Farm Advisor's Update

University of California
Agriculture and Natural Resources

LASSEN COUNTY

Summer 2023

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It has been a wet winter and spring and I wanted to write about a few things I have been working on, as well as a couple of general thoughts for things going forward this summer. It is great that we have received moisture to fill up stock ponds and reservoirs, however with all the increased precipitation come's different (but welcome) challenges.

Thoughts on Weeds and Moisture

By Tom Getts, Lassen, Modoc, Plumas-Sierra County Weeds Advisor

What a year it has been for weeds, with vegetation growing tall and lush anywhere and everywhere. All of these spring and summer thunderstorms have been tremendous for growing feed on the range. It also provides opportunity to target weeds and flush the seed bank from undesirable plants. Those of you on top of your weeds probably capitalized and killed your annual weeds this spring when they were small and easy to kill. If you were like many, and life got in the way, now would be a good time to reduce seed set and mow the weeds while they are flowering before the seeds mature. Reducing the number of seeds that mature and fall to the soil will pay dividends on managing those weed populations for years to come. If the seeds have already matured mowing will only spread the seeds as you mow. A couple of thoughts on specific species.

Right now (or a week ago) would be a good time to mow perennial pepperweed (tall whitetop) while it is in the flower/bud stage before seeds are set. Some areas are too far along to prevent seed production this year. Pepperweed has persisted through the drought, and has really taken off with the moisture we have seen this year. Elevated moisture in the soil sets it up to be a good year to get significant regrowth on pepperweed following a well-timed mowing. Research has shown mowing perennial pepperweed in the bud stage, letting it regrow for a month or so, back to the bud stage and spraying with a systemic herbicide can offer effective control. The mowing can help stress the deep root system of pepperweed as the plant needs to use sugar resources to regrow following the mowing, making it even more susceptible to a herbicide application. It also can be a good way to buy time if you missed the optimal application window, and stretch out the season to target the difficult to control root.

Picture One: White top in full bloom in the Honey Lake Valley, July 3rd. This perennial pepperweed (Tall whitetop) should be mowed immediately before seed is set, and regrowth treated with a systemic herbicide in a month or so to kill the root.

In pasture, nothing will completely kill the pepperweed in one shot. Multiple applications of 2,4-D over the course of two-three years can be effective, or if you have good established perennial grasses chlorsulfuron can be the herbicide of choice as it offers longer control and some residual activity the following year. Spot treatments will still be necessary to clean up escapes. In areas where there are no desirable grasses, (or in areas where you do not mind killing the grasses), glyphosate or

imazapyr can be effective. Use glyphosate in areas that will want to be replanted right away, where imazapyr can be a good choice where you want to kill everything growing. In terms of chlorsulfuron and pepperweed there have been some interesting things observed down in Sierra valley, where they have not been getting control. I personally would like to hear about anyone using chlorsulfuron who has not been getting a good kill on Tall whitetop/perennial pepperweed (Article detailing this below.)

Another plant, which has been really expanding its population, is scotch thistle. Right now, it is in the flower stage and could still be mowed to reduce seed set (or mowed and spray the regrowth). Just spraying it now that the flowers have formed may or may not eliminate seed set this year. However, I wanted to mention some characteristics of scotch thistle seeds and what you can do for next year!

Scotch thistle is generally a biennial and takes two years to make a seed. The seeds it produces have a water soluble germination inhibitor, and 80% of the seeds coming off the plant have an innate dormancy. However, it has been really wet this year which should help remove that germination inhibitor from seed in the soil, and we should have hordes of scotch thistle seedlings/ rosettes down in the understory of the mature plants. This fall (and early next spring) could be a great time to target those seedlings/small rosettes before they mature into flowering plants next year. I did a trial a few years back, and both aminopyralid (Milestone, Whetstone) and chlorsulfuron (Telar, Chlorsulfuron 75) offered effective control. Chlorsulfuron looked a little better as a fall treatment, and aminopyralid looked a bit better as a spring treatment the year after application. Both should give pretty good control on the rosettes down in the understory the season following treatment. While neither will give 100 percent control the following year, spot treating a few plants is much easier/cheaper than large broad scale treatments. Generally, the best time to target Scotch is in the rosette stage before it grows large. Taking advantage of this wet year, and killing the flushes of scotch seedlings this fall or next spring is an opportunity I would take advantage of.

