Native Perennial Grass Establishment and Management*

By Paul Kephart and David Amme

The purpose of this article is to review principles and practices which lead to successful and thriving native perennial grassland stands. Even with appropriate seeding and fertilizing techniques, seedings of perennial grasses need close attention and management during the first year. Unlike the annual grasses, most perennial grasses, both native and non-native, grow slowly the first year and take two years to develop into good stands. Weed competition and drought can make or break a successful seeding. A thorough and detailed plan that includes scheduling and allocation of resources should precede native grass plantings.

Determining the fundamental goals of seeding native perennial grasses is critical because management techniques will vary in scope, investment, and landscape description. Broad categories of goals are: 1) Grass seed production--objectives are a high seed yield, superior quality, and profitable grass seeding, 2) Range and pastureland improvement--objectives are a successful transition to perennial high quality forage, established with minimum mechanical, petroleum based technology and investment, 3) Roadside stabilization--objectives are a low maintenance, California-climate-adapted ground cover that controls erosion, suppresses weeds, and provides ecologically sound management techniques, 4) Habitat restoration--objectives are a biologically diverse plant and animal community and a foundation for natural processes and/or succession, 5) Urban landscape--objectives are dependable and predictable growth and flowering characteristics for aesthetic design and low water use, and 6) A sustainable agricultural landscape--objectives are low-maintenance buffer areas that serve as habitat to beneficial insects and wildlife.

Establishment Techniques

Common perennial grass establishment methods include broadcast, drill, or hydro-seeding and plug or liner planting. In a range setting where some native perennial grasses already exist, controlled grazing and prescribed burning are also methods of perennial grass establishment. Late fall to late winter are the best times to sow perennial grasses. Cool temperatures and periodic rains help retain soil moisture for seedling emergence and root development. Important objectives for successful perennial grass establishment include: 1) reducing the weed seedbank, 2) creating a firm seedbed, 3) burying seed at the proper depth, 4) providing adequate moisture during germination, and 5) controlling weed competition.

For sites that can be disturbed, mechanical and chemical (herbicide) treatments can be used to begin the process of weed seed bank reduction. Early fall rains or pre-irrigation causes annual grasses and weeds to germinate before perennial grasses are seeded. Annuals can be killed by light cultivation or application of a non-selective herbicide. If harrowing or disking is performed, it is important not to cultivate too deep or weed seed will be brought to the surface again. Cultivated or disturbed soils require rolling and compaction. A compacted, firm seed bed preserves moisture through capillary action and holds seed in place. Burying the seed just below the soil surface is the optimum seeding technique. A rule of thumb for planting is to plant seeds as deep as seven times the width of the seed.

*From *Grasslands*, A Publication of the California Native Grass Association, February 1992

Broadleaf herbicide treatments help establish perennial grasses and can play an important role in managing grass stands. Wicking or spot spraying are examples of specific plant applications. There is an arsenal of herbicides that kill annual grasses, broadleaf forbs, and specific plants. Certain chemicals will kill annual grasses without damaging established perennials. It is important to check with the local farm advisor or herbicide specialist for specific product information before deciding how to use the herbicides or whether or not herbicides are necessary to reach the landscape goal.

Where herbicides and soil disturbance techniques are not possible, higher seed rates and multi-species seed mixes have proven successful. This is best accomplished by using range or native grass seed drills. These drills plant seed just below the surface without soil tillage. Mechanical broadcast seeding with harrowing (lightly scratching the soil surface) is also successful, especially with complex seed mixes. However it is important to note that follow-up management either with mowing equipment or grazing animals is essential for controlling weed competition to insure perennial grass establishment when resident weeds cannot be controlled.

In addition to broadcast seeding and drill seeding, hydro-seeding and covering the site with native straw mulches are successful seeding methods especially on steep slopes and road banks where the erosion potential is great. Native grass hay that has been flailed contains as much as two pounds of seed per 100 pound bale. Crimping this hay into banks or covering the hay with netting reduces erosion and suppresses broadleaf weeds.

Adequate irrigation or rain during early germination is important to prevent crusting of the soil surface. This is often the case with disturbed or cultivated soils. One technique employed to break crusting is a light ring rolling or harrowing prior to seedling emergence. On rangeland and non-cultivated sites, livestock impact simulates mechanical cultivation and aids perennial grass establishment. Excited animals disturb the soil surface and their hooves compress broadcasted seed into impressions where moisture collects. Native grass hay and seed supplement seed mixes can make four legged range improvers out of livestock.

Container planting either with grown plugs (liners) or dug rhizomes are effective in establishing native perennial grasses. However, the cost for plugs and rhizomes is much higher than seed. Depending upon the species grown, type of plug, and numbers of plugs grown, the cost can vary from 7 to 75 cents each. Plug and rhizome planting are often the best methods of introducing native perennial grasses for steep slopes, buffer strips, and small critical areas. Plug planting is especially applicable in urban landscape settings. Planting plugs of rhizomatous native grasses such as creeping wildrye (*Leymus triticoides*) can often pass cost/benefit analysis where the spacing of plugs are over two feet apart and a closed stand is achieved the following year.

