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

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GREAT BASIN
Native Plant
Selection & Increase
PROJECT

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Sagebrush steppe
vegetation


Great Basin of
the western US

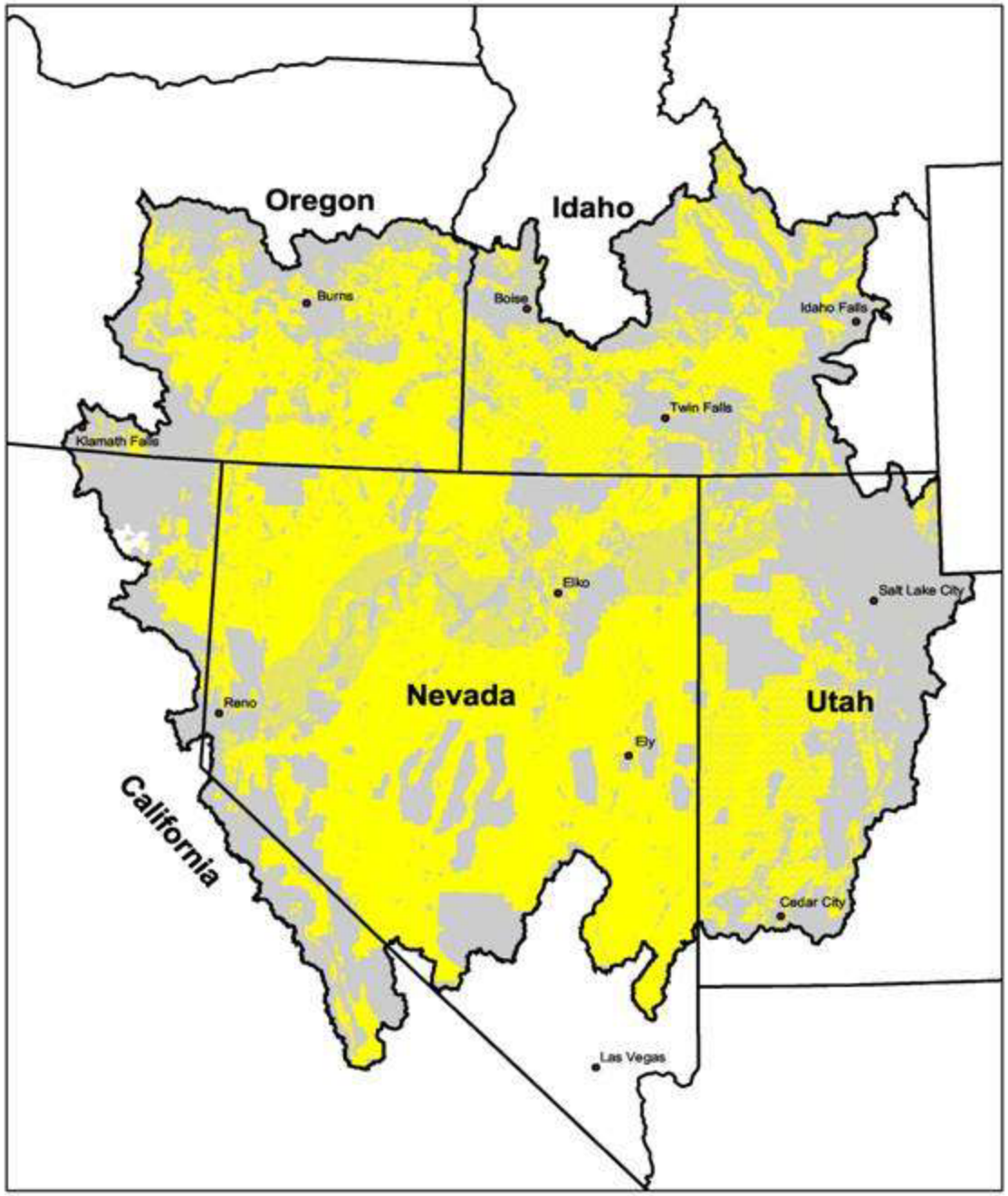

Invasive weeds


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:

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Develop irrigation and other cultural practices to help growers produce seed for restoration needs.

