

Biology

The question was asked if *Lepidium latifolium* was producing viable seed. A UC researcher stated that the seed has been shown to germinate well in the lab. Other participants said that field observations confirmed this. The question was asked if the seed passed through cattle and if this could be a vector for expansion. One participant from a cattle grazing operation that is also controlling *Lepidium* answered yes and that for that reason they quarantined their cattle for two days in a sanitizing staging area. This allowed enough time for any grazed seed to pass through.

Control

1. Sheep have been used along the Truckee River to effectively control *lepidium*. They eat down both old and new plants right into the ground. However, the thickness of the *lepidium* was so great the sheep were unable to penetrate the big stands. Given this, cattle were then enticed to enter and trample down big *lepidium* stands by spreading good hay inside *lepidium* areas. After the trampling by the cattle, the sheep had the access they needed. It took three heavy grazings by the sheep to reduce the *lepidium* to bare ground. Sheep were also used as a followup in the second year. New plants were sparse by the third year, but herbicide treatment was easy to carry out.

"Goats R Us" also reported effective control with goats on *lepidium*.

A UC researcher reported field trials they conducted with both sheep and goats showed that once the grazing pressure was off the *lepidium* came back. The take home message seems to be that both goats and sheep do a good job of reducing the biomass, knocking back the mature plants, but that a followup with herbicide to kill the roots and rhizomes is needed.

2. Flooding has been shown to be effective in killing *lepidium*, but it needs to be inundated for at least 6 months, and perhaps as much as 8 months.

3. Timing. Several participants indicated that the "common wisdom" that herbicide treatments must take place at the budding to seed set stage for effective control is not accurate and too restrictive. Mike Krebsbach of Monsanto said that he thought spraying with glyphosate could start much sooner and be effective. Participants from L.A. Water & Power indicated that in the Owens Valley they are treating *lepidium* almost year round with success. Telar seems to be effective at all stages of the plants growth, while 2,4-D is most effective at flower bud stage. Roundup (glyphosate) has been reported as most effective at bud and flowering stages, but new information indicates it can be effective when applied at earlier growth stages.

4. Vectors. A number of people reported on agricultural vectors for the spreading of lepidium. These included contaminated nursery stock, where lepidium roots and plants were contaminants in pots of both native and non-native plants, including popular Sago Palms, from a nursery in the San Pascual Valley in San Diego County. Lepidium as a contaminant in hay has been observed in a number of areas, again including San Diego County.

Many people were shocked to hear that Lepidium is an important part of the cut flower trade in California. Merchants from the Bay Area are confirmed to have traveled all the way into Nevada in search of large quantities of cut Lepidium blooms. In San Diego, one merchant was observed cutting large quantities of the blooming plants, was confronted in an educational fashion by an employee of one of the workshop's participants (this note taker), who tried to explain the dangers of moving this plant around, but was told it was an "important" part of their income. Another researcher present doubted that seed was actually being spread this way, but granted that the plant was being harvested at different stages of bloom and seed set. This suggests an interesting inquiry into whether the cut flower trade could be moving seed around. Any grad student interested out there?

5. Resources. The Nature Conservancy and WEEDRIC (UC Davis) both have stewardship papers et al on lepidium.

6. Ecological impacts. It was reported that the shrub part of the native community along the Truckee River was knocked out by Lepidium in only 4 - 5 years. Contrary to some popularly held opinions about Lepidium and soils, research was reported to have shown that Telar's root system is not structured to bind soil and is not good at preventing erosion. Lepidium has been shown to remove salts from the soil, hence an alkaline soil with a long term Lepidium infestation may be less alkaline after the infestation has been controlled and removed.

7. Sanitary methods. San Diego County is writing sanitizing requirements into their Lepidium contracts to avoid having contractors spraying the weed from spreading it around. This is necessary when the seed is setting. Others reported establishing a staging / sanitizing area for their vehicles where they would be inspected and washed down. One operation used the same area for quarantining their cattle (see above).

8. Telar. Mike Kelly of San Diego reported the successful use of Telar in alkaline marshes. No water was present since a prolonged drought has caused Lake Hodges, where the largest infestations in San Diego occur, to withdraw its open water more than a mile downstream from the infestations. This is important since Telar is not approved for aquatic use. Lepidium was effectively controlled in these marshes while native plants such as *Frankenia salina* (Alkali Heath), *Anemopsis californica* (Yerba mansa), *Isocoma*

(goldenbush) spp., *Ambrosia* (ragweed) spp., *Scirpus* spp., and *Typha* spp. were not killed. Occasionally a branch on an *Isocoma* seemed tinged, possibly from the Telar. Telar was deliberately "sprayed to wet" on several *Baccharis salicifolia* (Mule-fat), since this shrub is common in *Lepidium* areas around Lake Hodges. A few branches showed some yellowing of some leaves, but the shrubs otherwise appeared quite healthy. *Salix* spp. (willows) and mule-fat with *Lepidium* growing under them were treated with Telar without any noticeable detrimental impacts on the former, even after a year had passed. This is significant since Telar remains active in the soil and is supposed to have a preemergent effect in the second year.

9. Competing with and displacing *Lepidium*. There was one report of the successful use of *Distichlis* spp. (salt grass), *Juncus balticus*, and a *Leymus triticoides* (creeping wild rye) variety developed by Hedgerow Farms planted in an area where *Lepidium* was being controlled doing quite well in keeping the *Lepidium* out.

Another report indicated that *Lepidium*, like other mustards, doesn't seem to have symbiotic associations with mycorrhizae. This led to successful plantings of seed that was coated with carbon and inoculated with a commercial Mycorrhizae preparation. The carbon inactivates any Telar or other herbicides persisting in the soil.

10. Starving the root by mowing, discing, etc. . No one could report successful "starving" of the roots. Several researchers pointed out this was unlikely to work since any small piece of rhizome that is cut is capable of starting a new plant. No one had tried tarping after cutting.

11. White rust. A white rust has been seen on *Lepidium* in different parts of its range. UC researchers reported it is not an effective control and seems to be part of the natural cycle of the plant and has little hope of being an effective biocontrol.

12. Birch wet blade. This cut and simultaneous coating with herbicide was reported to be effective on *Lepidium*.

13. Grants and contract lengths. It was agreed by many that 2-3 year long grants are not long enough to allow for effective control or eradication of *Lepidium*, but that most grants for *Lepidium* or other exotic controls are rarely longer than 2-3 years. San Diego reported asking for and receiving one California state grant for a 6-year *Lepidium* grant. It was suggested that that grant applicants try to educate the grantors about this need for longer grant cycles and to allow for extensions of grants when needed.