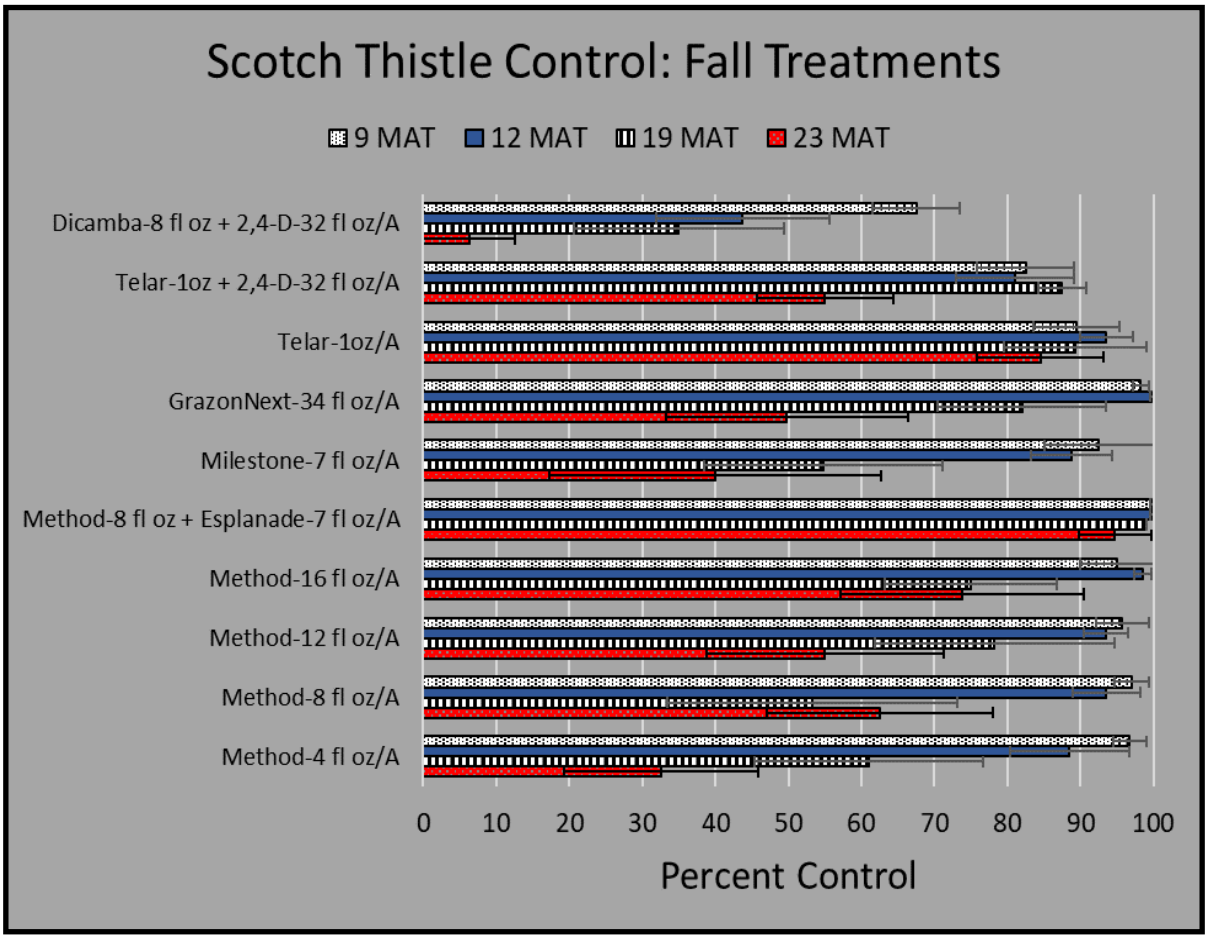


Figure One: Scotch thistle control trial from fall rosette applications. Most treatments gave good control the following spring (white bars 9 months after treatment). Telar and Milestone looked good 12 Months after treatment (blue bars) with around 90% control. No treatment gave 100% control and some spot treatments would be needed following application. Method (aminocyclopyrachlor) also offered effective control, but cannot be used in grazed areas, or around desirable trees.

