Imperial County Agricultural Briefs

From your Farm Advisors

Features

June* *2005

Page

Our Website is http://ceimperial.ucdavis.edu

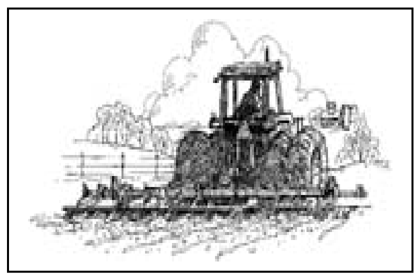
What is Agronomy?

Herman Meister

Several definitions were found on the internet. The shortest definition was "the science of crop production". The longest was "the branch of agriculture/horticulture that deals with the theory and practice of field crop production and the scientific management of soil". Both of these definitions are very broad and encompass an extremely wide range of issues that farmers deal with on a day to day basis. Many decisions that a farmer makes almost without thinking are agronomically related. For example, just setting up his irrigation schedule, tests his abilities to judge soil/water relationships in relation to crop use, weather, and water availability. Choosing a plant variety that is suited for his ranch and planting date is a crucial decision for a successful crop.

Some decisions in the area of "crop protection" are left to professional Pest Control Advisors (PCA's). Farmers have employed PCA's for years to recommend the correct pesticides to control insects, weeds, and diseases that can affect the production of crops. Only in recent years have farmers employed "agronomists" to make fertility recommendations based on soil and plant samples taken before and during crop growth. Farmers are learning that the old standard guideline of just adding some nitrogen and phosphorus to fields is not adequate in these times of high production costs.

A good farmer and a good fisherman have a lot in common. A fisherman uses various techniques to tell him what he can not see in the water. Certain lures and presentations can tell him what kind of structure (rocks, ledges, humps) or cover (wood or grass) is present in the water. Based on this and other information, he can adjust his approach to catching fish. The same is true with farming. A farmer can not see what is below the soil surface, so he must depend on soil sampling to tell him what the soil needs.



Taking the samples is only part of the picture. Interpreting the results of the samples is where an agronomists' expertise is necessary. The integration of soil science and computers has produced new technology that can apply the correct amount of fertilizer to a given area of the field based on the results of the samples. Cropping patterns have changed with more and more forage crops being planted. These crops produce a huge biomass containing large amounts of elemental nutrients that are removed from the field over time. With the various reports of nutrient deficiencies that I have seen over the past three years, I strongly suggest evaluating your field's nutrient capacities before planting. Let the agronomist take care of the soil issues and lets go fishing.

Livestock Drinking Water

Juan N. Guerrero

As the daily temperatures start to increase, it is important to assure good water quality for all our livestock and for pets. Colorado River water usually contains from 750 to 850 mg/L (or parts per million) of total dissolved solids. Although this level may be somewhat salty tasting (for some people), it is quite satisfactory for all livestock and for pets as well. The upper limit of total dissolved solids that is recommended for livestock is 1000 mg/L. Even water that has 2999 mg/L of total dissolved solids is satisfactory for livestock. Water of this salinity level might initially cause diarrhea in unaccustomed animals, but as the animals' systems adjust to tolerate the water, they become accustomed and will perform normally. Water that has greater than 3000 mg/L of total dissolved salts will cause problems for livestock.

Because of the desert heat, water sometimes becomes too warm. The warm water *per se* is not the problem, but rather the warm water permits algae and possibly toxic bacteria to grow. During the summer, fresh water should be provided at all times to livestock and to pets. During the summer, if water is provided in a large receptacle and not changed frequently, algae begin to grow in the water quite quickly. Sometimes the algae growth in stagnant water grows to intolerable levels making the water very turbid and green in color. When filaments of algae are present in the water, then the water should be changed quickly. Permitting the water to have algae filaments is indicative of poor livestock husbandry. Water for livestock does not have to be crystal clear, but it should be fresh and changed frequently.

Closely associated with uncontrolled algae growth in livestock drinkers, is the possibility of cyanobacteria (blue-green algae) poisoning. Cyanobacteria are ubiquitous and grow quickly on hot, sunny, days and in warm and nutrient rich waters. The presence of these bacteria may give the water a slightly blue coloration. At very high levels of cyanobacteria populations, the water may appear dark green or brownish green. Toxins from cyanobacteria are poisonous to cattle, horses, sheep, pigs, poultry, rabbits and dogs. Not all cyanobacteria are toxic, nor do all cyanobacteria that can produce toxins do so under all conditions. Algal poisoning appears quickly and has no known antidotes. If dead lizards or birds are found near a livestock drinker that has green water and that is full of algal filaments, then cyanobacteria poisoning should be considered as one possibility of death.

