Sacramento Valley Pest Notes
Summer 2019

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Agriculture and Natural Resources Cooperative Extension

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In this Sacramento Valley Pest Notes

Will Nitrogen (N) Fertilizer Help to Improve Crude Protein (CP)?

Dan Putnam, Rachael Long, Michelle Leinfelder-Miles

1. Forage Quality. While nitrogen (N) fertilizers can (in some cases) increase the apparent crude protein (CP) of alfalfa by a point or two, this "protein" is not actually well utilized by ruminants. N fertilizer usually results in a higher non-protein nitrogen content (NPN) which is NOT protein, but free N in various forms (e.g. nitrate or free amino acids), which is immediately released into the rumen upon ingestion and forms ammonia. The ammonia must be excreted by the animal at a metabolic cost (ATP), so it is actually costing feed energy. It also results in excess urea in the manure. So, even though it looks like the protein is a little higher, it actually isn't. Remember, CP is measured N content (not just protein) multiplied by 6.25.

2. Economics. Small differences in yield are sometimes (not always) observed with applied N; however, those are rarely economically advantageous. Remember that the uptake levels of N by alfalfa are very high. A 10-ton Central Valley alfalfa crop will use about 700 lbs of N, which without N_2 fixation, one would need to apply close to 1,000 lbs N/year to meet the N needs of the crop. One could never cost-effectively fertilize to satisfy this need.

3. Losing your free N. N applications or high soil N have the tendency of suppressing N_2 fixation by making the Rhizobium lazy. Fertilizers would mostly just replace fixed N. Atmospheric N contributions to alfalfa growth are a major environmental benefit, and it's a shame not to take advantage of it.

4. Weeds. N applications encourage weeds, especially grasses. This negatively impacts quality.

5. Trade-off with Energy. Keep in mind that some alfalfa hay crops that have low N and low CP also have high TDN (energy values) such as the well-managed Intermountain spring cut hays grown under cool temperatures. This is due to dilution - if carbohydrates accumulate in the leaves, (e.g. 5-8 percentage points higher), then CP (and NDF/ADF) will be lower. When something goes up, something else goes down. Since energy tends to be more valuable in the marketplace, however, this is a good thing!

The best way to improve CP is to: 1) cut early, 2) choose a more dormant variety (but give up yield), and 3) manage the harvest to retain the leaf fraction. In occasional situations N fertilization may be helpful, as detailed this in the blog **When is N fertilization to alfalfa beneficial? Almost Never!**

Late Rains are a Boon for Puncturevine and Bane for us!

Rachael Long

Puncturevine (goathead, *Tribulus terrestris*) is one wicked weed! The thorny seeds get caught up in crop harvests, interfere with livestock grazing, pop bike tires, and are painful to step on at home when brought in on shoes. They seem to spread best by attaching to vehicle tires wherever this thorny-

seeded plant grows.

Puncturevine is a summer annual weed that's favored by late spring rains, such as the recent storms that brought about 3-inches of rain to the Central Valley. Keep an eye out for these plants on roadsides, in orchards, and non-crop areas. It's low growing and forms dense mats 2-5 feet in diameter that grow from a single deep taproot. The leaves and leaflets grow opposite one another, stems are reddish-brown, and the plant is hairy. The flowers are numerous, yellow, and about a ½-in wide. From a distance, they look pretty, but don't be fooled; this is one plant we don't want around. Plants produce 200-5,000 seeds per plant that are small, woody, spiny, and hard to spot, as they blend in with their surroundings.

Long-term control of puncturevine is best achieved by reducing the amount of seeds in the soil. Hand-weeding or hoeing can effectively control puncturevine, especially for seedling plants. For larger plants, cut the tap root and haul the plant away in a garbage bag. Don't leave the plants in the field, as they'll drop seeds that'll germinate next year. If possible, check the ground for seeds after removing a plant, catching them with a rag. Mowing is not effective because of the plant's low-growing nature. Shallow cultivation can eliminate young seedlings, although deeper incorporation should be avoided to avoid burying seeds at depths where they are shielded from further disturbance.

For chemical control, spray puncturevine small and early! This species can be an extra challenge because it sets seed quickly after emergence and one needs to be on top of sequential flushes of germination, especially during wet springs. There are a number of products that'll kill puncturevine after it has emerged (glyphosate, e.g. Roundup) as well as others that have both pre- and post-emergent activity (Chateau flumioxazin, Sharpen saflufenacil). However, if the plants have already set seed, these herbicides are unlikely to have much effect on those seed that will germinate the following season. Pre-emergent herbicides need about a half-inch of rain or irrigation for activation in order to effectively control newly germinated seedlings and prevent establishment. As with any pesticide, always check the label for use of herbicides on crop and whether it can be used in cropped versus non-cropped areas to make sure it's registered.

A couple of beetles (weevils) that are host specific to puncturevine can provide good biocontrol of this weed. One feeds on the seeds, whereas the other feeds on plant tissue. The seed feeding weevil deposits eggs in the flower buds and immature seeds; the larvae feed inside the seed, pupate, and adults chew their way out. Look for exit holes in the seeds for signs of weevil activity. The other beetle lays its eggs in the undersides of stems, branches, and the root crown, with the larvae feeding inside the plant tissue. After they pupate, the adults chew their way out of the plant. Adults of both species overwinter in plant debris.

These beetles were introduced into California for puncturevine control in the 1960's and have naturalized around our state. However, they are susceptible to cold weather and especially frosts, which kills the adults, knocking back the population. As a result, in some years following hard frosts and/or late rains, we get a resurgence of puncturevine, due to a lack of biocontrol as well as favored weather conditions for plant germination.