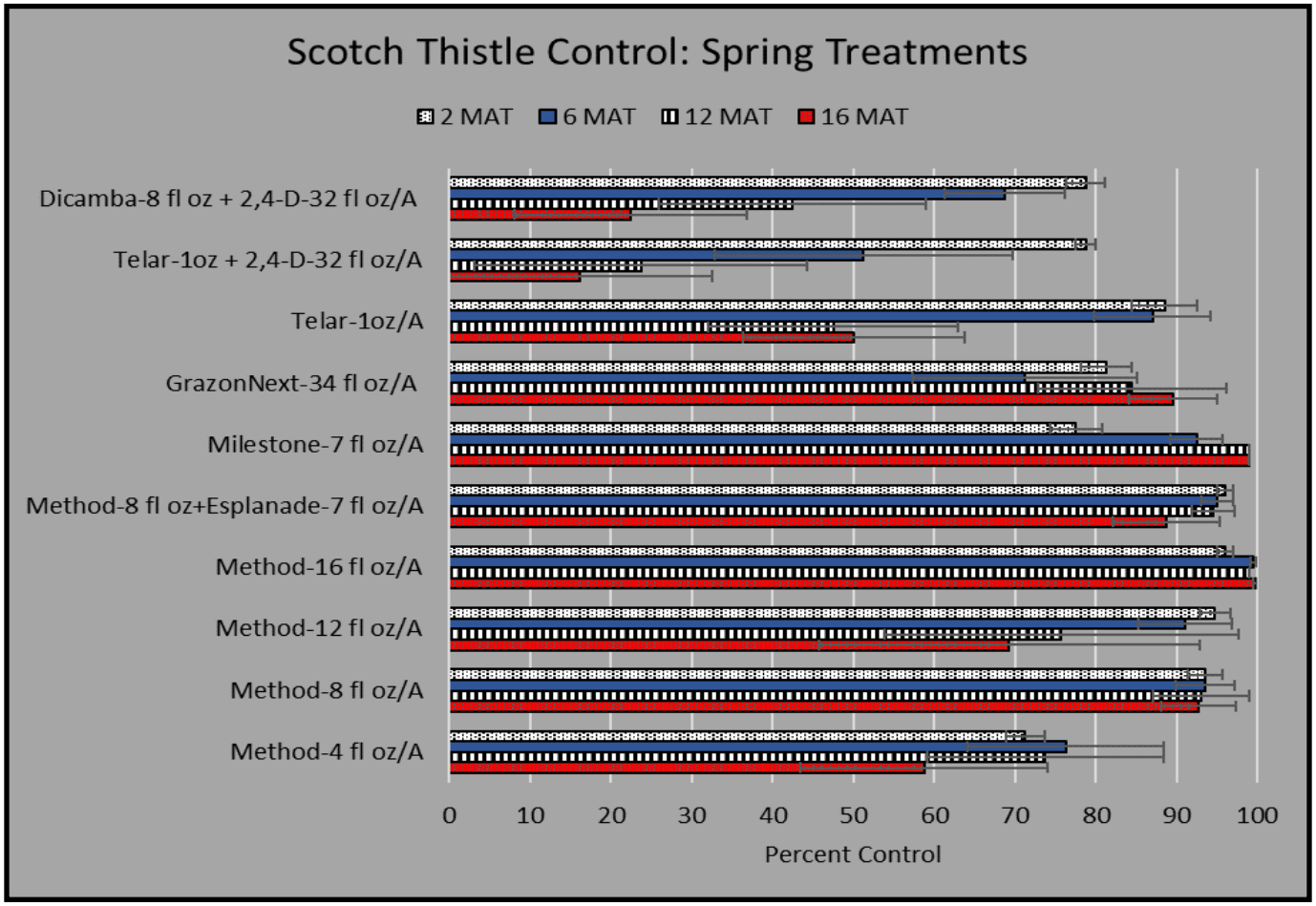


Figure Two: Scotch thistle control trial from spring rosette applications. Telar (Chlorsulfuron) and Milestone (Aminopyralid) gave good control at the first six months (blue bars). Sixteen months after treatment products with aminopyralid provided nearly 90% control (Some spot treatment would still be needed the season following treatment.) Method (aminocyclopyrachlor) also offered effective control, but cannot be used in grazed areas, or around desirable trees.

Highlighting some other weeds:

There are three other weeds I would like to highlight Mediterranean sage, Dyers Woad, and the "lesser known" Short whitetop (Hoary Cress).

Mediterranean sage was first documented in Susanville in 1892, so it has been around a while. However, I am seeing more and more of it and patches which are starting to grow in size. It is one that is very poor feed, and