If for some reason algal growth in livestock drinkers cannot be controlled with constantly replenished fresh water, then copper sulfate may be added to the water for algae control. The usual rate of copper sulfate concentration is 1 ppm, or about 8 lb of copper sulfate in 1,000,000 gallons of water. Copper sulfate is toxic to fish and should not be allowed to flow into drains or other waterways.

A mature 1000 lb bovine, during the desert summer, may drink from 25 to 30 gallons of water per day, a mature horse from 15 to 20 gallons. Exercise makes water consumption increase. Large drinkers for a few animals are not a good idea. A practical solution is to provide smaller drinkers with a float valve so fresh water is being replenished as the livestock drink their water. Nipple drinkers work well for swine and dogs.

Properties of Fungicides and Resistance Risk

Thomas A. Turini

The effects of fungicide resistance may be noticed by growers or agricultural professionals when once effective fungicides appear to give poor control. However, besides resistance, there are many possible causes of the failure of a commercial fungicide application to provide the expected level of control. Among these causes are poor coverage, incorrect timing, insufficient rate, and incorrect diseases identification. In addition, without an untreated control in the field it is impossible to know how severe the disease would have been if the application had not been made, perhaps the disease pressure was too high to get the level of control that had been seen under other conditions.

Although many fungicides remain very effective against the target pathogens for which they were developed, resistance risks exist. Recognition of the potential dangers of resistance will enable the industry to gain maximum benefit from the effective fungicides that are available.

When a fungicide is used, any fungi resistant to the applied material survive at a higher rate than sensitive individuals. This results in the increase of resistance in the fungal population to subsequent applications of materials with the same mode of action. Factors that influence the development of fungicide resistance include the type of fungicide, the frequency of use, if it is used alone or with other materials, the target pathogen and the ability of the resistant forms to survive.

Fungicides that kill by interfering with a single biological process possess a single-site mode of action. Some fungi within a population may have a slightly different physiology that allows them to survive exposure because the site that the fungicide acts on is sufficiently different that the material does not have effect. Multiple-site fungicides disrupt many processes that are essential to the survival of a fungus. Therefore, generally, as compared to fungicides with a single-site mode of action, materials with a multiple site mode of action are at lower risk for resistance. The target site and risk of resistance of selected fungicides are presented in Table 1.

Other factors that influence chances fungicide resistance development includes the period of time the fungal population is exposed to the material and the number of fungi exposed. A fungicide that is applied several times during a season is much more likely to develop resistance problems than a fungicide applied once. The larger the population exposed to a fungicide the greater the chance of resistance development. Therefore, fungal pathogens with high rates of reproduction are more likely to develop fungicide resistance.

Use a tank mix with materials that have a low resistance potential. When multiple applications are necessary, alternate fungicides with different modes of action. Although not well documented in all cases, it is reasonable to plan rotations based on the presence of cross resistance between fungicides within the same group that are active against the same pathogen.

Cultural practices that may help reduce fungicide resistance under some circumstances include using disease resistant varieties, avoiding sites with high disease pressure and rotating crops to avoid the buildup of soil-borne pathogens, and general sanitation.

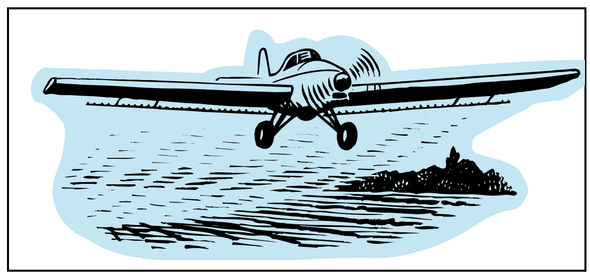


Table 1. Properties of selected fungicides.