Desert parsley
(*Lomatium dissectum*)

Showy penstemon
(*Penstemon speciosus*)

Sulphur-flowered buckwheat
(*Eriogonum umbellatum*)

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

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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

System	Row cover	Sawdust	Seed treatment	Sand	Mulch
1	yes	yes	yes	no	no
2	yes	no	yes	no	no
3	yes	yes	no	no	no
4	no	yes	yes	no	no
5	yes	yes	yes	yes	no
6	no	no	yes	no	yes
7	no	no	no	no	no

300 seeds per plot, data corrected for live seed

Establishment systems

LSD (0.05) system = 3.8 %

System	Row cover	Sawdust	Seed treatment	Sand	Mulch	May 13, %
1	yes	yes	yes	no	no	35.5
2	yes	no	yes	no	no	35.1
3	yes	yes	no	no	no	28.5
4	no	yes	yes	no	no	20.6
5	yes	yes	yes	yes	no	39.3
6	no	no	yes	no	yes	23.2
7	no	no	no	no	no	15.4


Heliomeris multiflora
Showey goldeneye
Penstemon acuminatus
Sharpleaf penstemon


Hurdle of Weed Control
--- over 14 species and many products

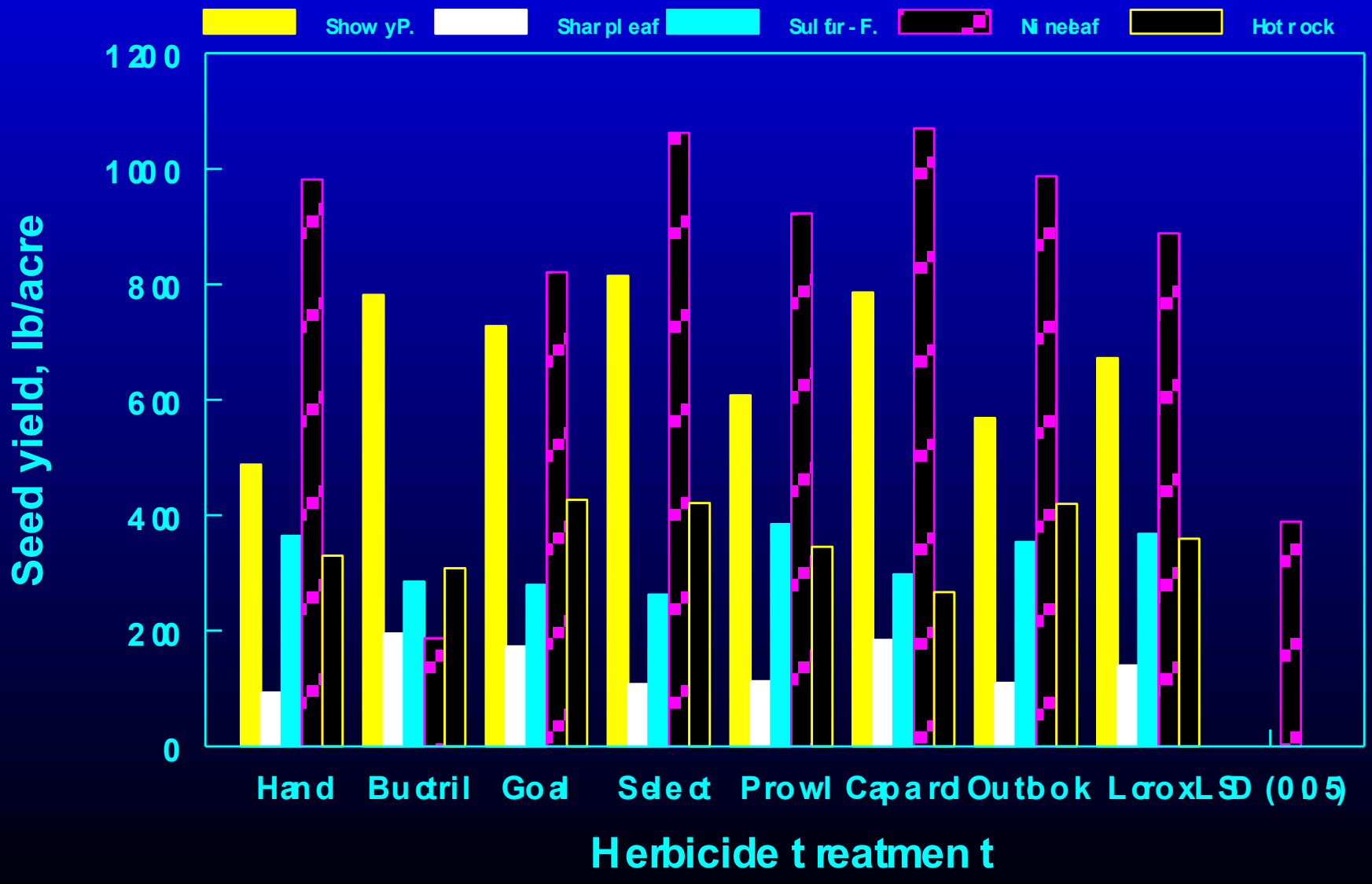
Soil active

Prowl (pendimethalin)
Outlook (dimethenamid)

Foliar active

Goal (oxyfluorfen)
Buctril, Brox (Bromoxynil)

Seed yield response in 2008 to repeated annual post-emergence herbicides applied 2006, 2007, and 2008.