further north I have seen some pretty thick monocultures in dryland pastures. Mediterranean sage has a very wooly leaf, almost like mullein, but has serrated edged and a sage smell. It is very drought tolerant, and thrives where only annual grasses are growing. Mediterranean sage generally is a biennial plant forming rosette the first year, and sending up a flowering stalk with many showy white flowers the second year. Just like scotch targeting the small rosettes is the best time to dig it, pull it, or spray it.

Picture Two: Mediterranean sage rosettes. Hairy leaves like common mullein, but have serrated/ ragged leaf edges and more of a greyish hue.

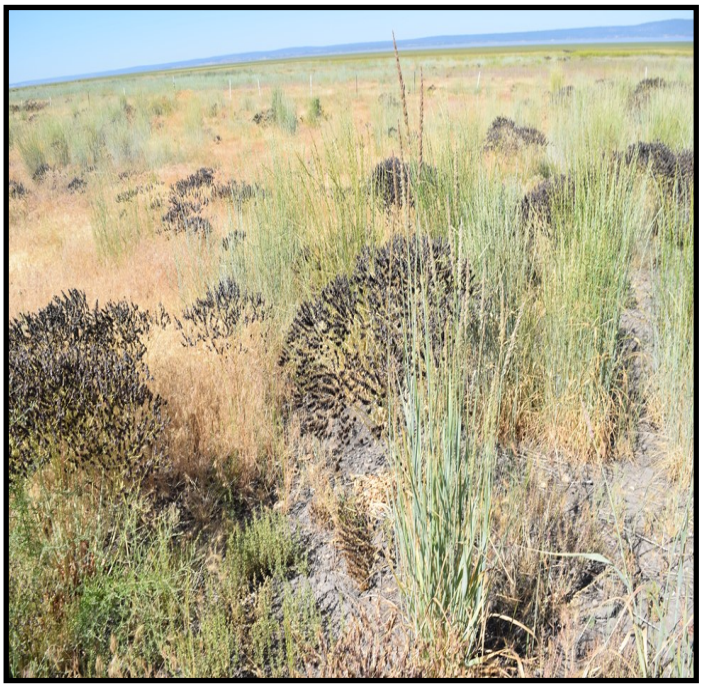
Picture Three: Mature Mediterranean sage. These plants have just lost their white flowers and are going to seed. They will break of and tumble across the landscape for an effective seed dispersal strategy.