Group Name	Target Site	Trade Names of Compound(s)	Resistance Potential
Carboxamides	Complex II in fungal respiration (succinate dehydrogenase)	*Endura (boscalid)*	Medium
DeMethylation Inhibitors (Class I of the Sterol biosynthesis inhibitors)	C14-demethylation in sterol biosynthesis	*Folicur (tebuconizole), Procure (triflumizole), Rally (myclobutanil), Rubigan (fenorimol), Tilt (propiconizole)*	Medium
Cinnamic acids	Cell wall synthesis (proposed)	*Acrobat (dimethomorph)*	Low to medium, but resistance management is required
Dicarboximide	NADH cytochrome c reductase in lipid peroxidation (proposed)	*Rovral(iprodione)*	Moderate
Dithio-carbamates and relatives	Multiple-site contact activity	*Maneb, mancozeb and thiram (various trade names)*	Low
Inorganic – Sulfur and Copper	Multiple-site contact activity	*Various*	Low
Isophthalonitrile	Multiple-site contact activity	*Various (chlorothanlonil)*	Low
Methyl Benzimidazole Carbamates	Mitosis: β-tubuline assembly	Topsin (thiophanate-methyl)	High
PhenylAmides	RNA polymerase I	*Ridomil Gold (mefenoxam)*	High
Phosphonates	unknown	*Aliette (fosetyl-Al), Fosphite (potassium phosphate))*	Risk assumed to be low
Quinolines	G-proteins in early cell signaling (proposed)	*Quintec (quinoxyfen)*	Medium
Quinone outside Inhibitors	Complex III of respiration: ubiquinol oxidase, Qo site	*Cabrio and Headline (pyraclostrobin) , Flint (trifloxystrobin), Quadris (azoxystrobin), Reason (fenamidone)*	High

Table adapted from Fungicide Resistance Action Committee Fungicide List (2)

WORM PEST MANAGEMENT IN ALFALFA

Eric T. Natwick

ALFALFA CATERPILLAR

Alfalfa caterpillar, *Colias eurytheme* is a warm weather pest of alfalfa. Seven generations may occur between May and October, in the low desert. Check fields for alfalfa caterpillars when yellow alfalfa butterflies first appear in May. Alfalfa butterflies flying over tall alfalfa most likely emerged from that field. Eggs are laid singly, standing on end, on the upper surface of leaves in fields with re-growth under 6 inches. Larvae hatch in 3 to 10 days, grow to about an inch long and pupate in approximately 2 weeks. Alfalfa caterpillars are green with white stripes down their sides and are distinguished from beet armyworm by their velvety appearance.

Photo courtesy of UC IPM

All alfalfa caterpillars consume leaves, but larger larvae are most destructive. In contrast to armyworms, alfalfa caterpillars do not skeletonize leaves and will consume the midrib. A small 0.25-inch long black wasp, *Cotesia medicaginis*, is a parasite of alfalfa caterpillar. This wasp stings very small alfalfa caterpillars and lays an egg inside. The wasp egg hatches and the wasp larva consume the body contents of the caterpillar. *Cotesia medicaginis* parasitized larvae are lighter than normal in color, being somewhat shiny rather than velvety on the surface, and swollen toward the rear. The wasp larva can be exposed by grasping the caterpillar at each end of the swelling and pulling it apart. A parasitized caterpillar dies before it reaches 0.5 inch in length.

Management guidelines. Damage may be avoided by cutting the crop early. Timing of an early cutting is critical to obtain satisfactory yield and to avoid serious damage. Monitor fields weekly from June through October, checking 2 to 3 times per week during periods of heavy infestations. Take 5 sweep counts in 4 to 5 field locations. Check for *Cotesia medicaginis* parasitism. An insecticide treatment may be warranted when field counts average 10 non-parasitized caterpillars per sweep.

Bacillus thuringiensis gives satisfactory control of the alfalfa caterpillar, does not adversely affect beneficial species, and leaves no undesirable residue on the hay. Upon ingesting *Bacillus thuringiensis* the caterpillars cease feeding but may remain on plants 3-4 days before dying.

ARMYWORMS

Beet armyworm and western yellowstriped armyworm are common pests in alfalfa from June through September, occasionally damages alfalfa in April or May in the low desert valleys of Southern California. Egg masses of both species are deposit on the upper side of leaves. White cottony scales cover beet armyworm egg masses and western yellowstriped armyworm egg masses are covered with gray cottony scales. Eggs hatch in a few days and larvae reach full size in 2 to 3 weeks. Larvae pupate on or under the soil surface. Adults of both species are brown nocturnal moths with a 1¼-wing span. Moths emerge to re-infest alfalfa or to infest other crops. There are at least 5 generations of beet armyworm and western yellowstriped armyworm per year in the low desert; the final generation of each species overwinters as pupae in the soil.

Beet armyworm larvae are smooth-skinned and are usually olive green, but color varies from bright green or purplish green. They have very fine dark stripes on their backs and pale yellow stripes on each side.

Photo courtesy of Digital Diagnostics at OSU

Western yellowstriped armyworm larvae appear smooth and are usually black with two prominent orange yellow stripes and many narrow stripes on each side. An intense black spot on the lateral margin of the first legless segment is a distinguishing characteristic. First instar larvae of both species web terminal leaves together and skeletonize the leaves, later dispersing through the crop. Spiders and various species of predacious bugs prey on the larvae of both armyworm species. *Hyposoter* *exigua* wasps prey on both armyworm species by depositing an egg in the larvae. A *Hyposoter exigua* larva hatches from the egg and parasitizes the armyworm larva.

