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PLANTS: A GROWING ALTERNATIVE

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Testing a Revegetation Technique in the Arid Southwest without Intensive Irrigation

After wildfires, rehabilitation of plant communities is of great importance (see seeding article in this issue). Re-establishing woody vegetation from seed is not very effective in the arid southwest, and a successful transplanting system that has minimal follow-up maintenance, particularly irrigation, is needed. Planting container grown shrubs along with some irrigation is essential for successful revegetation of most dry sites. The use of tall-pot containers coupled with a once-a-year application of a superabsorbent hydrogel (sodium carboxymethyl cellulose) for irrigation is being tested by the Los Lunas, NM Plant Materials Center (PMC) at three locations in northern New Mexico that receive 10-14 inches of precipitation annually. Another superabsorbent product having substantially lower cost per application is also being evaluated.

The superior performance of containerized transplants grown in tall-pots (containers longer than 24 inches) has been well-documented by other researchers. Seedlings grown in deep containers (e.g. PVC pipe) have had improved survival and growth compared to transplants grown in containers 6-12 inches deep. Excellent seedling survival and growth has been demonstrated even in areas with less than 3 inches of rain per year if plants are properly planted and provided with minimal water (2-3 supplemental waterings totaling about 2 quarts). The Center for Arid Lands Restoration at Joshua Tree National Monument in California has developed a tall-pot made with 32-inch tall, 6-inch diameter PVC pipe with a wire mesh base held by cross wires. Survival rates were more than 40 percent greater for these tall-pot transplants planted on a south facing slope in the low desert compared with transplants grown in 16-inch tall pots. In Australia, tall-pots have been used with consistent success.

Plant trials on reclaimed mine tailings have shown it is essential to supply irrigation water during the first two growing seasons where annual precipitation is 11-12 inches. As an alternative to traditional irrigation, a superabsorbent hydrogel might be applied to serve as a slow release water reservoir. A superabsorbent hydrogel is a crosslinked polymer or acrylonitrile with cellulose that absorbs and retains water hundreds of times its own weight. Some superabsorbents have been used as soil additives in

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Transplanting native shrub grown in tall-pot

Revegetation Seeding after Wildfires

Plant cover is one of the most important factors influencing soil erosion. Healthy vegetation helps control erosion by shielding the soil from the impacts of wind and raindrops, allowing the soil to absorb water, and slowing the velocity of runoff. Following a wildfire there's a good chance that native seeds on a burned site are still alive and will germinate. On severely burned areas, seeding may be needed.

To seed or not to seed

To identify locations where seeding is necessary, a field check of the burned area and a map of areas that have burned intensively should be completed. Black ash indicates that the fire probably moved rapidly through the area and did little damage to seeds laying in the soil; however, white ash indicates where the fire was very hot and it is likely that seeds in these areas were destroyed. Areas burned that were in thick brush without a grass understory will not have enough seed to germinate, establish, and protect the site. Exposed areas like temporary roads, firebreaks, and steep embankments including cut-and-fill slopes should also be planted.

Desirable plants include perennial grasses, forbs, and shrubs. Plants appropriate for use on burned areas will vary based on location, and Plant Materials personnel can provide recommendations to NRCS field offices. Species should be selected

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Plant Materials Program Wildfire Activities

Many Plant Materials Centers and Specialists are involved in wildfire-related projects. These activities range from developing plants and techniques for rehabilitation of burned lands to researching which plants and landscaping methods may help to lessen fire damage and protect lives in populated areas. For more information about Plant Materials wildfire research, visithttp://Plant-Materials.nrcs.usda.gov

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based on the types and depth of the soil, average annual rainfall, establishment ability, and amount of growth produced. Seeds must also be commercially available.

Methods of seeding

Seeding can be accomplished in a number of ways, depending on site conditions. Seeds can be broadcast with a hand-operated seeder, hydromulched, drilled, or seeded by air. Hydromulching (seeding followed by application of a slurry of water, wood fiber mulch, and often a tackifier to a slope to prevent soil erosion) is a fairly expensive method that is often reserved for highly erosive areas close to roads, bridges, homes, and other structures. It requires roads for equipment access and a nearby water supply. Aerial seeding is commonly utilized on large areas. Drills are used on large flat to gently sloping (less than 30%) areas where farm equipment can be maneuvered. Most homeowners and small landowners find broadcasting to be the most practical and economical method.