The next plant is Dyers Woad, or as some know it “Marlahan mustard”. This is an interesting plant that got its foothold up in Scott valley in Siskiyou and is very widespread up in Modoc (getting into Big Valley). While historically there have been isolated populations in Lassen, it is one that is actively managed, as it could be problematic in our rangeland, pasture and even hayed systems. Like pepperweed there are limited control options legal in California (as it is a mustard, and some chemistries labeled out of state are not labeled here). This spring I have stopped to pull individual plants on Hwy 395 heading into Madeline, on the Susanville rd. off Hwy 139, and even most recently off Hwy. 44 going up thought the Hog fire scar where I have not see it before.

Dyers Woad most often grows as a biennial plant (sometimes perennial) with a showy yellow flower, and the seedpods turn almost blackish as they mature. These characteristics make it a distinctive plant and relatively easy to identify. Like Med sage and scotch controlling it in the rosette stage is key to successful management, and physical or chemcial methods can be used.

Fun fact is that they used to use Woad as a source of blue dye back in Europe where it is native. As we have little need for plant derived blue dye, it is one weed that we want to kill so that we can keep it from becoming the next Tall whitetop in Lassen.

Picture Four: Dyers Woad patch in full bloom. Distinct yellow flowers make identification fairly easy.



Picture Five: Dyers Woad, often when it has matured, the seeds turn almost a blackish brown, and are a distinctive identification characteristic.

Speaking of white top, Tall whitetop (perennial pepperweed), is not the only whitetop to be concerned about. Short whitetop (Hoary Cress) is almost as bad and has some really large populations throughout Lassen county. It is in the same family as tall white top, and both are perennial *Lepidiums*. Short whitetop also spreads by it rhizomatous roots and controlling the root is key to getting rid of it. Cows do not like to eat it, and it will take over areas that are grazed (and ungrazed for that matter). It matures and flowers quite a bit earlier than tall white top, and the same herbicides can be used to control it (Chlorsulfuron, 2,4-D, glyphosate, etc.). Or combinations of physical control followed by herbicides can be used. This year infestations have been dramatic to see up in the Madeline Plain, Big Valley, and over by Greenville. I see it spreading and moving around the county on roadsides. While we won't ever eradicate it, it is another species worth keeping an eye out for and killing small patches before they turn into large monocultures.

Picture Six: Right- Small patch of Short whitetop on Hwy 44. No other patches for miles. This is the stage when weeds can be caught and controlled before the spread becomes economically unfeasible for control.

Picture Seven: Field in the Madeline Plain, with hundreds (if not 1000's) of acres infested with Short whitetop / Hoary Cress. The white flower that extends all the way to the foot of the mountains in the distance is Short whitetop. I drove for multiple miles on Hwy 395 surrounded by this invasive mustard on both sides.

Armyworms:
A few years back in 2017 and 2018 when we had some wet winters, it lead to a lot of vegetation growth. Populations of armyworms rose, and there were many folks who lost their third cutting or stockpiled fall pastures. (Link to blog post). Armyworms are a migratory insect that supposedly do not over winter here in the intermountain region, but migrate in as the temperature warms.

Down in the low desert they can have over five generations per year where in the central valley there are typically four generations. In the intermountain region, we typically get two generations. The first generation is often sporadic, and not too problematic, but the second generation is the one that historically can be damaging. This can be true especially on wet years when populations at lower evections may be larger due to vegetation growth with more migration coming up into the mountains. Armyworms are often also a pest on Rice and UC has a monitoring program in rice where they can be a yearly problem. They had problems in 2017 down in lower elevations and sure enough later in the season so did we.

While it may not happen, the more forage for armyworms there is at lower elevations, there is more potential for large populations to develop and spread up here. It will be worth keeping your eyes out for the moths in the coming weeks and months as there was tremendous amount of vegetation growth at lower elevations with the wet winter and spring. Look for the moths at night, around lights or if you are driving around you fields. After you see moths, keep an eye out for the worms in your fields. Monitoring typically should occur early in the morning or in the evening when the worms are the most active.

