experimen for themselves. In the studies described here farmers were encouraged to soak some of their seeds overnight, surface-dry them, and sow using traditional methods. The primed and dry seeds were sown in adjacent plots.

Farm walks, in which groups of farmers visited each others' fields, allowed villagers to evaluate the performance of seed priming over various soil types and levels of management. These groups then discusse the strengths and weaknesses of the technique and made constructive criticisms and improvements.

The participatory approach was highly successful in empowering farmers to test, develop and adapt seed priming and to appreciate its effects. Participatory development of the technology empowered farmers to the extent that farmer-to-farmer and village-to-village knowledge about seed priming spread rapidly.

Evaluations of farmers' opinions indicated that the majority of those who tried it will continue the practice (Figure 2). The uptake of on-farm seed priming in areas where farmers have tried the technology for themselves has been spectacular.

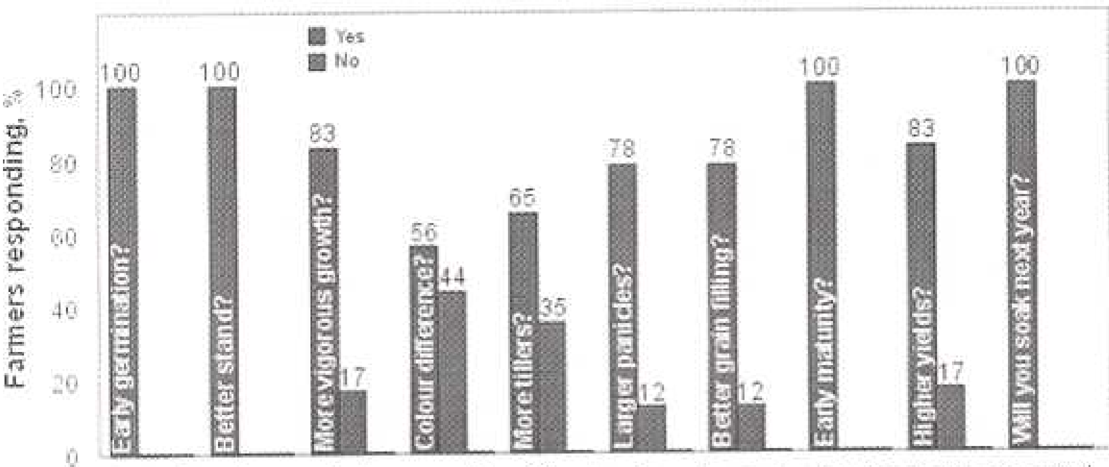
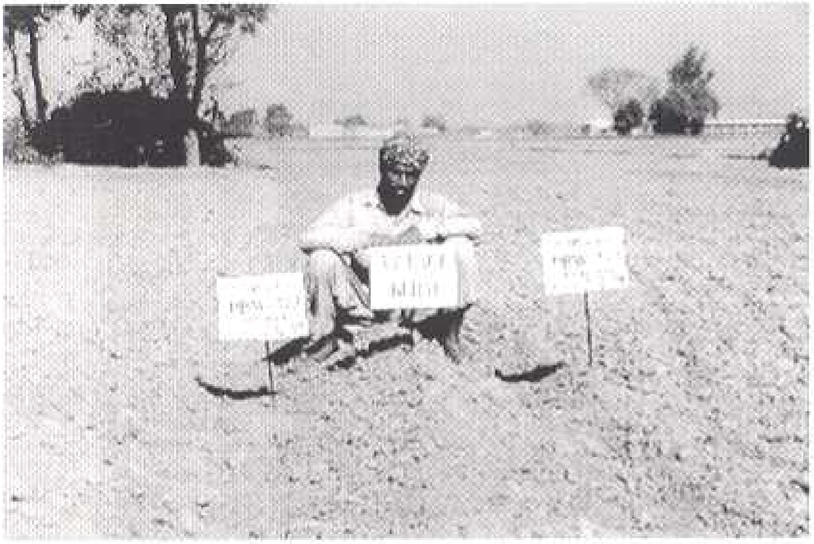


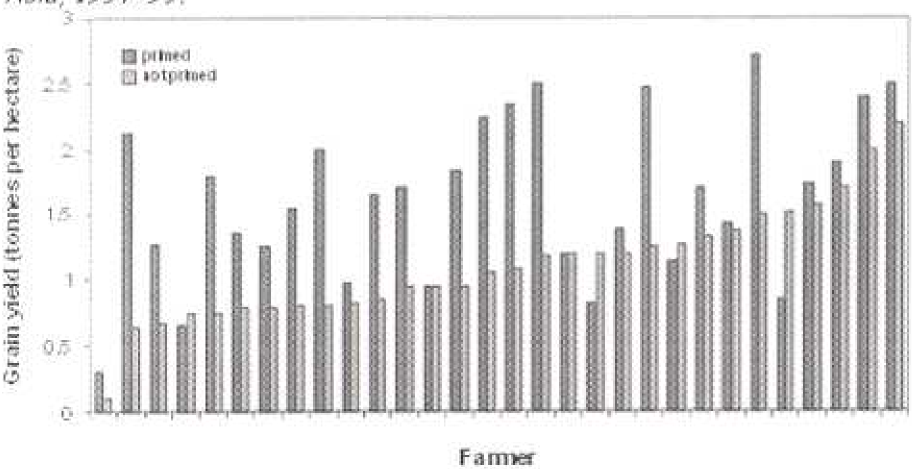
Figure 2. Indian farmers' views on the effects of seed priming in wheat are essential to understand what happens in the 'real' world.

On-farm seed priming seems to be a robust, widely applicable technology, and its effects are generally independent of the crop variety used. This is important, because priming can be used to add value to the benefits achieved by using improved, modern varieties or by adoption of other improved technologies such as fertiliser or better crop protection.



Rapid emergence of primed wheat seedlings in Punjab, India.

Table 2. Results from on-farm trials of seed priming in wheat in South Asia, 1997-99.

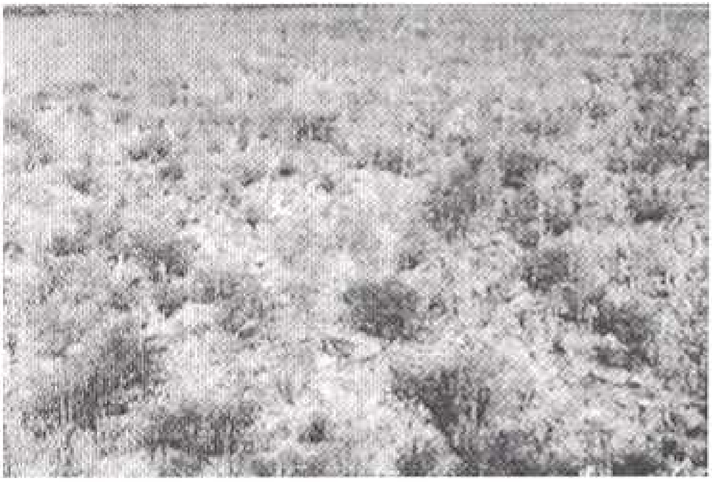


(Top)

produce less grain and straw. Giving crops a good start is therefore of crucial importance.

between the primed mungbean on the right and the non-primed crop on the left in this farmers field in Pakistan's North-West Frontier province.

Favourable crop establishment seldom occurs in the marginal environments of the semi-arid tropics. Unpredictable and erratic rainfall, poor soils, low quality seed and limited access to reliable draught power all contribute to a situation where good crop establishment is often the exception rather than the rule. Even where irrigation is possible, crop establishment is far from a sure thing.



Patchy stands, such as this chickpea in Bangladesh, are all too common in developing countries.

Crops like wheat or chickpea are sometimes sow for example, in fields previously compacted and flooded to grow rice. Sparse crops must be re-sown, an expensive process that can lead poor farmers into crippling debt. If farmers are to improve their livelihoods, solutions must be found, however simple, for better germination and establishment of crops. Fortunately, such solutions are available.

Once sown, seeds spend a great deal of time jus absorbing water from the soil. If this time is minimised, seed germination and seedling emergence can be significantly hastened. The easiest way to do this is to soak seeds in water before sowing. This is not a new idea, of course farmers from Nepal to Botswana have used this technique for generations.

Remarkably, however, soaking has only been done regularly during particularly poor conditions to "catch up" on time lost to drought. Soaking was never done on a regular basis and the duration of soaking was highly variable. Results have therefore been mixed.