The best time to seed is generally late fall through winter. This timing allows seed to be planted and resting in place, ready to germinate and establish the following spring. Exposed areas such as temporary roads, firebreaks, and steep embankments should be protected with straw mulch at the rate of 4 tons per acre.

The total amount of seed purchased for wildfire revegetation should equal the acres burned multiplied by the recommended seeding rate per acre (the minimum amount of seed to apply is an aggregate of about 25 viable seeds per square foot if seed is drilled and 50 viable seeds per square foot if seed is broadcast planted). Include any temporary roads and firebreaks in the burned acreage.

Certified seed should be the first choice for any seeding project. It is the best quality because it must meet specific standards for identity, germination, and purity, with restricted amounts of weed and crop seed. Seed of each species to be planted should be obtained in separate bags and kept cool and dry. It may be necessary to increase the bulk seeding rate if percent germination multiplied by the percent purity is less than 80% pure live seed (PLS).

Broadcast seeding

When seeding a mixture, it is best to broadcast each species separately, if possible, and in 2 directions (across and down a slope) to get the most uniform distribution of seed. On gentle slopes, a planter may be able to broadcast walking back up the slope, but on steep slopes, it is best to broadcast only walking downslope because the planter needs to maintain the same walking speed used to calibrate the seeder.

If conditions don't allow seeding in two directions, broadcasting in one direction is acceptable, with the remaining seed applied in the same direction across the slope while walking midway between previous lines of travel.

Reducing future fire danger

The risk of fire can be reduced by waiting until grasses and forbs set their seed in mid-summer to fall before mowing or clipping a new planting. Mowing herbaceous plants with a lawnmower will create a safe zone around structures. Cutting grasses and forbs to 3-4 inches in height with a nylon filament trimmer or similar equipment will produce a safe zone 30 to 70 feet out from buildings. Consider mowing around shrubs and trees beyond 100 feet. The resulting grass mulch will provide erosion protection against early rains.

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Wildfire Publications Available Online: More details on this issue's articles and wildfire publications such as *Determining Viability of Soil Seed Banks after Wildfires* are available on the Plant Materials Program Web site. Click on http://Plant-Materials.nrcs.usda.gov and go to Current Feature.

***Testing a Revegetation Technique** from page 1*

traditional horticulture and agriculture environments to improve water holding capacity, improve aeration and drainage of soil mix, reduce irrigation frequency, and increase shelf life of plants in cold storage.

Superabsorbents have also been used as protective root dips prior to shipping bare root seedlings. Now superabsorbents are being tested as an irrigation source for transplants in arid environments. When the powdered product is hydrated, each granule acts like a tiny reservoir that makes water available to plants. As microbial degradation of the cellulose product releases free water into the soil, that water is taken up by plants through root absorption. A hydrated superabsorbent placed in buried irrigation tubes can supply water to establishing transplants.

To investigate the use of superabsorbents in conjunction with tall-pot transplants, the Los Lunas PMC generated its own test plant materials. Native shrub ecotypes originating within a 200-mile radius of the three test planting sites were grown in 30-inch tall, 4-inch diameter PVC drain, waste, and vent (DWV) pipe tall-pots. These containers have two split seams that run most of the pipe length to encourage spiraling roots to grow downward and ease root ball removal. The bottoms of the containers are sealed with a porous fabric to allow drainage, but the fabric contains a copper hydroxide coating to control root penetration. Plants started from seed take about 3 years to develop full rootballs in these containers.

In fall 2000, more than 1,500 tall-pot transplants were planted in northern New Mexico at Milan, Santa Fe, and Eldorado Village. Planting holes were dug with a 9-inch diameter, 40-inch long auger powered by a 50-horsepower farm tractor. Holes, 3 feet deep, were hand cleaned using standard post-hole diggers. Plants were then removed from containers, placed in holes, and back filled. Prior

to back filling, an irrigation tube was placed next to the plant in each hole. This tube supplies the plant with moisture through either a hydrated hydrogel or water near the bottom of the root-ball to encourage growth of a deeper root system. The irrigation tubes are constructed from a PVC DWV pipe 3 inches in diameter and 40 inches in length. The orifice is capped to prevent animal entry and exposure of the root systems to sunlight. The 10-inch top section of the tube can be removed from the 30-inch perforated main tube body. After the end of the irrigation period (two years), the top 10-inch section of pipe will be removed and the remainder will be back-filled with soil. Because the lower portion of the tube should contain substantial root development, it will remain in place.

