Impact of *Lygus* spp. on damage, yield and quality of lesquerella (*Physaria fendleri*), a potential new oil-seed crop

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Lesquerella - *Physaria fendleri*

- **Family** Brassicaceae
- **Perennial, native to North America**
- *Physaria fendleri* native to southwestern US and cultivated as an annual Oct through May
- **Seeds contain industrially-valuable hydroxy fatty acids**
- **Commercial production pending**
Native P. fendleri Range
The Lesquerella Plant

Silique (seed pod)

Replum

Seed

Trichome

Open pollinated Flower w/ anthers & stigma

Plant with inflorescences
Products from Lesquerella
Other New Crops

Guayule
Source of hypoallergenic latex and domestic rubber

Camelina
Biofuel feedstock and source of omega3 fatty acids

Vernonia
Source of epoxy fatty acids
Lygus feed on variety of new crops

Lygus preferentially feed on reproductive tissues

Lesquerella is a suitable host

Naranjo, unpublished
Lesquerella is a potential source crop for natural enemies

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Lesquerella is a potential source crop for natural enemies

Naranjo, unpublished
Lesquerella is a breeding site for Lygus

Naranjo, Ellsworth & Dierig, *J. Econ. Entomol.* 2011
Evaluation of Lygus impact on lesquerella

- Field studies conducted in 2005, 2006, 2007 and 2009
- Plots 150 m² (2005); 300 m² (2006, 2007, 2009)
- *Lygus* spp. density manipulated by insecticides applied at
  - Varying nominal thresholds (e.g. 0.5, 2, 4, 8 per sweep – 2005, 2006)
  - Weekly, bi-weekly or tri-weekly intervals (2007, 2009)
  - Early, late and total season control in 2009
- Bi-weekly plant damage assessment
- Yield and quality assessment
Lyzus damage to lesquerella
Variable pest density by treatment

Naranjo, Ellsworth & Dierig, J. Econ. Entomol. 2011
Lygus species composition

![Graph showing the proportion of different Lygus species from April 2nd to May 14th.]

- **L. hesperus**
- **L. elisus**
- **L. lineolaris**

Naranjo, Ellsworth & Dierig, *J. Econ. Entomol.* 2011
Nymphs associated with damage

Naranjo, Ellsworth & Dierig, *J. Econ. Entomol.* 2011
Variable impact of Lygus on lesquerella yield

Nymphs

Adults

Yield (kg per ha)

Lygus per sweep

Lygus per sweep

Naranjo, Ellsworth & Dierig, J. Econ. Entomol. 2011
Variable impact of Lygus on lesquerella seed quality

Nymphs

Adults

Naranjo, Ellsworth & Dierig, J. Econ. Entomol. 2011
Timing of damage not important

Nymphs

2009 late damage
2009 early damage
2009 all season

Adults

2009 all season
2009 early damage
2009 late damage

All regressions NS
Seasonal cycle of Lygus spp.

- **Weeds**
- **Alfalfa**
- **Vegetables**
- **Cotton**
Seasonal cycle of Lygus spp.
Summary/Conclusions

• *Lygus hesperus* readily feeds on lesquerella and prefers the flowering structures; development is fast and mortality is low.

• Lesquerella harbors significant breeding populations of *Lygus* spp. (and natural enemies).

• *Lygus* spp. effects on lesquerella were inconsistent
  – Nymphs were primarily associated with plant damage and with resulting effects on yield/quality
  – Yield/quality effects observed in association with agronomic issues; plant compensation to damage?

• Lesquerella could significantly influence regional pest and natural enemy dynamics in all affected crops