As you're out and about, be sure to keep any eye out for puncturevine. Pull it before it begins to flower and set seed, take it away, and drop it in the garbage or a burn pile. Be alert! Help protect all of us from this noxious weed!

Rain Damage to Garbanzos

The late May rains caused some crop damage to garbanzo beans in the Sacramento Valley. Seeds that were physiologically mature absorbed water, causing them to swell and split in the seed pod. This is an initial stage in the germination process, though cool, wet conditions did not last long enough to actually see germination (e.g. no root development). Splitting affects canning quality, as there can be no seed cracks or splitting, for meeting canning quality grade. Seed conditioning (cleaning and sorting out poor seed) can be done to improve seed quality in affected fields.

Watch for Lygus this year!

With all the rains we've had and lots of weedy growth surrounding fields, watch for lygus bugs, especially in beans and seed crops, such as carrots during bloom and seed set stages. They could be

a problem in sunflower hybrid seed production as well, a focus of current research. Lygus are also serious pests of cotton, seed alfalfa, and strawberries. These small, rectangular-shaped insects have a distinctive yellow 'V' on their back. Nymphs are bright green and look similar to aphids, but they move around on the plant (not sedentary), https://www2.ipm.ucanr.edu/agriculture/dry-beans/Lygus-bugs/

Damage: When lygus feeds, it probes with its beak and injects saliva full of enzymes that breakdown plant tissue, causing tissue dieback and bud and flower loss, resulting in yield losses. Feeding damage also affects seed quality because stings and dark blemishes on seed coats degrade seeds and affect seed germination. Lygus stings on sunflower cause kernel brown spot, Sunflower Production Manual photo, https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8638.

Lifecycle and monitoring: In the Sacramento Valley, lygus become active in May, with 3 to 4 generations per year. They overwinter as adults, build up and reproduce on weedy hosts surrounding fields, especially mustard and radish, and when these dry down, they move into adjacent crops. Lygus eggs are laid in plant tissue and hard to find. Adults and nymphs are best monitored with a sweep net in dry beans (visual inspections in other crops). When it's hot, lygus bugs go deep in plant canopies for shelter from heat, so morning sampling is best. Safflower and alfalfa are sources of lygus as well, so don't plant susceptible crops next to these fields, as the lygus will migrate out of safflower as it dries down and alfalfa when it is cut and damage crops when they're susceptible (flower bud and seed stages).

Control: Parasitoid (parasitic) wasps provide some suppression of lygus eggs and nymphs, but not enough for economic control. Threshold levels for lygus (numbers per sweep) have been established for many crops and are available on the UC IPM guidelines (http://ipm.ucanr.edu/) for agricultural pests. For dry beans, some varieties show more tolerance to lygus than others. UC ANR studies are currently evaluating blackeye (cowpea) varieties that show some resistance to lygus.

Unfortunately, once lygus reaches threshold levels in crops, there's no options for control other than the use of insecticides. Organic control is tough. Sulfur does not work; we tried an application in a bean field, thinking it would irritate lygus and they would move elsewhere, but they stayed right there, continuing to feed. Control alternate weed hosts around fields. Better yet replace weedy vegetation with managed native California flowering plants that are not hosts for lygus. These plants will also attract natural enemies for pest control and native bees for pollination and help suppress weeds.

In UCCE dry bean research trials, pyrethroids provided best control of lygus, along with highest yields. These included Warrior and Bifenture, as well as Leverage and Brigadier (mixtures with imidacloprid a neonicotinoid). Dimethoate (not registered on cowpeas) and Steward (indoxacarb) in dry beans provide moderate levels of lygus control with good yields. Check the pesticide label to make sure it's registered for the intended dry bean crop (e.g. common, lima, blackeye, or garbanzo or other crops). Transform (sulfoxaflor) a new insecticide chemistry, should be registered for some crops for lygus control this coming year in California.

Resources

Garbanzo (chickpea) production in California, 2019
A new resource on garbanzo production in California is available online at https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8634 (free download). Authors include Farm Advisors R Long, M Leinfelder-Miles, K Mathesius, and S Light, UC ANR Irrigation Specialist K Bali, and UC Davis emeritus Soils Specialist R Meyer. This production manual includes information on garbanzo varieties grown in California, soil fertility, irrigation management, and practices for managing pests, weeds, and diseases.

Sunflower Hybrid Seed Production in California, 2019
A new resource on hybrid sunflower seed production in California is available on line at https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8638 (free download). Authors include Farm Advisors R Long, S Light, and K Mathesius, USDA emeritus Plant Pathologist T Gulya, Irrigation Specialist K Bali, and UC Davis emeritus Soils Specialist R Meyer, along with extensive contributions from the sunflower seed industry. This production manual includes information on soil fertility, irrigation management, and practices for managing pests. There's also a color photo guide for insects, diseases, and weeds of concern for hybrid sunflower seed production.

Resources for IPM (Integrated Pest Management)
The UC IPM Pest Management Guidelines have a wealth of information on managing insect and mite pests, diseases, nematodes, and weeds for many crops grown in California at **http://ipm.ucanr.edu/**. For weed control, a significant resource are tables that list weeds alphabetically by their susceptibility to various herbicides. These tables can be found in the Weed Section of the IPM guidelines for specific crops, under 'Susceptibility of weeds to herbicide control'. These tables are a good source of information for determining herbicide choice by crop and weed type.