The plantings will be evaluated for survival in fall of 2001 through 2003. Other treatments being tested at each location consist of (1) tall-pot transplants planted with irrigation tubes and supplied only with water (equivalent to the volume supplied by hydrogel), (2) tall-pot transplants planted without irrigation tubes and only surfaced watered, and (3) tall-pot transplants planted and irrigated with a more inexpensive type of hydrogel.

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Landscaping with Fire Resistant Plants in Southern California

Southern California citizens continue to place greater demands on natural resource areas; because of expansion of existing cities, and developing new suburban communities, information is needed for proper selection and placement of landscape plant materials to minimize the spread of wildfires. Landscaping with fire resistant plants in chaparral-urban interface areas protects lives and property.

In 1997, a cooperative field study was established between the USDA NRCS Somis Field Office, Ventura County Fire Protection District, and USDA NRCS Lockeford, CA Plant Materials Center, to evaluate selected landscape vegetation for creating and sustaining fire resistant vegetative buffer zones. Ten plants were used in the study: capeweed (*Arctotheca calendula*), trailing ice plant (*Lampranthus spectabilis*), prostrate myoporum (*Myoporum parvifolium*), 'Alba' trailing ice plant (*Delosperma cooperi* 'Alba'), 'Yankee Point' California lilac (*Ceanothus griseus* var. *horizontalis* 'Yankee Point'), 'Dara's Choice' creeping sage (*Salvia sonomensis* 'Dara's Choice'), dwarf coyote bush (*Baccharis pilularis*), trailing African daisy (*Osteospermum ecklonis*), dwarf periwinkle (*Vinca minor*), and trailing gazania (*Gazania rigens* var. *leucolaena*). Plant samples were collected from field plots over a 2-year period (1997-1998) and evaluated for low flammability, water use, and maintenance, as well as good erosion control and drought tolerance.

			Flammability resistance		
Species	**Erosion control**	**Low maintenance**	**1997**	**1998**	**Drought tolerance**
trailing gazania (i)*	excellent	excellent		excellent (0.5)**	excellent
'Alba' trailing ice plant (i)	excellent	excellent		excellent (0.25)	excellent
trailing ice plant (i)	good	excellent		excellent (0.25)	excellent
prostrate myoporum (i)		good		excellent (0.5)	good
'Dara's Choice' creeping sage (n)			excellent (1.5)		
'Yankee Point' California lilac (n)			excellent (1.0)		good
dwarf coyote bush (n)	good				good
trailing African daisy (i)				excellent (0.5)	good
capeweed (i)	good				
dwarf periwinkle (i)		good	excellent (0.5)	good (0.5) excellent (0.75)	

*n = native, i = introduced
**number in parentheses is minimum irrigation level in gal/wk required to maintain flammability resistance

On an overall basis, the two ice plant species and trailing gazania performed best; the rest of the species, including some of the native plants rated well for particular evaluation factors. For more detailed information or a copy of California Plant Materials Technical Note 57, which includes study methods and data, please contact the Lockeford PMC at 209-727-5319 or log on to the Plant Materials web site.

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Plant Spotlight

'Goldar' bluebunch wheatgrass (*Pseudoroegneria spicata* ssp. *spicata* 'Goldar')

'Goldar' bluebunch wheatgrass is a native grass recommended for revegetation of burned areas. It was released in 1989 by the Aberdeen, Idaho Plant Materials Center (PMC) in cooperation with the Idaho and Utah Agricultural Experiment Stations, and the USDA Agricultural Research Service. Bluebunch wheatgrass is a long-lived, drought tolerant widespread bunchgrass that grows throughout the western US; 'Goldar' was originally collected from a native stand in Asotin County, Washington. Plants were evaluated at the Aberdeen PMC and the cultivar was selected for its vigor, stand establishment, potential seed production, and forage yield. 'Goldar' can be used in mixes for firebreaks, rangeland seeding, critical area stabilization, mine spoil reclamation, weed control, and re-establishment of native plant communities. It is adapted to sites throughout the Intermountain West, especially areas with medium texture loamy soil, greater than 10 inches of precipitation and greater than 3,280 feet elevation.

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IN THIS ISSUE

The Mission of the NRCS Plant Materials Program:

We 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.

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