Hurdle of Irrigation for Seed Production


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

1 inch of water per irrigation 4 x

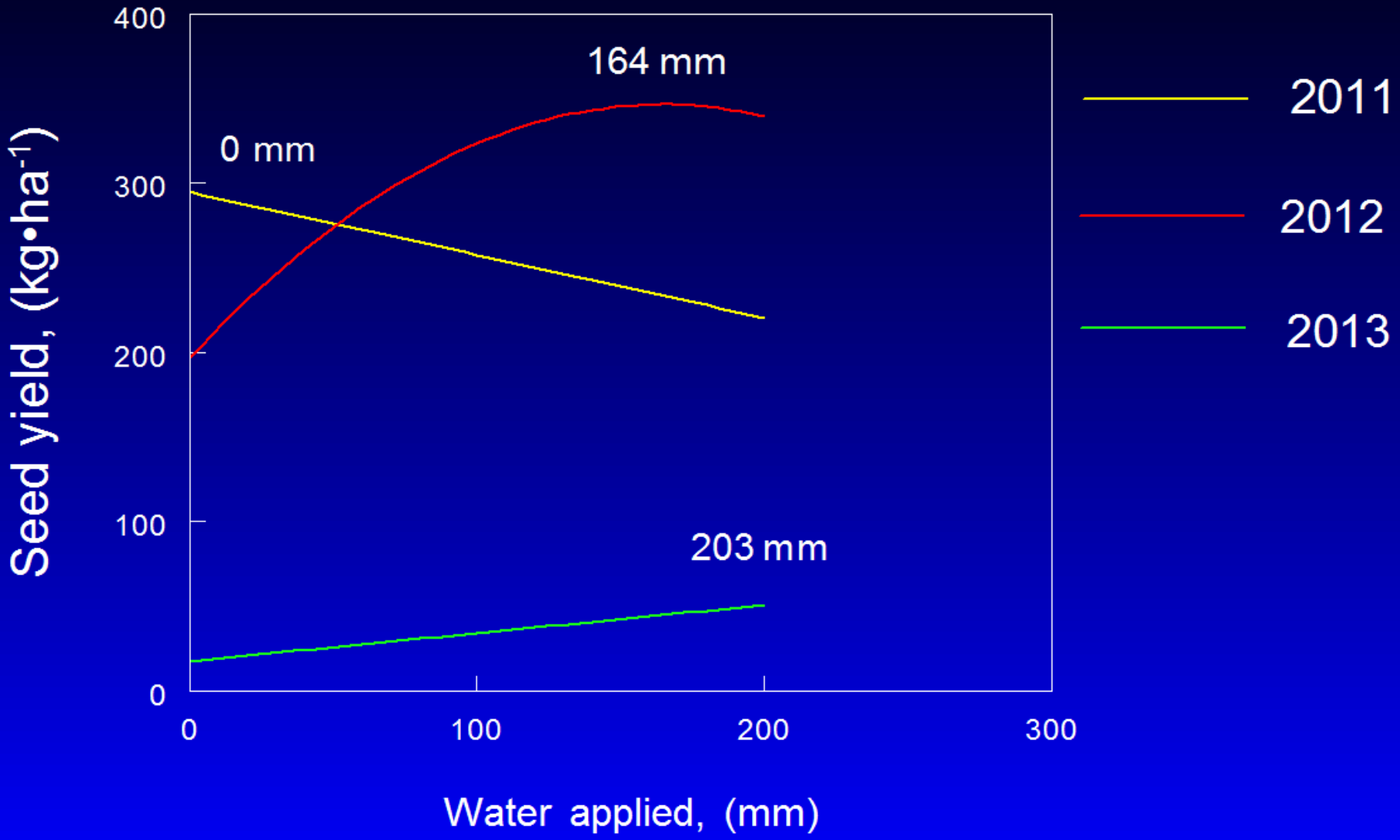
2 inches of water per irrigation 4 x


33 species

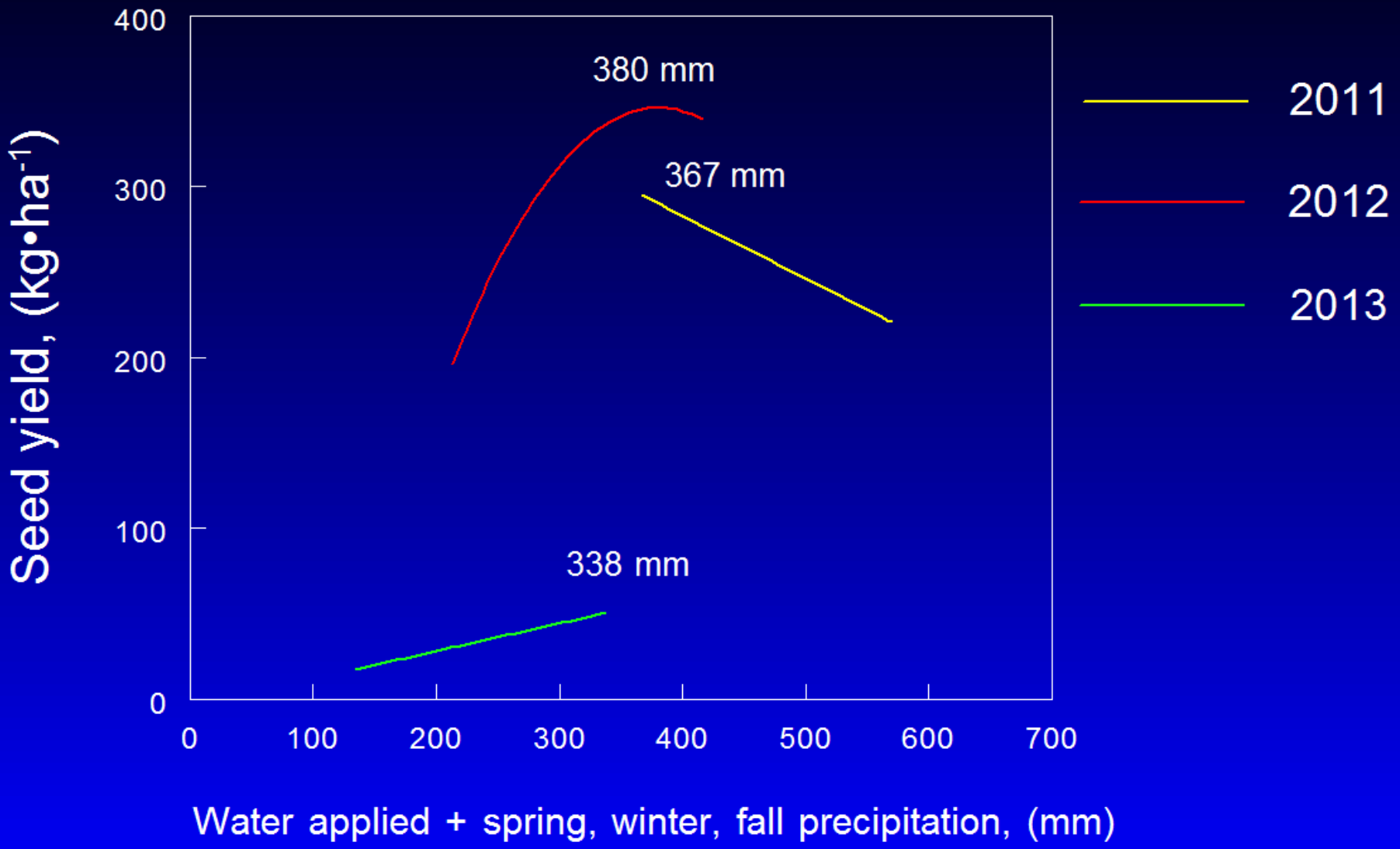
Dalea ornata (Western prairie clover)