It is really important to catch the populations at the early growth stage. It takes 2-3 weeks after hatching for the worms to reach maturity. While the smaller instars (growth stages) of the worms can cause damage in large numbers, they do the vast majority of their feeding in the last growth stage. Which is why you might not notice you have a problem, until they seemingly eat your field over night! Studies in the southern US indicates the fifth stage larvae instars (The last stage) eat 80% of the total foliage they are going to consume. This is vastly more than all other instars combined, which is why you want to find them small!

We have western yellow stripe armyworm, and also true armyworm. Most of the fields I visited in 2017-2018, which were decimated, had more true armyworm than western yellow stripe. One thing to point out is that these worms do have multiple natural controls. Watch for birds in your fields, as they will feast on the worms often keeping the pupations low. Likewise, during monitoring it is important to check for parasitized worms. Many worms can become parasitized and these will not make it to the last instar where most of the damage is done. If treatments are necessary, there are numerous products which can be used, and are effective at controlling armyworms.

Picture Eight: Above- True armyworm larvae collected under a windrow in a grass hay field.

Picture Nine: Below-True armyworm adult and pupa.

Picture Ten: Courtesy of Luis Espino- Sourced from the UC Rice Blog. Picture of adult western yellow striped armyworm.

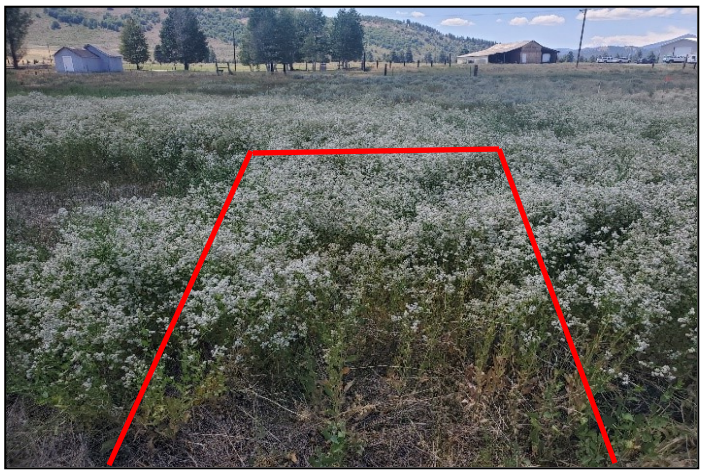
Case Study: Perennial Pepperweed and Chlorsulfuron in Sierra Valley

Perennial pepperweed (*Lepidium latifolium*) is one of the most troublesome weeds to control in pastures and riparian areas in California. Throughout the decades, there has been a tremendous amount of effort and research to discover effective methods to control perennial pepperweed. Two products, chlorsulfuron (Telar) and 2,4-D, have been shown to be effective materials where desirable grasses are present. Both of these materials have been effective for control in research trials in the Honey Lake Valley. Telar typically offers multiple year suppression of perennial pepperweed with a single application. In the past years, there have been reports in Sierra Valley from ranchers and land managers indicating Telar was not offering effective pepperweed control.

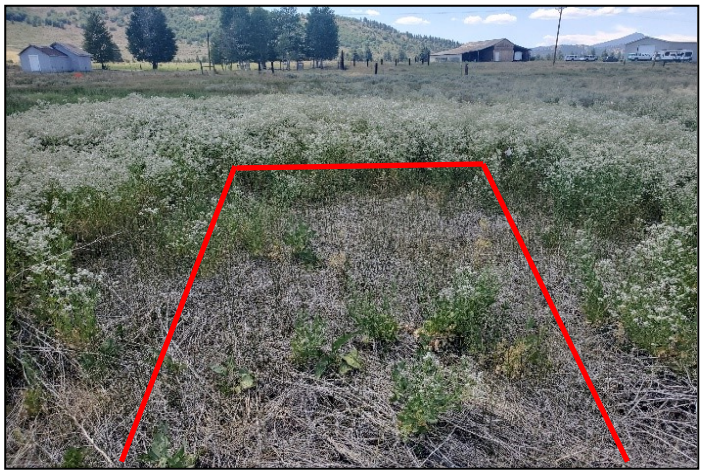
We set out to investigate the issue by setting up a couple of trials in Sierra Valley. The first one in 2019 was over sprayed by the grower, but indicated some effectiveness from Telar. The second trial in 2020 tested two rates of Telar compared to 2,4-D and surprisingly only 20-40% suppression of the pepperweed was achieved in the Telar treated plots 12 months after treatments. Where 2,4-D offered the suppression typically seen for perennial pepperweed in other locations (75%). The study was retreated again in 2020, to make sure an application error had not occurred, but still little effect from the Telar was observed at this site in Sierra Valley, with good suppression from 2,4-D.