Management guidelines. Sample for parasitism by pulling the heads from ½ inch or longer armyworms and squeezing the body contents out from the anal end toward the head *Hyposoter exigua* larvae will be pushed out of parasitized armyworms. Monitor fields weekly by making 5 sweep counts at each of 4 to 5 locations per field using a standard sweep net. Check fields 2 to 3 times per week when heavy populations begin to develop. Treat with an insecticide when there are 15 non-parasitized ½ inch armyworms of either species per sweep.

CUTWORMS

Cutworms are chronic pests in low desert alfalfa planted on beds. Granulate cutworm, *Agrotis subterranea* (Fabricius), and the variegated cutworm, *Peridroma sausia* (H□bner), are the two species that most commonly attack desert alfalfa. Cutworm adults are night-flying moths in the Family: Noctuidae. The white or greenish eggs of these noctuids are laid in irregular masses; on alfalfa leaves or stems often near the base of the plant. The eggs darken as they approach hatching. Larvae can grow up to 2 inches (5 cm) long. The heavy-bodied larvae appear as smooth-skinned caterpillars of various colors and patterns. Larvae frequently roll into a C-shape when disturbed. Cutworm larvae hide under loose soil, in soil cracks or under duff during the day, move to the plants at night to feed. Granulate cutworm feeds largely underground or under duff, cutting off new shoots at or below the soil surface. Many new alfalfa shoots can be cut off during the night; often the first indication of a problem is the lack of re-growth. Variegated cutworm feeds mostly above ground and may climbs in to the plant canopy to, but they generally cause only minor damage.

Variegated cutworm populations may develop in weedy areas and migrate into seedling stands or mature stands. Seedling alfalfa stands can be severely damaged by cutworms cutting the seedlings off at or just below the soil surface. Established fields are damaged when cutworms cut off new growth of feed on the alfalfa foliage.

Granulate cutworm is a devastating pest of bed planted alfalfa, but can also be a pest of alfalfa planted between borders. Low desert alfalfa fields are attacked by granulate cutworm from May through October, but the pest is resident in fields throughout the year.

Established alfalfa fields can be severely injured when cutworms cut off new shoots at or below ground level following hay harvest. The pest often goes undetected after cutting and hay removal. The problem becomes apparent when the field is watered back and there is little or no re-growth due to cutworms feeding. Cutworms feeding on shoots, thereby holding back re-growth, deplete starch reserves in the crowns, weakening the plants, making them susceptible to disease. Granulate cutworm is nocturnal, but will move from daytime hiding places and climb into the alfalfa canopy to feed in the evening.

Management guidelines. Cutworms are most injurious in fields with high plant residue. Pre-plant tillage and abatement of weedy refuge areas around fields help

prevent cutworm infestations. Flood irrigation will drown many cutworm larvae. Flood irrigation during daylight hours will attract Egrets, Ibis, gulls and other birds that prey on the cutworm as the advancing water forces the larvae from hiding. Monitoring and treatment guidelines have not been established for cutworms in desert alfalfa. However, looking under duff and carefully digging to a depth of one inch deep in loose soil near alfalfa crowns can detect cutworms. When cutworm numbers exceed one or two per foot of row or severe damage is apparent, treatment with an insecticide is usually warranted. Pyrethroids have been the only efficacious insecticides for control granulate cutworm in the low deserts.

Black cutworm

Variegated Cutworm

CIMIS REPORT

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of June 1 to August 31 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082). Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (visit http://tmdl.ucdavis.edu and click on the CIMIS link).

Table 1.Estimates of daily Evapotranspiration (ET_o) in inches per day

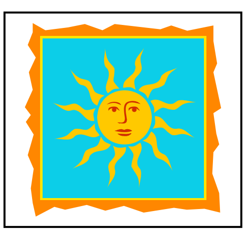
Station	June		July		August	
	1-15	16-30	1-15	15-31	1-15	16-31
Calipatria	0.39	0.40	0.39	0.38	0.35	0.32
El Centro (Seeley)	0.36	0.38	0.38	0.37	0.32	0.29
Holtville (Meloland)	0.38	0.39	0.39	0.38	0.34	0.31

* Irrigation Management Unit, Imperial Irrigation District.

To simplify our information it is sometimes necessary to use trade names of products or equipment. No endorsement of named products is intended nor is criticism implied of similar products, which are not named

Eric T. Natwick, County Director

Cooperative Extension
University of California
1050 E. Holton Road
Holtville, CA 92250-9615



Happy Summer!