

Revegetation With Native Plants on John Day Fossil Beds NM

By Richard F. Miller and Marshall R. Haferkamp

Vegetation on our western rangelands has been altered through farming and overgrazing by cattle, sheep and horses. Current management practices and technology have helped to improve a large portion of this resource, but many acres still exist in an altered state. Harsh climatic conditions, such as limited precipitation, large fluctuations in daily temperatures and the introduction of numerous highly competitive species from other countries have made changing these lands back to their native state a big challenge. Plants such as cheatgrass, which arrived in the northwest from Europe in the mid to late 1800s, are well adapted to our environment and often out-compete native plants for space to live.

Lands surrounding the John Day Fossil Beds National Monument (NM) very much fit this scenario. Cattle, sheep and horses have grazed the Monument since the late 1800s. Poor management practices caused overuse of lands along the river bottoms, while little use occurred on the towering slopes above the John Day River. Also, abandoned farmland on the bottoms and the introduction of exotic species have placed many of the plant communities in a state of low ecological order. Grasses such as bluebunch wheatgrass, once found in thick stands on many of the lower slopes of the monument can now only be

found as scattered remnants. However, far above on the steep slopes, plant communities are probably very similar to what they were thousands of years ago.

Conventional techniques for revegetating rangelands have been fairly well established. However, successful revegetation usually is accomplished with removal of competing vegetation, and the planting of desirable but introduced grass species with a drill. Little work has been done with reestablishment of native species on rangelands, especially broadleaf plants (forbs). Due to lack of seed sources, high costs of available seed and little understanding of seed germination requirements, few government agencies or private land owners have attempted to reestablish native vegetation. However, increased awareness of the public toward our natural resources is placing pressure on many public agencies to revegetate range and forested lands to original or near original plant communities.

A project was initiated in 1979 to develop methods in reestablishing the native vegetation that occupied sites on the John Day Fossil Beds prior to man-induced disturbances. Some of the objectives defined to meet this challenge were: 1) to evaluate methods to reduce competition from increaser¹ or exotic plant species presently occupying deteriorated sites; 2) to determine the germination and establishment require-

ments of native species to be seeded: 3) to measure yearly production of healthy seed crops on or near the Monument that could be used for revegetation: 4) to define climatic conditions at or near the soil surface limiting the establishment of native plant species: and 5) to determine the best techniques for revegetating rangelands with native plant species on the John Day Fossil Beds NM.

Unless competing plant species occupying the site are removed or reduced, reintroduction of native plants will have little chance. Various methods can be used to open up the site from competition including fire. Fire at one time was a natural component of this area, probably burning portions of the Monument every 40 to 70 years. Most were probably started by lightning. Once undesirable plants have been reduced, desirable plants must quickly be planted and established to overcome the rapidly reinvading undesirable plants.

Currently, the plant with the greatest potential for reestablishment on the John Day Fossil Beds NM is bluebunch wheatgrass. In four consecutive years, bluebunch wheatgrass produced good crops of seed with 86 to 95 percent of the seed being able to germinate. Seeds should be harvested when fully ripened, which occurs sometime in late July. Required seeding rates are in the range of 6 to 12 lbs/acre (250,000 to 300,000 seeds/lb), so large quantities of seed will need to be harvested if significant portions of the Monument are to be seeded. Another alternative would be the use of a bluebunch wheatgrass variety developed by the Plant Materials Center, Soil Conservation Service, called Secar. After tests in both the greenhouse and field, Secar bluebunch wheatgrass has proved to be a plant well adapted to the environment at the Fossil Beds.

A primary limiting factor for successful reestablishment of native vegetation on the fossil beds is the rapid wetting and drying of the soil surface caused by low precipitation, warm temperatures, high evaporation rates and competing vegetation. A wet soil surface is critical during the early stages of seedling development. Once seeds germinate, the surface soil must remain moist long enough for adventitious roots to develop. If they don't, the seed will germinate, then die. The effective moist period can be extended with mulching or the formation of furrows, pits or microdepressions designed to catch and hold moisture for extended periods. We are currently evaluating the effectiveness of the land imprinter for forming these microdepressions.

Another limitation is the problem of available seed and breaking seedling dormancy of many forb (wildflower) species. Two forbs in the pea family - (*Astragalus filipes* and *A. purshii*) occupy many of the less disturbed sites. Seeds produced from these plants will lie in the soil for many years before germinating due to a dormancy caused by the seed coat. This is common for many of the forbs. However, by scratching or scarifying the seed coat (ie. sandpaper), germination was greatly enhanced the first year. Another problem with many of the forb seed crops is predation by insects and rodents. Predispersal seed predation on the *Astragalus* sp. ranged as high as 96 percent.

The third problem to overcome is conventional equipment used for seedbed preparation and planting is not suitable for use on the steep rocky slopes occurring on many acres of the John Day Fossil Beds NM. Without equipment the reduction of competing plant species and proper placement of seeds becomes extremely difficult. Simply dispersing seeds over the surface by hand or use of a broadcaster will frequently

meet with failure. Experiments on the Monument proved this to be true. However, a test where seed was dispersed on the surface and then covered with a straw mulch met with good results.

Successfully meeting the above challenges does not occur overnight, but takes years of study, trial, and error. These problems exist not only on the John Day Fossil Beds NM but on millions of acres of rangeland in the United States. Learning how we can more effectively solve these problems will have a broad application to this resource.

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¹Plant species of the original vegetation that increase in relative amount, at least for a time, under mismanagement.