Researchers from the Centre for Arid Zone Studies (CAZS), funded by the Plant Sciences Research Programme of the Department for International Development (DFID), have taken a fresh look at this on-farm seed soaking, which is also known as priming. They began their studies in marginal areas of western India, but later expanded the work to include the countries shown in Figure 1.

NATIVE SEED PRECONDITIONINGS:

Scarification, Stratification, and Priming

DORMANCY:

Definition: Unfavorable conditions, environmental and/or organic that lead to the lack of seed germination.

ENVIRONMENTAL: Lack of water, improper temperatures, lack of oxygen and/or light.

ORGANIC: (Two Types)

ENDOGENOUS – Some characteristics of the embryo prevents germination.

EXOGENOUS – Some characteristics of structures, endosperm, perisperm, seed coats, or fruit walls covering the embryo prevents germination.

ORGANIC DORMANCY: TYPES

1) **SEED COAT DORMANCY** – Produced by seed coverings that are impervious to water.

   A) Hardness is increased by environmental (Dry) conditions.

   B) High temperatures during drying phase will increase seed coat hardening.

   C) Harvesting slightly immature seeds will prevent hardening and will make immediate propagation possible in many species.

   D) Examples: Rhus glabra cismontana (mountain sumac), Gymnocladus dioica (Kentucky coffee tree).

   E) In native or field conditions, soil microorganisms, freezing and thawing of soil and/or fire (conifers) will soften or crack hard seed coats.

2) **MECHANICAL DORMANCY** (hard seed coats)

   A) Seed enclosing structures, mainly endocarps and sometimes mesocarps, are woody and too strong to allow for embryo expansion during germination. Examples; walnuts, pit of stone fruits, Rosaceae, Rhamnus olive.

B) Water can be imbibed in some species, and not in others with this type of dormancy.

C) Cold stratification will break down the enclosing structures, allowing for embryo expansion and germination.

3) <u>**CHEMICAL DORMANCY**</u> (inhibitor dormancy)

A) Chemicals, phenols and abscisic acid for example, accumulate in fruit and/or seed covering during development and after harvest which inhibit germination.

B) Plants in the family Apiaceae (example, cow parsnip), any berries such as Snowberry, Sorbus, Lonicera and dry-land plants such as Atriplex possess this type of dormancy.

C) With this type of dormancy, removal of the pericarp or leaching with water can remove these inhibitors. (we will discuss leaching methods later)

4) <u>**MORPHOLOGIAL DORMANCY**</u>

A) Embryo is not fully developed at the time of dissemination.

B) Enlargement occurs after the seed has imbibed water.

C) Final embryo development takes place after a period of warm temperatures.

D) Examples: Ranunculaceae (amemones), Twinberry, Snowberry, Serviceberry.

5) <u>**ENDOGENOUS PHYSIOLOGICAL DORMANCY**</u>

A) Embryo is not strong enough to emerge.

B) Exists with many types of herbaceous plants, but also some woody plants.

C) Usually periods of dry storage eliminates any chemical or structural inhibitors.

D) Can also be overcome with exposure to light or darkness. (Alder & Birch)

E) Plant species that fit into this type of dormancy include Fescues, Bromes, Rabbitbrush, Calamagrostis and Agastache (horsemint).

6) **MORPHOPHYSIOLOGICAL DORMANCY** (double dormancy)

   A) Seeds have 2 or more types of dormancy.

   B) Usually underdeveloped embryo & physiological dormancy.

   C) Examples include most Junipers, Serviceberry, Twinberry, Moor Grass, Ribes, Viburnum, Crataegus.

In nursery and greenhouse production, propagation protocols need to be developed to overcome the previously discussed dormancy types. Along with dormancy types, knowledge of the habitat and environmental conditions where native plant species exist is paramount. Included in this is the following;

1) Length of season

2) Seasonal temperatures

3) Soil type and chemistry

4) Flowering times

TECHNIQUES FOR SEED PROPAGATION

(To overcome what is done in nature, the following practices are used.)

SCARIFICATION

Any process of breaking, scratching, mechanically altering or softening the seed covering in order to make them permeable to water and gases.

A) **MECHANICAL SCARIFICAIOTN**

   1) Sand paper

   2) Files

   3) Gravel

   4) Scarifying machine = Forsberg

B) **CHEMICAL**

   1) Bleach

2) Peroxide

3) Acid – (Indian ricegrass, Arctostaphylos)

Can damage hilum or strophioles opening.

4) Antifreeze - P.E.G. 6000

5) Hot water

C) **MOTHER NATURE**

STRATIFICATION

A method of temperature regiments involving either warm or cold temperatures, or a combination of both in order to mature embryos, break down chemical inhibitors, and/or break down structures covering the embryo.

WARM STRATIFICATION

1) Allows embryo to completely mature.

2) Softens hard seed coats.

3) Allows seed to imbibe water and exchange gases.

4) Associated with species that possess morphophysiological dormancy.

COLD STRATIFICATION

1) Initiates release of gibberillic acid within the seed that stimulates production of hydrolases in the endosperm that eventually breaks down endosperm or any other structural coverings.

2) Decreases abscisic acid levels in structures covering the embryo and thus allowing for water inbibition.

3) Length of cold stratification is variable and is species specific.

LEACHING WITH H2O

DRYING SEED (AFTER – RIPENING)

OVERCOMING DORMANCY WITH THE USE OF GIBBERILLIC ACID

SEED PRIMING

A procedure designed to initiate germination, before planting, in order to shorten the time of emergence and improve uniformity of germination.

SOAKING

1) Seeds are soaked in tepid water for specific times to allow seeds to imbibe water.

2) Examples: Bromes, Fescues, and other grasses – 2 hours
   Castilleja – 24 hours
   Heracleum sphondylium – 3 days
   Birch and Alder – 4 hours

NOTE

Water must be well oxygenated either by running water or by placing the seed in knitted bags and putting the bag in the resevoir tank of a toilet.

OSMOTIC PRIMING

- Osmotic priming uses solutions of potassium nitrate or other salts to decrease the osmotic potential in seed. This allows metabolic activities that lead up to germination to commence.

- Nitrate priming satisfies light induction requirements (works synergistically with ethylene).

- Liquid ammonium applied to fields has been show to promote the above Mention activities.

Germination Protocals

Species	Common Name	Chemical Strat	Mechanical Strat	Priming Needs	Warm Strat/Days	Cold Strat/Days	Total Days	Notes
Achnatherum hymenoides	Indian Ricegrass	3-5 min acid				20	20	
Aconitum columbiana	**Monkshood**					120	120	Seed needs to be frozen in media
Actostphylos uva-ursi	Bearberry	6 hour hot H2O				120	120	Hot water @ 150 F
Alnus tenuifolia	Thin-leaf Alder			2 hour H2O			0	Light Germinationor/GA to overcome
Alopecurus arundinaceus	Creeping Meadow Foxtail			2 hour H2O			0	
Amelanchier sp	Serviceberry	30 min Acid			75	110	185	
Artemesia sp	Sage					20	20	Seed must slowly dry for 6-8 Weeks
Atriplex canescens	Fourwing Saltbush		30 sec Forsberg	4 hour H2O		90	90	
Betula occidentalis	River Birch			2 hour H2O			0	Light Germinationor/GA to overcome
Bouteloua curtipendula	Sideoats Grama		5 sec Forsberg	2 hour H2O		60	60	
Calamagrostis canadensis	Bluejoint Reedgrass					30	30	
Castellija sp	**Paintbrush**		1 min Forsberg	2 hour H2O		60	60	
Cercocarpos sp	Mahagony	8 hour peroxide	20 sec Forsberg			100	100	
Chrysothamnus sp	Rabbitbrush					30	30	Seed must slowly dry for 6-8 Weeks
Festuca thurberii	Thurber's Fescue			2 hour H2O			0	
Heracleum sphondylium	Cow Parsnip			3 Day TB		270	270	Prime in toilet Tank Resevoir;4 hour KNO3
Heterotheca villosa	Hairy Golden Aster					30	30	
Ipomopsis aggregata	Scarlet Gilia	3 Hour GA					0	
Juniperus sp	Junipers	6 hour hot H2O			90	120	210	
Mahonia repens	Oregon Grape	6 hour hot H2O				120	120	Hot water @ 120 f
Pascopyrum smithii	Western Wheatgrass			2 hour H2O		15	15	
Penstemon cyanothus	Wasatch Penstemon	24 hour hot H2O				120	120	Warm water @ 115
Penstemon eatonii	Firecracker Penstemon	24 hour hot H2O				60	60	Warm water @ 115
Penstemon strictus	Rocky Mountain Penstemon	24 hour hot H2O					0	Warm water @ 115
Potentilla fruiticosa	Shrubby Cinquefoil					45	45	
Purshia tridentata	Antelope Bitterbrush		10 sec Forsberg	4 hour H2O		90	90	
Rhus glabra cismontana	Mountain Sumac	3 hour Acid				100	100	Fresh "green seed" will germinate w/o strat
Rosa sp	Rose	1 hour Acid			45	100	145	
Sambucus recemosa	Red Elderberry	45 min Bleach			90	120	210	10% Bleach Solution
Sphaeralcea sp	Globemallow		1 min Forsberg			140	140	
Stipa comata	Needle and Thread		15 sec Forsberg	4 hour KNO3		30	30	
Symphoricarpos sp	Snowberry	45 min Bleach			90	120	210	
Viburnum sp	Vibunum	24 hour hot H2O			160	160	320	
							0	
							0	