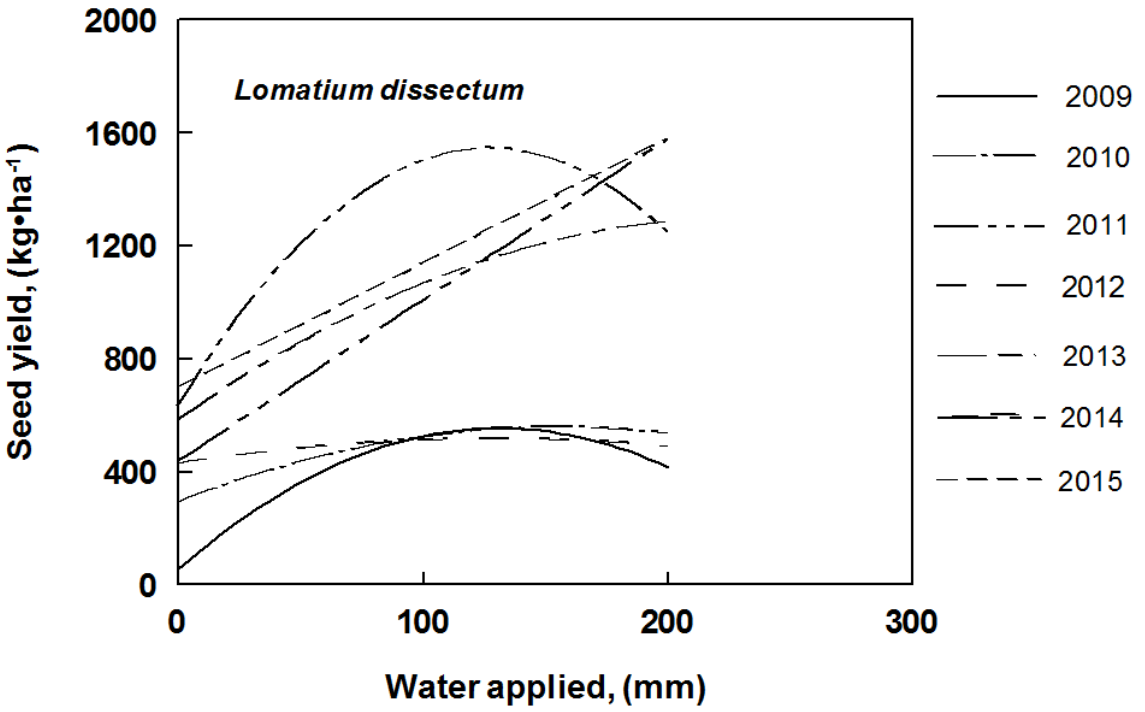
Dalea searlsiae (Searl's prairie clover)