The use of fertilizers and their rates depends on soil type and fertility, species response, and performance goals. Soil testing should always precede a native perennial grass seeding. The goals and choice of the perennials to be seeded also has important bearing on the use of fertilizers. The faster growing native perennial grasses such as California brome (*Bromus carinatus*), meadow barley (*Hordeum brachyantherum*), blue wildrye (*Elymus glaucus*), and slender wheatgrass (*E. trachycaulus*) respond favorably to added fertilizer during the establishment phase. Slower growing native perennial grasses such as needlegrass and creeping wildrye show little improved response to fertilizer during the establishment phase. In low-input rangeland settings where annual grasses and weeds are dominant, fertilization during the establishment phase is clearly counterproductive. Nitrogen fertilizers stimulate the faster growing annual grasses and weeds, out-competing the slower growing perennials. Second year

fertilization programs are more beneficial in this situation because the perennial grasses are well-established and are able to utilize nutrients more efficiently. In an agricultural or irrigated pasture setting where the annual grasses and weeds can be more closely controlled, fertilizers are effective during the establishment period.

Management

Follow-up management of a seeded site is just as important (if not more important) to a successful perennial grass stand as is the careful attention paid to the actual seeding operation. The most important objective for a first year management program is to favor perennial plant cover over annual grasses and weeds. Carefully timed mowing, planned grazing, prescribed burns, or a combination of these management practices is needed to achieve this objective. Annual grasses and weeds grow faster and reach reproductive maturity earlier than native perennial grasses. Precise timing of mowing events will alter the balance of reproductive success between the annuals and perennials. The timing, height, and frequency of a mowing schedule are designed to reduce direct competition from annual grasses and weeds and to stimulate tillering and root growth. The mowing season and frequency should be adapted to plant size and growth rates. Close mowing with the removal of residue (clippings) in the early spring greatly favors perennial grass establishment and prolonged vigor. This reduces future production of annual grass seed in the soil seed bank, reduces direct competition of annuals, increases available moisture in surrounding soil for perennials and stimulates tiller production, and provides maximum sunlight for the slower growing perennials.

Two or three mowings are needed during the first year after initial seeding. The most important mowing is the early spring mowing. Depending on the amount of rainfall and the wet season temperatures this is usually accomplished near the end of March. Late spring/early summer mowing usually results in the gradual expansion of noxious biennial weeds such as yellow star thistle. By the middle of June the perennial grasses should be allowed to dry out and go dormant. A fall mowing enhances perennial grass regrowth and provides light and space for emerging seedlings as well as reducing the potential fire hazard.

Grazing can be an important restoration tool for establishing and maintaining native perennial grass stands. When planning grazing frequency and intensity it is important to allow the the native perennial grasses adequate time to recover after the grazing event. Overgrazing (chronic and severe defoliation) occurs when livestock stay in a pasture too long or return to a pasture too soon. The most severely stressed native perennial grass should be targeted for close monitoring to determine the grazing plan. The rest periods of the pastures determines the grazing period. The more pasture units the better. Planned grazing reduces annual grass seed production and direct competition by annual grasses. Grazing favors perennials by improving soil moisture and mineral availability and by increasing light at the plant base which stimulates basal bud growth. Planned grazing allows the native perennial grasses to produce seed and aids in seed dispersal and planting. Temporary electric fences are indispensable for controlling livestock movement and degree of utilization. Planned grazing requires water and fence development but most importantly successful grazing requires dedicated managers who put extra time and money into managing livestock in an ecological and sustainable manner.

Prescribed burning promotes the spread of native perennial grasses. Fire reduces the cover and vigor of annual grasses and weeds, recycles nutrients and minerals retained in aboveground biomass, provides the optimum seed bed and conditions for perennial grass seedling establishment and renews old decadent bunchgrasses. Long-lived perennial grasses

such as creeping wildrye, purple needlegrass (*Stipa pulchra*), nodding needlegrass (*S. cernua*), foothill stipa (*S. lepida*), pine bluegrass (*Poa scabrella*), foothill melic (*Melica imperfecta*) and California melic (*M. californica*) are known to respond well to the frequent use of late summer and early fall fires. Idaho fescue (*Festuca idahoensis*), western fescue (*F. californica*) and short-lived perennials such as California brome, meadow barley, blue wildrye, and slender wheatgrass, are more sensitive to frequent fires. Seeding native perennial grasses after a prescribed fire or wild fire is very effective in establishing a native perennial grass stand. Annual cutting of brush and weeds for a fire break defines areas for a burning and seeding program. Prior mowing or grazing reduces fire risks and provides optimum burning temperatures. The limiting factors when using prescribed fire is a lack of a specific objective and the political and cultural backlash that sometimes accompanies proposed prescribed burns.