Presentation by:
Dr. Phil Dittberner
Bureau of Land Management
September 27, 2004

PLANT INFORMATION NETWORK II (PIN II)

Collaborative Project with Colorado State University Herbarium,
Utah State University Herbarium, Canyons of the Ancients
National Monument, Colorado Canyons National
Conservation Area, Gunnison Gorge National
Conservation Area, and Grand Staircase-
Escalante National Monument

July 26, 2004

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Dr. Mark Simmons, Colorado State University Herbarium
Dr. Mary Barkworth, Utah State University Herbarium

The Plant Information Network II (PIN II) is a database that includes information about plant species found in CO and UT. Particular emphasis and effort has been expended to include the information about species found in the following areas: 1) Canyons of the Ancients National Monument, 2) Colorado Canyons National Conservation Area, 3) Gunnison Gorge National Conservation Area, and 4) Grand Staircase-Escalante National Monument. The database includes a broad spectrum of information about those species including taxonomic, biologic, geographical, ecological, and economic. The data base is in an Access data base and can be easily queried to obtain many combinations of information about plant species. Some of this information is available from other places but not in queryable form that can be easily obtained in short time frames. Other data bases often are in large table or narrative formats. Examples of some of the descriptors are as follows:

1. Taxonomic – family, genus, species, infraspecific, common name
2. Biologic – anthesis, CO2 fixation, <u>habit, life cycle, reproduction,</u>
3. Geographic – distribution by counties, <u>elevation ranges</u>, endemic, origin,
4. Ecological – trophic status, <u>habitat, mycorrhizal relationships, nodule forming, nitrogen mixing, cover value,</u> disturbance indicator, <u>erosion control potential, establishment requirements, growth on soils, growth on slopes, soil depths, potential biomass production, vegetation associations</u>
5. Economic – hayfever causing, edible, <u>energy value, food value for wildlife and livestock, short and long term revegetation potential, palatability, poisonous for livestock, protein value, weediness</u>

_____ Descriptors in the data base that are of particular interest for ecological restoration

Optional tasks for expansion and revisions of the PIN II data base include the following possibilities (pending funding and interest or demand of users).

1. Establishing and operating as a web based data base.
2. Expand the data base to other states or regions of the western US.
3. Expand descriptor and descriptor states to include additional information for species useful in restoration projects, and/or invasive and sensitive species.
4. Add GIS capability to the data base to include more site specific geographic distributions of species.

Following in Appendix A is a complete list of the descriptors and descriptor states that are included in the PIN II Data Base.

APPENDIX A

Definitions of Descriptors and Descriptor States. Descriptors in CAPITAL LETTERS and Descriptor States in *Italics.*

ANTHESIS: the time of flowering for angiosperms, or pollination for gymnosperms, in Colorado, Montana, North Dakota, Utah, or Wyoming. Anthesis is determined for most angiosperms from herbarium specimens. Manuals are used to determine anthesis time for a few angiosperms (including grasses, sedges, and rushes), because they are seldom collected when in flower, and for gymnosperms because pollination cannot be directly observed. Descriptors for three different anthesis times are provided: (1) the earliest observed month of anthesis, or “beginning of anthesis”; (2) the most frequently observed month of anthesis, or “anthesis”; and (3) the latest observed month of anthesis, or “end of anthesis”. All anthesis descriptors use the following abbreviations:

*JAN*uary	*JUL*y
*FEB*ruary	*AUG*ust
MARch	*SEP*tember
*APR*il	*OCT*ober
MAY	*NOV*ember
*JUN*e	*DEC*ember

CARBON DIOXIDE FIXATION: the biochemical and physiological mechanism associated with the incorporation of CO_2 and its ultimate conversion into carbohydrates.

C_3 – the plant uses a pathway where the first step in CO_2 fixation involves the formation of three -carbon compounds, the stomata are opened, and CO_2 is fixed in the daylight.

C_4– the plant uses a pathway where the first step inCO_2 fixation involves the formation of four-carbon compounds, the stomata are opened, and CO_2 fixed in the daylight.

CAM– (crassulaceous acid metabolism) the plant uses a pathway where the first step in CO_2 fixation involves the formation of four–carbon compounds, the stomata are opened, and CO_2 is fixed in the dark.

Other– the plant uses another type of pathway (e.g. is intermediate between C_3 and C_4 plants).

None– the plant does not fix carbon dioxide (i.e., nongreen parasitic or saprophytic plants).

COUNTIES: Includes all counties for Colorado (63), Montana (56), North Dakota (53), Utah (29), and Wyoming (24).

Present– the plant is known to occur in the county based on a specimen of the plant being deposited and verified in one of the following herbaria: Colorado State University, Fort Collins, CO; University of Colorado, Boulder, CO; U.S. Forest Service Herbaria, Fort Collins, CO; Montana State University, Bozeman, MT; University of Montana, Missoula, MT; North Dakota State University, Fargo, ND; University of North Dakota, Grand Forks, ND; Utah State University, Logan, UT; and Rock Mountain Herbarium, Laramie, WY.

Reported– the plant has been reported in the county, but there was no specimen of it in the herbaria listed when surveyed. Reported records are generally obtained from reliable literature citations.

COVER VALUE: the degree to which a plant provides environmental protection (i.e. thermal, nesting, brooding or feeding cover), during one or more seasons.

Good– readily utilized for cover when available.

Fair– moderately utilized for cover when available.

Poor– rarely or never utilized for cover when available

DISTURBANCE INDICATOR: a plant whose growth and distribution commonly indicates one of the following types of disturbance. Indicators are only scored once in the order of precedence shown.

Erosion– the accelerated wearing away of rocks and soils at the earth's surface by natural processes.

Mechanical– the physical disturbance of the soil and vegetation by trampling of man or animals or by machinery.

Overgrazing– excessive feeding by domestic or wild animals.

Fire– disturbance by burning.

Other– indicates a disturbance not listed (e.g., flooding or poor drainage).

No– the presence of the plant does not indicate a disturbance.

EDIBLE: a plant that can be eaten as food by humans.

Yes– one or more parts of the plant are edible.

Yes-qualified– the plant is edible only after a specific preparation or in certain seasons. User should consult expert.

No– the plant is not edible but not poisonous.

Poisonous– the plant contains toxic substances or potential toxic substances that would prove harmful if ingested..

ENERGY VALUE: the usable energy a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a <u>comparable life form</u> (i.e. a grass is compared to other grasses).

High– retains usable energy value well during fall and winter (e.g. cures well and/or retains leaves).

Medium– retains usable energy value moderately well during fall and winter.

Low– poor retention of usable energy value during fall and winter (e.g., cures poorly and/or drops leaves).

EROSION CONTROL POTENTIAL: a plant that commonly exhibits growth habit, plant structure, biomass and/or root system that has the potential to reduce soil erosion.

High– plant that has aggressive growth habits, persistent plant structure, high potential biomass, and/or good soil-binding root-rhizome-runner system in established stands.

Medium– plant that has moderately aggressive growth, moderately persistent plant structure, moderate potential biomass, and/or moderate soil-binding root-rhizome-runner system in established stands.

Low– plant that has poor growth, persistence, biomass and/or soil-binding root system that makes it generally inadequate for erosion control.

ESTABLISHMENT REQUIREMENTS: the relative extent of cultural practices that must be employed to ensure a successful planting of the species on sites to which it is adapted .

High– species requires elaborate or intensive cultural practices (e.g. irrigation, special seed treatments, containerized seedlings).

Medium– species requires standard tillage practices or special cultural practices of short duration (e.g. plowing and/or discing and drilling).
Low– species requires only minimal cultural practices (e.g. pioneer or invader species).

FAMILY: a name category ranking below an order and above a genus. This category has the ending "-aceae".

FOOD VALUE: the relish and degree of use shown by a wildlife species for a plant or plant part, as well as the plant's availability throughout its range.

