Malheur Agricultural Experiment Station

Oregon State University

Sustainable Agricultural Techniques:

NATIVE PLANT SEED PRODUCTION

Sulphur-flower Buckwheat

Eriogonum umbellatum (ERUM)

Parris, C.; Shock, C.C.; Feibert, E.; and Shaw N.

Figure 1. Sulphur-flower buckwheat with umbels in full bloom

Purpose

Native forb seed production is needed for rangeland restoration and reclamation projects within the Great Basin. Sulphur-flower buckwheat *Eriogonum umbellatum* Torr. [ERUM], (Fig.1) is a widespread species with many subspecies in the western United States and Canada. Production of sulphur-flower buckwheat seed adds to the array of native forbs available for planting disturbed areas on western wild lands. It is also an attractive plant for low maintenance landscaping or xeriscaping. This brochure summarizes data relating to sulphur-flower buckwheat seed production that will provide interested growers with production techniques that reduce crop failure and increase seed yields.

Uses

Sulphur-flower buckwheat seed maybe planted with a mixture of forb, grass and shrub seeds to create diverse native vegetation communities where local seed sources have been lost. Sage grouse, for example, use native vegetation for cover and forage. Sulphur-flower buckwheat flowers can attract and increase valuable pollinator populations. These insects provide a major protein source for young, fast-growing sage-grouse chicks.

Description and Natural Adaptation

Sulphur-flower buckwheat is a native mid-season herbaceous perennial in the Buckwheat Family (Polygonaceae). It occurs over a wide range of elevations from the Pacific coastline to the eastern Great Plains. Sulphur-flower buckwheat grows in dry, well drained soil. Plants are adapted to minimal precipitation and hot summers. The root system is anchored by a well developed taproot. The woody base branches with tufted leaves at the nodes. The low growing plants are from 4 to 12 in. tall. Plants in different localities may show different growth forms, leaf size and flower color which vary in relation to elevation and precipitation. The showy yellow flowers form in several-rayed, umbrella like clusters which rise 3 to 8 inches above the whorled leaf base. Plants bloom from late May until mid-July, depending on winter and spring precipitation. Seed maturation depends upon the subspecies location and the length of blooming period. Maturation generally occurs between late July and early August with seed dispersal from the umbel flower head occurs primarily in August and September, varying with location and local weather conditions.

Agricultural Considerations

Pre-plant considerations are important for maximizing seed yields using appropriate production practices that will deliver high quality products over an extended period of time. Site evaluation of soil texture, weed seed bank pressure, presence of perennial weeds, irrigation delivery systems and harvest management must be considered. Native forbs found in semi-arid regions often grow in shallow soils with a relatively high pH (8.0- 8.5). Native seed production sites may be utilized as an alternative rotational field crop like other perennials such as alfalfa. Since native forbs require limited irrigation, growers with water restrictions could use the saved allotments elsewhere.

Figure 2 Sulphur-flower buckwheat spring seedlings.

Establishing Sulphur-flower buckwheat

While native forb seed production poses many challenges, the application of appropriate management practices for each species will diminish grower risk. The production of sulphur-flower buckwheat seed requires a minimum of 2 years for plant establishment, and seed yields may not be profitable for several years. The species is long-lived and after establishment will have several productive seasons. Direct fall planting has been shown to produce well-established spring stands (Fig.2), and may yield a small summer crop. Spring planting requires pre-plant seed treatments such as cold-wet stratification for a period of 3-5 weeks. Planting rates for sulphur-flower buckwheat are about 2.25 lbs/acre of pure live seed. A pound of sulfur-flower buckwheat seed contains 145,000 to 155,000 seeds (achenes). (Fig.3) Consult your seed supplier for viability or germination test results.

Figure 3. Sulphur-flower buckwheat seed (achenes)

Irrigation Methods and Requirements

Irrigation methods, timing, and delivery will determine plant vitality, seed yield and quality. Subsurface drip, furrow, or sprinkler irrigation delivery systems are methods may produce suitable stands. Sulphur-flower buckwheat has a relatively low irrigation requirement. With sub-surface drip systems, 8"/yr. of irrigation was adequate at Ontario, OR where 10"/yr of precipitation is received. In comparison, traditional row crops may require up to 36"/yr. of irrigation. Established sulphur-flower buckwheat subsurface irrigation scheduling consisted of four irrigation applications. At the onset of flowering, two inches of water was applied every two weeks. (Fig. 4)

Besides reducing water consumption, subsurface drip irrigation also provides a precision delivery system, possible irrigation automation, decreased weed pressure, and better field access for implements.