Seed yield response to water applied for *D. searlsiae*

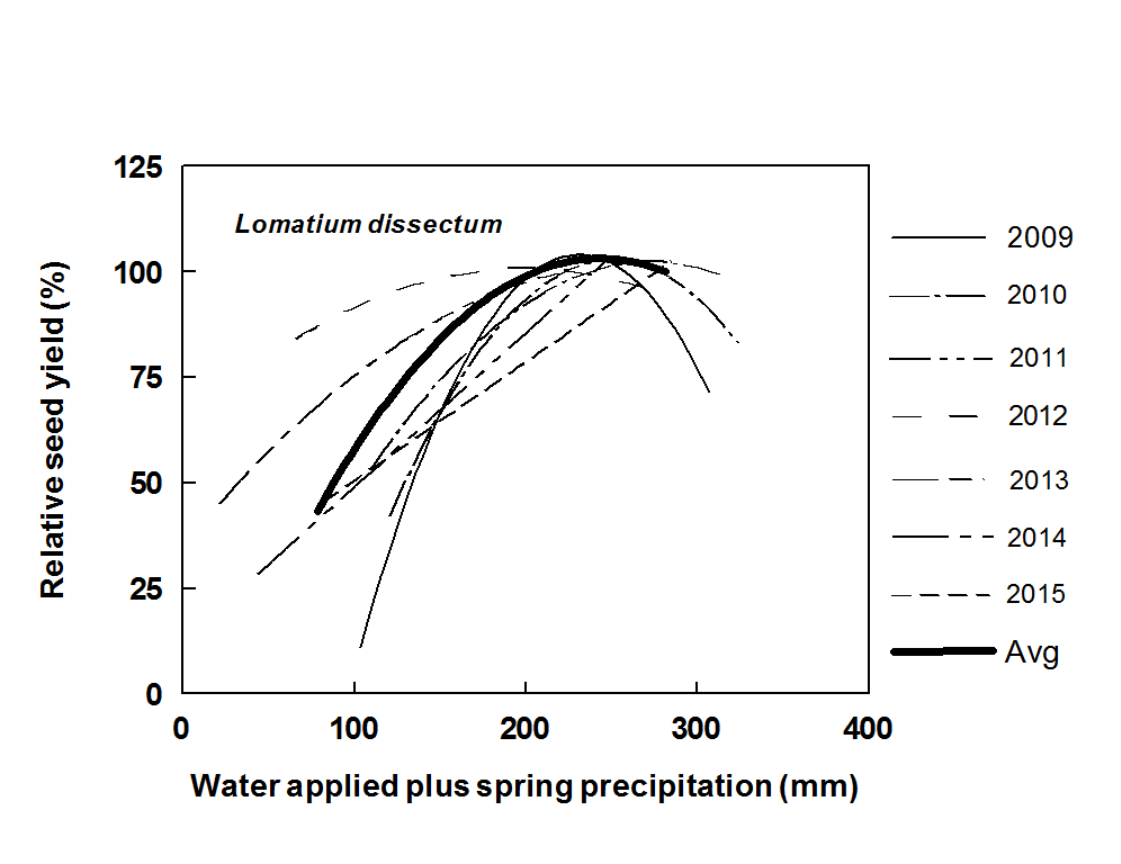


Seed yield response to water applied plus spring, winter, fall precipitation for *D. searlsiae*





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.

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More information:

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