Good– readily to moderately available in the plant's range and consumed to a high degree.

Fair– readily to moderately available in the plant's range but consumed only to a moderate degree.

Poor– available but the plant is consumed to only a small degree or not at all.

GENUS: a name category ranking below a family and above a species. The use of the genus followed by a Latin adjective or epithet forms the scientific name of a plant.

GROWTH ON SOILS: the relative ability of a plant to show the full development of all phases of its growth potential on a particular soil texture or soil type where the plant normally occurs.

Good– the plant is highly adapted to growth on a particular soil texture or soil type.

Fair– the plant is moderately adapted to growth on a particular soil texture or soil type.

Poor– the plant shows little or no adaptability to growth on a particular soil texture or soil type.

Growth on Gravel– a soil in which large particles (between 2mm and 7.62 cm) make up 70% or more of the material by weight.

Growth on Sand– a soil in which the sand separates (0.05 - 2mm) make up 70% or more of the material by weight.

Growth on Sandy Loam– a loamy soil that is intermediate in texture between sand and loam.

Growth on Loam– a soil that is considered to have an ideal texture for gardening. It contains about equal amounts of silt (0.002 - 0.05 mm) and sand and less than 25% clay.

Growth on Clay Loam– a loamy soil that is intermediate in texture between clay and loam.

Growth on Clay– a soil with at least 35% clay separates (less than 0.002 mm) by weight but not more than 50%.

Growth on Dense Clay– a soil with at least 50% clay separates (less than 0.002 mm) by weight.

Growth on Organic Soils– a soil that contains more than 20% organic matter by weight.

Growth on Acidic Soils– a soil with a pH less than 6.

Growth on Saline Soils– an alkaline soil with a conductance of saturation extract exceeding 4 mmho/cm but with sodium comprising less than 15% of the absorbed cations and pH of less than 8.5.

Growth on Sodic Soils– an alkaline soil with both a pH of 8.5 or higher and an exchangeable sodium content of 15% or more but with conductance of saturation extract less than 4 mmho/cm.

Growth on Sodic-Saline Soils– an alkaline soil with both conductance of saturation extract exceeding 4 mmho/cm and exchangeable sodium content of 15% or more but with a pH of less than 8.5..

GROWTH ON SLOPES: the capability of a plant to grow naturally on gentle (0-8%), moderate (9-30%), or steep (31+%)slopes.

Descriptors for above slopes:

Good– plant frequently occurs on indicated slope.
Fair– plant occasionally occurs on indicated slope.
Poor– plant rarely or never occurs on indicated slope.

HABITAT: the type of locality or set of ecological conditions under which a plant grows, defined here in terms of the moisture requirements of the plant.

Dry– the plant grows in soil that is characterized by conditions of extended periods of soil drought.

Dry-moist– the plant may grow in either dry or moist habitats.

Moist– the plant grows in soil that is characterized by conditions of medium soil moisture.

Moist-wet– the plant may grow in either moist or web habitats

Wet– the plant grows in soil that is saturated with water. Includes plants that are occasionally emergent aquatics during periods of excessively high water levels.

Dry-moist-wet– the plant may grow in dry, moist, or wet habitats.

Emergent aquatic– the plant grows in a fresh water environment with its vegetation parts floating upon or rising above the water surface.

Submerged aquatic– the plant grows in a fresh water environment with its vegetative parts not rising above the water surface.

Phreatophytic– the plant derives its water supply from the water table and its growth is more or less independent of short term rainfall. If the water table is essentially at the soil surface during most of the growing season, the plant is scored as a wet habitat plant rather than a phreatophyte.

Epiphytic– the plant grows upon another living plant. It may or may not obtain nutrients from the host.

HAYFEVER CAUSING: inducing a hayfever response in humans.

Yes– the plant is reported in the literature as causing hayfever.

Maybe– the plant is reported to possibly cause a hayfever response; thought to be hayfever-causing but not yet proven so.

No– the plant is known to be definitely not hayfever-causing in any circumstances and reported so in the literature.

INFRASPECIFIC: a morphologically recognizable category of classification below a species. Refers to subspecies, varieties, or forms.

LONG-TERM REVEGETATION POTENTIAL: the ability of a plant to become established and persist over a period of more than 3 years.

High– plant demonstrates good growth, cover, reproduction, and maintenance characteristics.

Medium– plant demonstrates fair growth, cover, reproduction, and stand maintenance characteristics.

Low– plant demonstrates poor growth, cover, reproduction, and stand maintenance characteristics.

MAXIMUM ELEVATION -UT: The highest elevation at which a plant has been collected in Utah. Recorded in 100-foot intervals from 2,000 to 14,000 feet.

MAXIMUM ELEVATION-WY: The highest elevation at which a plant has been collected in Wyoming. Recorded in 100-foot intervals from 3,000 to 15,000 feet.

MAXIMUM ELEVATION-ND: The highest elevation at which a plant has been collected in North Dakota. Recorded in 100-foot intervals from 800 to 3,500 feet. Elevation data for North Dakota are not currently in the data bank.

MAXIMUM ELEVATION-MT: The highest elevation at which a plant has been collected in Montana. Recorded in 100-foot intervals from 1,500 to 13,000 feet.

MAXIMUM ELEVATION-CO: The highest elevation at which a plant has been collected in Colorado. Recorded in 100-foot intervals from 3,000 to 15,00 feet.

MINIMUM ELEVATION-ND: The lowest elevation at which a plant has been collected in North Dakota. Recorded in 100-foot intervals from 800 to 3,500 feet. Elevation data for North Dakota are not currently in the data bank

MINIMUM ELEVATION-UT: The lowest elevation at which a plant has been collected in Utah. Recorded in 100-foot intervals from 2,000 to 14,000 feet.

MINIMUM ELEVATION-WY: The lowest elevation at which a plant has been collected in Wyoming. Recorded in 100-foo intervals from3,000 to 15,000 feet.

MINIMUM ELEVATION-MT: The lowest elevation at which a plant has been collected in Montana. Recorded in 100-foot intervals form 1,500 to 13,000 feet.

MINIMUM ELEVATION-CO: The lowest elevation at which a plant has bee colleted in Colorado. Recorded in 100-foot intervals from 3,000 to 15,000 feet.

MYCORRHIZAL RELATIONSHIPS: the nature of the relationship of a plant to a mycorrhizal association. All plants listed as being mycorrhizal have been cited in the literature as such. It should be recognized that most plants are considered to be mycorrhizal, but published reports are available for only a few at the present time.

Endomycorrhizal– mycorrhizal association having a loose network of fungal hyphae enclosing the root and intracellular hyphae penetrating the cortical cells of the root.

Ectomycorrhizal– mycorrhizal association having a dense fungal sheath enclosing the root and intercellular hyphae penetrating the root cortex.

*Ectendomycorrhiza*l– mycorrhizal association having a dense fungal sheath enclosing the root and both inter- and intracellular hyphae penetrating the root cortex.

Endo/ecto– refers to plants reported as being both endomycorrhizal and ectomycorrhizal

Ecto/ectendo– refers to plants reported as being both ectomycorrhizal and ectendomycorrhizal.

Nonmycorrhizal– refers either to plants that have been examined for mycorrhizae with none found or plants that occur in families considered to be classically nonmycorrhizal [Aizonaceae, Amaranthaceae, Brassicaceae (Cruciferae), Caryophyllaceae, Chenopodiaceae, Commelinaceae, Cyperaceae, Fumariaceae, Juncaceae, Nyctaginaceae, Polygonaceae, and Urticaceae]. Thus, t/e plants are probably nonmycorrhizal, although exceptions may be found in the future.

NITROGEN FIXING: a plant that can assimilate and fix the free nitrogen of the atmosphere with the aid of microorganisms.

Yes– plant fixes nitrogen, as reported in the literature.

Maybe– the plant may fix nitrogen, but has not been reported as such in the literature.

No– plant is known not to fix nitrogen.

NODULE FORMING: occurrence of root nodules on a plant's roots.

Reported– reported a nodule forming by observation or in the literature.

Possible– may form root nodules but no literature citation has bee found.

No– reported as not nodule forming in literature.

OPTIMUM SOIL DEPTH: depth of soil to parent material on which a plant normally produces best growth. Measured in inches.

0-10– very shallow

10-20– shallow to medium

20+– deep

ORIGIN: the geographic area to which a plant is indigenous.

Native: any plant known to be indigenous to Colorado, Montana, North Dakota, Utah, or Wyoming. The descriptor state, “native”, takes precedence over all other geographic descriptors except “native”.