Drawbacks of subsurface drip irrigation include startup and maintenance costs. Growers new to drip irrigation might want to begin with a simple system on a small acreage.

Figure 4. Eriogonum grown with subsurface drip irrigation.

Seed Source

Seed sources for crop production of sulphur-flower buckwheat must be designated 'certified' to guarantee noxious-weed-free supplies. There are a number of sulphur-flower buckwheat sub-species; consequently, it is important to obtain the sub-species best adapted to the planting location. Seed sources may include the USDA, NRCS, BLM or private seed companies.

Site Preparation

Fall soil preparation should begin long before planting. Fields should be chosen that are relatively weed fee and have no troublesome perennial weeds. When sub-surface drip irrigation is used, drip tape should be placed 12 inches below the planting soil surface, centered between future plant rows. Ground preparation should create a smooth, level, firm seedbed for accurate shallow seed placement.

Figure 5. Pollination of sulphur-flower buckwheat

Pollinators, Pests and Diseases

Bee pollination can increase the viability of sulfur-flower buckwheat seed. (Fig. 5) Suggested stocking density is one strong honey bee hive per acre. Relatively little pest and disease pressure has been found on sulfur-flower buckwheat seed production. Rust may need control. Secondary infections of disease may appear due to excessive irrigation.

Weed Pressure & Herbicide Use

Weed pressure is a primary concern for sulphur-flower buckwheat growers. Cultivation and hand rouging may be used to manage weed problems. Presently, no herbicides are labeled for use on native forb seed crops.

Like other seed specialty crops, native forb seed crops must be free of invasive weed seeds and limited in noxious weed seeds to less than 1%.

Figure 6. Combine harvesting of Sulphur-flower buckwheat

Harvesting

The harvest period for sulphur-flower buckwheat is late July to early August, and is dependent on elevation, latitude, and variety. Seeds are mature when the bracts are dry and papery. Seeds persist on the plants for 1-3 weeks following maturation. The uniform maturation of sulphur-flower buckwheat and seed stability on the flowering structure allows for standard combine harvesting methods. (Fig. 6)

Seed Yield (lb/acre) at the subsurface irrigation rate of 8" /season. (Shock, C. et al. 2010)

2006	2007	2008	2009	Ave.
371.6	193.8	245.2	240.1	262.7

Seed Cleaning and Conditioning.

The combined material may be threshed using a "dewinger", barley de-bearder, or brush machine. Fine material such as bract, leaf, and stem debris is removed using an air-screen separator. Trashy seed lots may first be run through the air-screen separator to remove large stems and leaves. This is usually not necessary when seeds are harvested by combine.

Post harvest seed conditioning involves proper drying techniques. Low volume warm air drying reduces seed moisture content and prevents seed damage. Seed moisture content should not exceed 15% for proper storage.

Seed Certification and Marketing

Viability, purity and moisture content must be provided for all certified seed produced. Marketed seeds should be cleaned to 95% purity. Jorgensen and Stevens (2004) recommended that seed purchased have a minimum germination percentage of 75%.

Seed production contracts with government agencies or private corporations are viable options for marketing sulphur-flower buckwheat. A developing niche market for sulphur-flower buckwheat seed may also be found in the expanding area of home xeric gardening.

Resources

BLM Seed Procurement
http://www.blm.gov/or/procurement/index.php

Drip Irrigation: An Introduction
http://extension.oregonstate.edu/catalog/pdf/em/em8782-e.pdf

Great Basin Native Plant Selection & Increase Project
http://www.fs.fed.us/rm/boise/research/shrub/greatbasin.shtml

Idaho Crop Improvement Assn. Seed Certification
http://www.idahocrop.com/

Jorgensen, Kent R, R. Stevens. 2004 Gen. Tech. Report RMRS-GTR-136-vol.3. Ft. Collins, Co: U.S.D.A. F.S., Rocky Mtn. Research Station p. 699-716

Oregon State Seed Certification Service
http://seedcert.oregonstate.edu/home

Oregon State University, Malheur Exp. Station
http://www.cropinfo.net

Shock, C.; Feibert, E.; Saunders, M.; Shaw, N. 2010 Native Wildflower Seed Production with Limited Subsurface Drip Irrigation. p. 193-209 in Malheur Experiment Station Annual Report 2009.

USDA, NRCS 2010. The PLANTS Database
http://plants.usda.gov