Ecological restoration hurdles to use rarely cultivated plants; Developing reliable seed production technology

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Great Basin of the western US

Sagebrush steppe vegetation

Invasive weeds

Fire frequency and intensity
Precipitation:

7-12 inches/year
Objective:

Increase the availability of native seed, especially forbs, for restoring disturbed Great Basin rangelands.

OSU Objective:

Develop irrigation and other cultural practices to help growers produce seed for restoration needs.
Desert parsley
(*Lomatium dissectum*)

Sulphur-flowered buckwheat
(*Eriogonum umbellatum*)

Showy penstemon
(*Penstemon speciosus*)

Gooseberryleaf globemallow
(*Sphaeralcea grossulariifolia*)
Hurdles for seed production

- Seed placement
- Timing of planting
- Seedling survival
- Competition with weeds
- Diseases and insects
- Pollination and pollinators
- Irrigation management
- Nutrient needs
- Harvest timing
- Harvest methods
- Seed cleaning
Stand establishment

Weed control

Irrigation management
Hurdle of Plant Establishment

--- more than 14 species

Direct seeding of native plants has been problematic.
Row cover
Seed treatment
Sawdust
Sand
Hydroseed mulch
### Establishment systems

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<th>System</th>
<th>Row cover</th>
<th>Sawdust</th>
<th>Seed treatment</th>
<th>Sand</th>
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300 seeds per plot, **data corrected for live seed**
## Establishment systems

LSD (0.05) system = **3.8 %**

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Heliomeris multiflora

Showey goldeneye

Penstemon acuminatus

Sharpleaf penstemon
Hurdle of Weed Control
--- over 14 species and many products
Soil active

Prowl (pendimethalin)
Outlook (dimethenamid)

Foliar active

Goal (oxyfluorfen)
Buctril, Brox (Bromoxynil)
Hurdle of Irrigation for Seed Production

15 mil drip tape 12” deep every 5 feet
Irrigations applied every two weeks -- bud to seed set
Design

Irrigated at 0, 1, and 2 inches/irrigation

4 x every 2 weeks, RCBD 4 rep.

Timing: flowering to seed set
No irrigation

Total 0 inches
1 inch of water per irrigation 4 x
2 inches of water per irrigation 4 x

Total 8 inches
33 species
Dalea ornata (Western prairie clover)  

Dalea searlsiae (Searl’s prairie clover)
Seed yield response to water applied for *D. searlsiae*
Seed yield response to water applied plus spring, winter, fall precipitation for *D. searlsiae*
Annual *Lomatium dissectum* seed yield response to irrigation, Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2015.
Annual *Lomatium dissectum* seed yield response to irrigation, considering spring precipitation and relative seed yields, Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2015.
Conclusions:

- Fall planting met vernalization requirements.
- Direct seeding of native range plants has been problematic.
- Successful planting methods mitigated the losses.
- Commercial herbicides applied after emergence improved weed control.
- Seed yield responses to irrigation varied by species and seasonal precipitation.
- Only small amounts of irrigation are required.
Work supported in part by BLM and US Forest Service grants, Hatch funds, OSU, and the Malheur County service district.
More information:

https://agsci.oregonstate.edu/mes/malheur-experiment-station