Africa:

Asia:

Australia-Pacific:

Eurasia: Europe and Asia

Europe:

South America:

PALATABILITY: the relish and degree of use shown by livestock for a plant or plant part.

Good– highly relished and consumed to a high degree.

Fair– moderately relished and consumed to a moderate degree.

Poor– not relished an normally consumed to only a small degree or not at all.

POISONOUS-LIVESTOCK: plants that contain or produce, under natural conditions, physiologically active or toxic substances in sufficient amounts to cause harmful effects in livestock or produce mechanically injurious plant parts. Each plant is included in only one category in the order of precedence shown.

Major– a plant that typically produces substances of high toxicity, may be highly or moderately palatable, and is usually available in its range, This category includes plants that often accumulate selenium, molybdenum, or nitrates to toxic levels. Plants in this category cause the majority of livestock losses.

Minor– a plant that produces substances of low toxicity and/or rarely produces substances of high toxicity, and/or has low palatability, and/or is usually unavailable or rare in its range. This category includes plants that are secondary selenium or molybdenum accumulators. It should be noted that also included in this category are legumes, crop plants, and other species of significant economic value that rarely cause toxicosis or bloat and then only under unusual conditions of weather, local abundance of the plants, or animal hunger. Careful management will usually alleviate these problems

Mechanical injury– a plant that produces a mechanically injurious plant part during some part of the growth cycle. Suspected– a plant of suspected but not confirmed toxicity, This category includes some plants that are suspect because there are known toxic species in the same genus.

No– a plant believed to be nontoxic.

POTENTIAL BIOMASS PRODUCTION: the relative genetic ability of a plant to produce plant material by weight on an annual basis compared to other members of the same life form (a grass is rated against other grasses, etc.). Species are rated as if growing on the sites where they are typically found. Thus, a plant may have a higher or lower biomass production than the rating given by PIN if it occurs on a site more favorable or less favorable than its normal site.

High– plant possesses ability to produce a greater yield of dry plant material than most other species of the same lifeform. Examples of high producing species of different lifeforms are big bluestem (*Andropogon gerardii*), smooth brome (*Bromus inermis*), alfalfa (*Medicago sativa*), yellow sweetclover (*Melilotus officinalis*), big sagebrush (*Artemisia tridentate*), snowbrush cantus (*Cantus flutings*)< Engelmann spruce (*Pica Engelmann*), and plains cottonwood (*Populous deltoids occidentals*).

Medium– plant produces an average yield of dry plant material as compared to other species of the same lifeform. Examples of medium producing species of different lifeforms are timothy (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*), common sunflower (*Helianthus annuus*), alsike clover (*Trifolium hybridum*), shadscale (*Atriplex confertifolia*), western snowberry (*Symphoricarpos occidentalis*), limber pine (*Pinus flexilis*), and inland boxelder (*Acer negundo*).

Low– plant produces a low yield of dry plant material as compared to other species of the same lifeform. Examples of low producing species of different lifeforms are Sandberg bluegrass (*Poa sandbergii*), cheatgrass brome (*Bromus tectorum*), northern bedstraw (*Galium boreale*), broom snakeweed (*Gutierrezia sarothrae*), leadplant (*Amorpha canescens*), bearberry (*Arctostaphylos uva-ursi*), and creeping juniper (*Juniperus horizontalis*).

Very Low– plant produces a very low yield of dry plant material as compared to their species of the same lifeform. Examples of very low producing species of different lifeforms are ring muhly (*Muhlenbergia torreyi*), sixweeks fescue (*Vulpia octoflora*), harebell (*Capanula rotundifola*), Hoods phlox (*Phlox hoodii*), cushion coryphantha

(*Coryphantha vivipara*), and bristlecone pine (*Pinus aristata*).

PROTEIN VALUE: the digestible protein a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a comparable life form (i.e., a grass is compared to other grasses).

High– retains digestible protein value well during fall and winter (e.g., cures well and/or retains leaves).

Medium– retains digestible protein value moderately well during fall and winter.

Low– poor retention of digestible protein value during fall and winter (e.g. cures poorly and/or drops leaves).

SHORT-TERM REVEGETATION POTENTIAL: the ability of a plant to become quickly established and exhibit rapid growth with 1 to 3 years (includes annuals).

High– plant demonstrates rapid growth, good cover, and good reproduction.

Medium– plant demonstrates moderately rapid growth, fair cover, and fair reproduction.

Low– plant demonstrates slow growth, poor cover, and poor reproduction.

SPECIES: the lowest, most commonly used category of taxonomic classification, ranking below a genus.

VEGETATION ASSOCIATION: vegetation zones are defined by Kuchler (1964)

Alpine Meadows/Barren
Western Spruce-Fir Forest
SW Spruce-Fir Forest (SW = Southwestern)
Douglas Fir Forest
Pine-Douglas fir Forest
Black Hills Pine Forest
Western Ponderosa Forest
Eastern Ponderosa forest
Northern Floodplain forest
Juniper-Pinyon woodland
Mountain Mahogany-Oak Scrub

Great Basin Sagebrush
Saltbrush-Greasewood
Sagebrush Steppe
Wheatgrass-Needlegrass Shrubsteppe
Foothills Prairie
Sandsage-Bluestem Prairie
Wheatgrass-Needlegrass
Grama-Wheatgrass-Needlegrass
Grama-Buffalograss

WEEDINESS: a plant considered undesirable or troublesome, especially on that is growing where it is not wanted. Each plant is scored only once in the order of precedence below.

Noxious– a plant that is listed on official noxious weed seed lists. The specific state or States in which a plant is considered noxious is indicated by a hyphenated abbreviation at the end of the word “noxious”.

Economic– a plant whose growth and reproduction cause economic loss.

Colonizing– a plant that has attributes enabling it to become easily established in areas of environmental disturbance or where it is not wanted.

No

Use of Local Ecotype Seed Restoration Potentials and Technological Constraints

By
Wendell Hassell
Pawnee Buttes Seed Inc.

LOCAL ECOTYPE SEED POTENTIAL

- “OPPORTUNITIES UNLINITED”
- “DEMAND OUT STRIPS THE SUPPLY”
- “OFTEN DEPENDS ON THE GROUP”
- “REALLITY CHECK”

To preserve genetic diversity and ensure that the plants used in revegetation projects are adapted for local conditions, it is important to use local ecotypes of native species. Ecotypes are populations of a plant species that are genetically adapted for a given set of conditions. Current literature indicates that the use of appropriate ecotypes can significantly affect restoration project success (Knapp and Rice 1996). This is a greater factor for some species than others (Lesica and Allendorf 1999) depending on their reproductive system, genetic variation among and within populations, and the degree of disturbance at the restoration site.

Choices of seed sources are listed below, beginning with the most desirable options and ending with the least desirable.

- Local ecotypes of native species (from sources less than 100 miles from Missoula)
- Similar ecotypes of native species (from sources over 100 miles from Missoula, but a similar region)
- Commercial-source seeds of native species
- Commercial- source, cultivars of native species
- Native species that are not found on the project areas
- Non-native species that do not reproduce beyond the first growing season.

Process / Key Elements

- Collect / Direct Seed Back
- Field Increase / Plant Back

Collect and Direct Seed

- Collect seed
- Clean seed and quality test
- Direct seed back on site
- Willing to take some risk

Field Increase

- Source of seed
- Propagation
- Field management
- Seed Conditioning
- Resources and Funding

Propagation

- Protocol for germination
- Greenhouse transplants
- Direct field seeding

Field management

- Irrigation
- Weed control
- Insect control
- Harvest seed

Seed Conditioning

- Drying
- Cleaning
- Storage

Resources and Funding

- Public
- Commercial
- Volunteer

Other Considerations

- Technical expertise/experience
- Equipment
- Time dependent
- Getting what you ask for

Actual Projects

- Years
- Funding
- Number of Species
- Cost
- Success
- Constraints

National Park Service

- Initiated 1989
- Long term agreements/funding
- Cooperation between Federal agencies
- Policy and philosophy constraints

City of Denver/USFW

- Cooperative project initiated 1999
- Species collected 96 / 215
- Collection cost $10,000
- Propagation – City nurseries
- Field operations - drip system $ 2,500
- Maintenance $ 1,000 / month
- Individual interest/personal assigned
- Budget and priorities

Commercial Project

- Initiated 2003
- Greenhouse transplants $0.30 each
- Land/operations $7,000 / Year/Ac
- Success – 3/9 species
- Returns on investment $ 0.00
- Cleaning equipment $ 45,000


05/10/2004


07/24/2004


07/24/2004


07/24/2004


07/24/2004


05/10/2004


07/24/2004


07/24/2004


07/24/2004

Boulder County

- Initiated 2003
- Focus on foothill grasses
- Species 6 – 7 in Ponderosa
- Volunteer groups collecting
- Commercial cleaning
- County budget $5,000
- Field increase
- Cooperative uses

Constraints

- Species
- Moisture
- Weeds
- Growth form
- Equipment
- Technology


05/10/2004

THE END

Presentations by:
Jay Davison
University of Nevada Reno
Cooperative Extension Service
September 28, 2004

Native Seed Production Program in Nevada

Jay Davison

University of Nevada Cooperative Extension

Native Seed Production Program in Nevada

- Obtain funding to complete program.
- Build support at top administrative levels.
- Coordination with Federal/State/Private interests.
- Establish local research/extension efforts.
- Organize potential Nevada seed producers.
- Develop a stable demand for native seeds.
- Establish local demonstration projects
- Conduct out/reach and education programs.