The lack of control with an application of Telar is quite curious, and we are still investigating what could have occurred. Telar has been shown to be very effective from research throughout the west, but was not effective in this case study trial. What could be happening? At this point, we had two hypotheses. First, there may be some interesting interaction with the unique soils that have very high organic matter (11-12%). Secondly, (and less likely) it is possible herbicide resistance of perennial pepperweed has developed to Telar at this site, which has been treated on several occasions.

In the fall of 2021, I dug up roots of pepperweed from the Sierra Valley population and from a Honey Lake site where Telar had worked great. I transplanted these roots into potting soil in small pots. They were a little slow to get established, and were overwintered in a greenhouse up in Tulelake. I brought them back to Susanville and watered them in my garden. They became infested with a white rust (quite common on pepperweed in the spring.) I trimmed the plants, let them regrow and sprayed the regrowth in the bolting stage in August of 2022. I did a small dose response study, spraying each population with increasing doses of herbicide.



Picture Eleven: Perennial Pepperweed in Sierra Valley treated two years in a row at the bud stage with Telar 2.6oz/acre. No Control Observed.



Picture Twelve: Perennial Pepperweed in Sierra Valley treated two years in a row at the bud stage with 2,4-D 2qt./acre. Around 80% control observed.

Percent Pepperweed Control				
	12 MAT		24 MAT (12 MAT second Treatment)	
Treatment	Mean	Tky	Mean	Tky
2,4-D 2 qt/acre + MSO	77	A	83	A
Telar 1.3 OZ/acre + MSO	28	BC	10	BC
Telar 2.6 OZ/acre + MSO	40	B	28	B
Telar 2.6 OZ/acre + NIS	20	C	7	C
Untreated	0	D	0	C

Figure Three: Visual estimate of control at perennial pepperweed trial in Sierra Valley, 12 months and 24 months after the first application. (A second application of the same treatments was made to each plot 12 months after the first applications.) TKY– Stands for Tukey pair wise comparisons at the 95% CI.

This spring upon green up, we saw some interesting results. The Honey Lake population did not seem to overwinter quite as well as the Sierra valley population. One of the untreated Honey Lake plants died over the winter, and generally, they were not quite as vigorous. However, three out of four untreated Honey Lake plants were alive. All of Honey Lake plants which were treated with Telar the previous fall died even at the low rate (Picture 13). Where not one of the Sierra valley plants died in any of the herbicide treatments, even at double the maximum label rate for Telar (5.2oz/acre).

This is pretty concerning as all plants were in the same soil, and the results of this does response indicates resistance could be a possibility. I am working with some colleagues to do the lab analysis to confirm if ALS resistance is actually what could be occurring. Stay tuned for future results.

If you are not able to get control of pepperweed, with Telar consider switching tactics, and using another herbicide like, 2,4-D or Glyphosate.

If you have had failures with Telar/chlorsulfuron please do not hesitate to reach out.

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Picture Thirteen: Perennial Pepperweed from Sierra Valley and Honey Lake. The back row is from Sierra Valley, Front Row is from Honey Lake Valley.

Treatments range from Untreated (left), 1.3oz Telar, 2.6 Oz Telar, and 5.2 oz Telar.

All treated plants from Honey Lake died, where all plants from Sierra Valley did not die regardless of herbicide rate.

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