Obtain Funding to Complete Program

- Nevada State BLM Office contacted Cooperative Extension regarding increases of native seed in Nevada.
- Secured approximately $140,000 for research and Extension work.
- Developed proposals outlining products for research and Extension efforts
- BLM signed cooperative agreements with UNR to complete projects.

Build Support at Top Administrative Levels

- Governor was convinced of need and benefits (Department of Agriculture).
- Senior Senator supports rural development projects in Nevada.
- State BLM Director was convinced of need and benefits.
- Program was viewed as environmentally and economically important to rural communities.

Project Leadership

- Department of Agriculture employees (Karen Grillo, Don Henderson) were instrumental in leading the effort.
- Scheduled regular meetings,made follow-up phone calls encouraging participation, distributed minutes.
- Obtained funding for demonstrations,organizations, and seed lab.
- Kept diverse organization on track.

Coordination with Federal/State and Private Interests

- NRCS plant material center personnel (ID, WA) participate on committee.
- Nevada growers actively participate on committee.
- Utah crop association personnel regularly consulted.
- BLM has existing relationship with USFS Shrub Lab in Provo Ut.
- Ongoing relationship with Utah Division of Wildlife personnel.
- Met regularly with ARS personnel, UT, NV.

Steering Committee Membership

- BLM
- U.S.F.S
- NRCS
- U.S.FWS
- ARS
- Indian Tribal Reps
- U.S. Senate Reps
- NvDA,NvDF,NDOW
- University of Nevada (UNCE, CABNR)
- DRI
- Governor's Office Rep
- Farm Bureau
- Consultants
- Private growers

Local Research Efforts

- Obtained grant funding $100,000 for researchers at UNR.
- Established priorities of growing locally adapted ecotypes from Nevada collections.
- Established research plots in 3 locations.
- Lobbied for new Plant Materials Center to be located in Nevada (July 1, 2004).

Testing local ecotypes at 3 locations.

Survival determination and seed increases primary tasks.

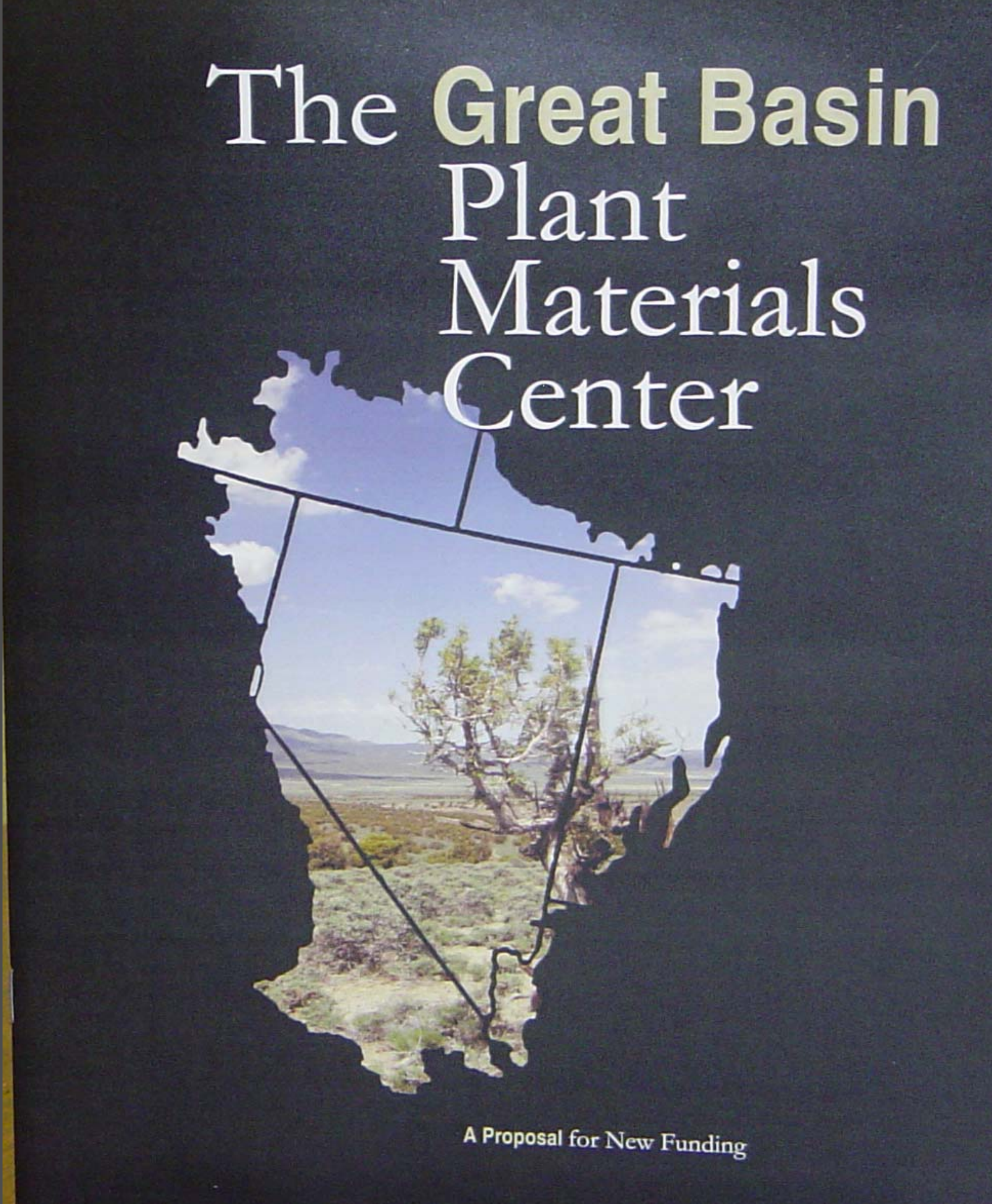
Ongoing projects.

PMC has been funded at approximately $5000,000 For 2004-2005.

NRCS currently in negotiations
with UNR concerning lease terms

Good possibility that the details will be finalized in December 2004.

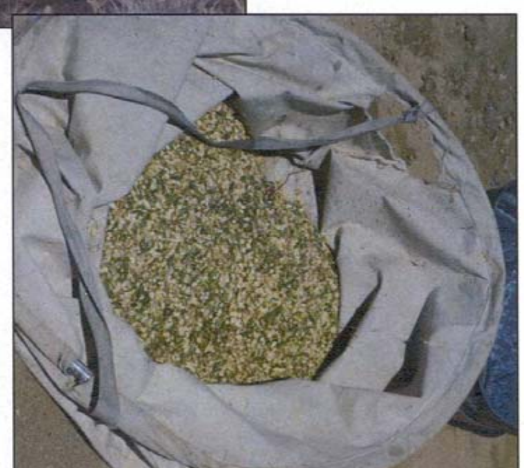
Continued funding has already been proposed for future years.



Cooperative Extension Efforts

- Write and publish a native seed collection guide for Nevada.
- Conduct workshops on native seed collection.
- Assist BLM in developing long term native seed production contracts.
- Assisted growers in preparing “Specialty Crop” grant proposals.
- Assist in the establishment, maintenance and harvest of native seed demonstration projects.
- Conduct outreach activities on native seed production.

A Field Guide for Collecting Native Seeds in Nevada



Jay Davison
Area Plant and Soil Specialist

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WANT TO EARN EXTRA MONEY?

LEARN HOW

ATTEND A NATIVE SEED COLLECTION WORKSHOP AND LEARN WHAT IT TAKES TO BE SUCCESSFUL

WORKSHOP DATES AND LOCATIONS

Tonopah	Tuesday, May 6th, 9:00 –12:00 noon	**Tonopah Convention Center** **301 West Brougher** **Tonopah, Nevada**
Ely	Tuesday, May 6th 4:00- 7:00 p.m.	**White Pine County Library** **950 Campton** **Ely, Nevada**
Elko	Wednesday, May 7th 9:00 –12:00 noon	**NRCS Office** **555 West Silver St. #101** **Elko, Nevada**
Winnemucca	Wednesday, May 7th 4:00 –7:00 p.m.	**Humboldt County Extension** **1085 Fairgrounds Road** **Winnemucca, Nevada**
Fallon	Thursday, May 8th 9:00 – 12: noon	**Churchill County Extension** **111 Sheckler Road** **Fallon, Nevada**

Topics to be presented include:

- Presentation of a comprehensive Native Seed Collection Handbook
- BLM Policies and Fees
- Collection techniques tips
- Seed source certification program
- Marketing tips from a seed buyer

For more information, call Jay Davison at (775) 423-5121 or your local Cooperative Extension Office.

Sponsored by the Nevada State Office of the Bureau of Land Management and University of Nevada Cooperative Extension

Specialty Crops grant program $125,000 available statewide.

Two producers successful in obtaining grant funds & planted 27 acres (4 species).

Three other producers planted approximately 50 acres (shrubs/grasses) without grant funds.

Outreach and Education

- Presented seed production program at national and regional professional meetings.
- Conducted 5 workshops in Nevada in 2003.
- Conducted field days at producers farm in Fallon 2003 and 2004.
- Utilized popular media to spread the word about native seed opportunities (newspapers, trade magazines).

Organizing Potential Nevada Seed Producers

- Recruited existing seed producers (alfalfa grass) for service on the committee.
- Obtained grant money ($5,000) to support the establishment of Native Seed Producers Association.
- Begin a separate effort to form producers organization.
- Aggressively pursued the program over the long term.

Organizing Potential Nevada Seed Producers

- Promote the native seed production program in Nevada.
- Act as a clearing house for native seed information.
- Coordinate native seed sales/buys
- Provide guidance to BLM and other major purchasers on reducing impediments to native seed production (rules &regulations).

Developing a Stable Demand for Native Seed in Nevada

- Market price swings/demand is the major impediment to large scale farm production.
- BLM is major native seed consumer and will buy locally produced seed.
- Stable market saves BLM $ and insures adequate native seed for revegetation needs.
- Developed a long term service contract for seed production.
- GBRI will have large seed need.

Reasons For Success to Date

- Commitment at the highest levels of Federal and State agencies
- Persistent and continuing facilitation efforts by NvDA personnel
- Ecologically and economically beneficial
- Minimal potential for conflict among all participants

Current Activities

- Increasing the number of species being grown by producers and researched
- Working on developing additional market outlets for current native seed producers.
- Assisting NRCS with implementation of off-site PMC in Fallon.

Thank You

Jay Davison
University of Nevada, Reno Cooperative Extension

Organizing the Nevada Wildland Seed Producers Association

Jay Davison

University of Nevada Cooperative Extension

Fallon, Nevada

Nevada Wildland Seed Producers Association

P.O. Box 129
Orovada, NV 89425
Phone: 775-272-3274
Fax: 775-272-3294


4 3 '00


4 4 '00

Native Seed Program in Nevada

- Established a steering committee in 2001.
- Developed a list of priority species for Nevada.
- Secured grant funding for Nevada State Seed Lab, field trials, and establishment of wildland seed producers organization.

  Pursued the establishment of an offsite plant materials center.
- Encouraged the BLM to begin developing long term contract for growers.

Steering Committee Membership

- BLM
- U.S.F.S.
- NRCS
- U.S.FWS
- ARS
- Indian Tribal Reps
- U.S. House Reps
- U.S. Senate Reps
- NDOA, NvDF, NDOW
- University of Nevada (UNCE, CABNR)
- DRI
- Governor's Office Rep
- Farm Bureau
- Consultants
- Private growers

Priorities for Increasing Native Seed in Nevada

- Developed list of species to guide collection/production.
- First priority was to increase native seed collections from Nevada rangelands.
- Priority 2 was to increase farm production of priority species.
- **Priority 3 was to establish a seed producers organization**
- The last priority was to establish research programs & develop a proposal for the Great Basin Plant Materials Center.

Why Establish a Native Seed Producers Association?

- Nevada agriculture producers have little representation during the legislative process except for Farm Bureau (Most urban state in U.S.).
- Promote the native seed production program in Nevada.
- Act as a clearinghouse for native seed information in Nevada.

Organizing Potential Nevada Seed Producers

- Recruited members from existing seed producers (alfalfa).
- Personal contact, discussions, and invitations by members on the steering committee.
- Aggressive facilitation and support of organizational efforts by NDOA personnel.

Nevada Wildldand Seed Producers Association (organizational structure)

- President
- 1 or more Vice-Presidents
- Secretary
- Treasurer
- 9 Directors (3 year staggered terms with 3 standing for election every year).
- Committees (as needed by Directors)

Nevada Wildland Seed Producers Association (Mission Statement)

- *The Nevada Wildland Seed Producers Association, as a group of farmers with seed growing expertise, can be a key provider to the BLM, other government land managers, conservation groups and private landowners with the quantities and varieties of seeds needed at a reasonable price.*

Nevada Wildland Seed Producers Association (purpose)

- “To promote a healthy and viable native seed production industry in Nevada and to support Nevada seed producers engaged in this enterprise”.

Nevada Wildland Seed Producers Association (functions)

- Provide a contact point for government and private entities to communicate with seed producers.
- Share knowledge of government procedures and production contracts for seed and plant materials
- Promote a government procurement process that provides fair and equal access for Nevada producers.
- Establish a self funded process by which the Association can provide and distribute foundation seed stock to qualified Nevada producers.

Nevada Wildland Seed Producers Association (functions)

- Distribute available educational information on how to successfully produce native plant seeds and materials.
- Promote the establishment and uniform application of sound and comprehensive seed testing and certification requirements for the purpose of maintaining the reputation of quality seed production in Nevada and to safeguard conscientious producers.

Financial Support of Seed Producers Association

- Obtained $5,000 grant in support of the proposed seed producers association (Specialty Crop grant dollars).
- Utilized to pay legal fees, travel reimbursement, supplies, etc (11 meetings).
- Obtained approx $100,000 to fund seed technician position (NDOA) who works closely with Association (Fire Plan $ from U.S. Forest Service).
- Agency personnel actively support the Association using agency funds (travel, phone, clerical etc.)

Association Activities

- Incorporated in Nevada (501(c)(3) desired).
- Approximately 50% of seed producers in Nevada are members.
- Partnership on USDA Rural Development Grant awarded in 2003/2004 ($57,000).
- Continue to function in spite of poor market conditions and lagging interest in native seeds.

USDA Rural Development Grant $57,000

- Feasibility study for establishing a “Nevada’s Own” Wildland Seed Cooperative.
- Grow, process, package and market native Nevada grasses and forbs.
- Determine market demand and pricing.
- Determine production and distribution requirements.
- Determine business feasibility.

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Committed to the future of rural communities.

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Success Stories: USDA Rural Development Funds First Value-Added Producer Grant in Nevada

Outline of Need:

The State of Nevada frequently experiences wildfires; additionally, one of the main industries in Nevada is mining. Both of these create a need for land reclamation and restoration. State and Federal Land Management Agencies have determined that the use of native plant materials is more environmentally sound than the use of non-native plant materials in the reclamation of distressed areas. There is currently a fledgling Native Plant Materials Industry in Nevada. This industry recently formed the Nevada Wildland Seed Producers Association as an industry support organization. As a group, this organization wanted to explore ways in which they might further develop their industry and evaluate diversification of their existing enterprise.

How Rural Development Helped:

Thanks to the hard work and dedication of Nevada Rural Development's Business and Cooperative Specialist, Dan Johnson, Nevada Wildland Seed Producers applied for and was the recipient of Nevada's first Value-Added Producer Grant in the amount of $57,312 *(learn more about this program)*.

The Results:

USDA Rural Development funds will be used to complete a feasibility study on the formation of a Wildland Seed Producers Cooperative. The cooperative would clean, bag, process and market the native plant materials. The study will be completed by the University of Nevada Reno to determine the market demand and economic impact of such a business within the State of Nevada.

Photo: Nevada Wildland Seed Producers Value-Added Producer Grant Signing (Front Row Left-Right) Karen Grillo, Nevada Association of Counties, Kip McAlexander, Vice President, Nevada Wildland Seed Producers, Dr. Rang Narayanan, University of Nevada Reno; (Back Row Left-Right) Bob Dexter, Secretary, Nevada Wildland Seed Producers, Dr. Kynda Curtis, University of Nevada Reno, and Gail Munk, Treasurer, Nevada Wildland Seed Producers.

(April 2004)

Questions?

Handout Courtesy of:
Don Bermant
Granite Seed Company

AMERICAN SEED TRADE ASSOCIATION

The Use of Local Native Seed
Position Statement from the American Seed Trade Association

The seed industry has long recognized the importance of planting seed that is adapted to the site. The industry has come a long way since the early 'Dust Bowl' years when there were relatively few species commercially produced for restoring damaged lands. The number of species currently produced by the seed industry for land repair far exceeds the number of species produced by all other seed industries combined. However, land repair seed requirements are relatively small, requiring few total pounds each year. The seed industry has always depended upon its customers for guidance in producing the species they need to get their job done. However, the process breaks down when the seed supplier is uncertain of what the seed user needs because of changing goals and objectives of land repair.

The purpose of this Position Statement is to set a framework within which the land manager can make consistent decisions that the seed supplier can predict. Since the seed supplier must plan their crops one or more years in advance, a consistent and predictable use of materials will help insure that the correct species are produced in the quantities needed to service the land repair business. The American Seed Trade Association (ASTA) believes that the process of specifying plant material for land repair can be made more predictable if the land manager follows certain guidelines when planning present and future land repair projects. These guidelines are as follows:

1) Identify a flexible set of goals and objectives for the land repair project.
2) Carefully assess those goals and objectives to insure they are ecologically and economically achievable.
3) Select plant materials that are consistent with the goals and objectives of the project.
4) Select plant materials whose ecological and economic success to the project can be demonstrated by sound science.
5) Select plant materials that are either currently available in the marketplace or can be acquired within a reasonable period of time.
6) Change the goals and objectives of the project when they are difficult to attain because of ecological or economic constraints.
7) Publish reports of project successes and failures and encourage research institutions to improve the techniques used for land repair.

Definitions:

In order to reduce confusion and ensure that concepts mentioned in this position statement are clearly understood, ASTA believes it is necessary to clearly define some of the major terms used in the land repair industry.

Land Management Definitions:

ASTA recognizes that land management goals can range in scope from: a) restoring the community to a pristine state to b) rehabilitating a community to a cultural use, such as an improved pasture. In order to assist the land manager in making sound decisions and the seed industry in acquiring the needed species to service these decisions, ASTA believes that the land manager should define his goals within the context of land management terminology. The following terms are used to assist at arriving at this end.

Land Restoration: The re-creation of conditions that would allow the ecosystem to return to the characteristics that are ecologically representative of those prior to the land disturbance.

Land Rehabilitation: The establishment of an ecosystem that is ecologically reminiscent of, but not representative of, the pre-disturbance ecosystem, including native and/or introduced species that are similar in ecological structure and function to species native to the site.

Land Reclamation: The creation of an ecosystem that is substantially different ecologically from the endemic ecosystem, yet is compatible with existing land-use practices, such as grazing, recreation, or supplemental irrigation.

Plant Materials Defined:

Local Native Plant Material: Plant material that is the same species as plant material naturally occurring at the site and whose origin is from the region where it is being planted. It may be wildland-harvested, pre-varietal, or variety/cultivar plant material as long as the first generation of plant material came from the region where it is being planted.

Non-Local Native Plant Material: Plant material that is the same species as that occurring at the site but that does not originate from the region targeted for use.

Introduced Plant Material: Plant material whose species is not native to the region where it is being planted.

Released Plant Material: Plant material that has been made available to the public after approval by officials in the public or private sectors. It may be either a variety/cultivar or a pre-variety germplasm; be either local native, non-local native, or introduced in origin; originate from either a single location or multiple locations; and be developed using the plant breeding techniques of hybridization and artificial selection for certain performance characteristics ("genetically manipulated") or without such techniques ("natural").

ASTA's Position on the use of Plant Material for Land Restoration, Rehabilitation, and Reclamation

ASTA recognizes that the goals and objectives identified for repairing land can differ from project to project.

ASTA also recognizes that the differences in definition between land restoration, reclamation, and rehabilitation may not be distinct but rather form a continuum from one objective to the next. ASTA recognizes that plant communities, undisturbed or disturbed, are always changing and that the differences between restoration, rehabilitation, and reclamation may intergrade when considering the direction the natural plant community may be moving.

ASTA believes that the land manager must carefully specify a goal that is attainable. He must determine the overall objectives of the project and then select the plant materials to best attain those objectives.

Plant Materials for Land Restoration: ASTA advocates the use of Local Native Plant Material when the goal of the project is Land Restoration. ASTA understands that Land Restoration objectives can differ from project to project because of factors such as degree of disturbance, availability of plant material, and cost of the project. ASTA believes that if the goal of the project is restoration of the species composition that is genetically similar to the pre-disturbed community, if that goal is economically reasonable, and if the plant material is either readily available or can be acquired within a reasonable period of time, the land manager should use Local Native Plant Material. However, if the materials are not available or are unreasonably expensive, ASTA recommends the use of Released Plant Material, either Local Native Plant Material if available, or otherwise Non-Local Native Plant Material.

ASTA recognizes that Land Restoration is an objective that may be impossible to achieve in the short term. However, ASTA also believes that a step in this direction may be attained by using a combination of Local and Non-Local Native Plant Materials that have either been Released and produced under cultivation or wildland-harvested with or without Release.

ASTA believes the use of Introduced Plant Materials may be necessary in situations where the disturbance to the site has been so severe as to greatly diminish the ability of Local Native Plant Materials to establish and reproduce. Under these circumstances, Introduced species may be used to facilitate the future establishment of Local Native species, i.e., assisted succession.

Plant Materials for Land Rehabilitation: ASTA understands that the goals of Land Rehabilitation may differ between projects. ASTA understands that the goal for some projects may be the use of Native Plant Materials while the goal for other Land

Rehabilitation projects may be the use of a mixture of Introduced and Native Plant Materials. However, the common goal for all Land Rehabilitation projects is the creation of a plant community that is self-sustaining without periodic human intervention.

ASTA recognizes that Released Plant Materials have been subjected to a variety of testing protocols, such as site adaptation, seed yield, and pest resistance. Because of this testing, ASTA believes that the risk associated with using Released Plant Materials is less than the risk associated with Non-Released Plant Materials. Furthermore, Released Plant Materials are more readily available in the marketplace than Non-Released Plant Materials. Therefore, ASTA suggests that the first choice of plant material for Land Rehabilitation should be Released Plant Materials.

ASTA recognizes that no Released Plant Material may be available for some desired plant species. In these situations, ASTA suggests the use of Non-Released Plant Material.

The use of Local Native, Non-Local Native, or Introduced Plant Material depends upon the goal of the Land Rehabilitation project. The use of a single one of these categories or combination of them is acceptable as long as it promotes the goals of the Land Rehabilitation project.

ASTA recognizes that, even though Land Rehabilitation differs from Land Restoration, the two may intergrade, and Land Rehabilitation may become Land Restoration at a later date. This change in objectives may be directed by a combination of influences such as land management practices, reintroduction of Local Native Plant Materials, or by natural ecological processes.

Plant Materials for Land Reclamation: Because Released Plant Material has been selected for certain traits and tested under different protocols, ASTA advocates the use of Released Plant Material over Non-Released Plant Material when the goal is Land Reclamation. ASTA considers the use of Local Native, Non-Local Native, and Introduced Plant Materials acceptable as long as they assist the land manager in attaining his goals.

The Need for Flexible Objectives when Designing Land Repair Projects:

For all cases of land repair the goal of the project should be the reestablishment of a functional ecosystem. If, when designing the project, the land manager finds it economically or ecologically impractical to attain his goal of Land Restoration, Rehabilitation, or Reclamation, ASTA suggests changing goals to another land use

objective. Failure to be flexible and to reevaluate objectives could result in complications from other environmental perturbations, such as the establishment of invasive weeds or pollution of groundwater from erosion.

The Need For Future Research:

ASTA recognizes that the Land Restoration, Rehabilitation, and Reclamation industry has come a long way since its infancy. ASTA also recognizes the need for more research into the development and use of plant materials, as well as Land Restoration, Rehabilitation, and Reclamation techniques. Therefore, ASTA advocates ongoing and unbiased research, incorporating sound scientific procedures into plant materials development and land repair techniques.

Approved by the ASTA Board of Directors
July 1, 2004
ASTA Convention
Philadelphia, Pennsylvania

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