Cooperative Extension
Colorado State University, Fort Collins, Colorado 80523

Colorado State University

AGRON-  -GRAM

March, 1991

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BEFORE YOU PLANT CORN

Most corn seed has been purchased from commercial seed dealers, either last fall or winter and much of this seed has been delivered. Varieties have been selected and plans made to plant, care for and harvest a profitable crop. But there are many obstacles to overcome before the dollars are in the bank. A wise manager recognizes there are inherint risks and will profit by understanding them. Some management topics follow.

Soils are extremely dry in most corn growing areas of Colorado. I would recommend checking deep soil moisture now and pre-irrigating if moisture is low. Stored water is still one of the secrets to optimum yield production. One still expects additional spring precipitation; however, the assumption that we will get adequate amounts prior to planting is risky. Most irrigation system application rates are far less than the .25 to .35 inches required per day for irrigated corn during the rapid growth period. Low levels of deep soil moisture can be a disaster, especially in fields having marginal systems. When behind in water application and low in deep soil moisture, you never "catch up".

Another critical factor involves weed control. You must rely on information from the chemical label. There are provisions to apply chemicals preplant incorporated, preplant, postplant and postemerge. There are different methods of application such as granular, spray, fertilizer-chemical combinations and chemigation. In addition to those mentioned, there are registered blends of chemicals that improve herbicide performance. Some chemical mixtures are not compatible while others enhance effectiveness. Using spreaders, stickers, adjuvants and other similar products when the label doesn't ask for their use is risky. Phytotoxicity may occur resulting in chlorosis, leaf crinkling, bent plants, stunted growth, and the loss of some plants which may result in significant yield losses. The newest concern is using certain sulfonylurea-type herbicides postemergence for grass control when Counter, an organophosphate insecticide, is used. This mixture could cause serious losses.

Each herbicide, fertilizer, insecticide or blend has been tested and approved prior to being added to the label. However, there are additional conditions that dictate the product or combination's safety. These are weather conditions. There are times that it is too cold or too hot, too wet or too dry or some combination which may create problems. This is impossible to determine ahead and farmers must be willing to accept a certain amount of risk. It is said that those who try to outguess the weather are foolish.

Plant full season varieties early giving the

plants that extra time in the fall. The rule of thumb is that planting corn 5 days earlier in the spring will result in 1 day earlier maturity in the fall. Rely on weather temperature trends to establish your planting date. When soil temperatures reach 40°F, it is time to plant corn. Some folks say that when oak leaves are the size of squirrels' ears, it's time to plant corn. But then, how may oak trees are there in a corn field? (Croissant)

EARTHWORMS BENEFITS TO SOIL

Numerous investigators have pointed out the beneficial effects of earthworms on soil properties. Some of the important effects are:

- They aid in the degradation of organic residues in the soil with the release of elements such as carbon, nitrogen, sulfur, and other nutrients.

- The action of the digestive fluids and increased microbial activity in the casts (droppings) tends to solubilize inorganic plant nutrient elements present in inorganic soil minerals.

- The structural stability of ingested soil is improved through increased microbial activity while the soil is within the worm and after it has been deposited as casts.

- The extensive burrowing of the earthworm improves soil aeration.

- Burrowing may increase water penetration into soils.

Although earthworms are considered beneficial to soil productivity or plant growth, few valid studies have been made to determine whether their presence will significantly improve plant growth.

Before considering field or garden scale, inoculation of earthworms into the soil, one should keep in mind that earthworms are natural components of the soil population. If the soil is properly managed this natural population will thrive. In soils where earthworms are inoculated, only species that can adapt to harsh, soil environments should be used. This allows for improved survival rate and increased reproduction capabilities. (Follett)

IDAHO GREEN TAG SEED

There have been many questions, comments, and complaints in recent months about selling and planting Idaho Green Tag bean seed. I would like to clarify what the Idaho program is trying to accomplish. Idaho is concerned about disease problems that can ravage a bean seed field and potentially ruin the bean crop. To control the spread of disease, the Idaho legislature has adopted regulations stating that beans planted for commercial use shall have a documented disease-free background. There are two ways to achieve this documentation, either to plant certified seed, or to have the bean seed fields inspected for pathological problems. Idaho certified seed fields are inspected for varietal purity as well as presence of disease by the Idaho Crop Improvement Association. Therefore, blue tag certified bean seed is approved for planting in Idaho.

The problem that bean seed dealers are complaining about is the second circumstance, green tagging of non-certified seed. Idaho farmers wishing to replant their own seed or seed companies who want to sell uncertified seed in Idaho must apply to the Idaho Department of Agrigulture for green tag inspection. An inspector from the Idaho Department of Agriculture inspects these fields for disease contamination. Seed produced from inspected disease-free fields are allowed to be tagged as apparently disease-

free. This tag is issued by the Idaho Department of Agriculture, not by the Seed Certification Service. The seed is now legal to be planted for commercial production in Idaho.

In some cases a yellow tag may be attached to a seed bag. This tag states that the seed is reported to be blight-free based on laboratory serological tests. Again, this tag is not a certification tag.

Some green tag seed arriving in Colorado is seed of varieties protected under the Plant Variety Protection Act (PVP). Because of the PVP, it is illegal to sell seed of any variety that has received protection unless it is certified. An exception in the law, commonly referred to as the "Farmers Exemption", allows a farmer whose primary business is not seed production to sell "saved seed" for reproductive purposes. The farmer is not allowed to advertise this seed for sale, nor is a third party allowed to sell it or even be involved in the sale. Enforcement of PVP in Colorado is difficult at this time. The Colordo Department of Agriculture has stated that enforcement of the Colorado State Seed Law is difficult. The second method of enforcement is for the variety proprietor to file a civil suit against the infringer. Colorado Pinto Bean varieties "Bill Z" & "Olathe" are protected under PVP and therefore cannot be sold as uncertified or Idaho green tag seed. (Stanelle)

GROUNDWATER QUALITY

I would like this opportunity to familiarize the readers with some history and provisions of Senate Bill 90-128, known as the Agricultural Chemicals and Groundwater Protection Act, which became effective July 1, 1990. The law is designed to allow Colorado to take the initiative in protecting the State's groundwater and avoid having solutions imposed by federal organizations such as the EPA. The bill is funded from a 25 cents per ton fertilizer tax and part of the pesticide registration application fees. The bill is primarily a precautionary bill as there are few ground water problems identified in the State at present. The only serious groundwater problems are in the enclosed aquifer of the northern San Luis Valley, and the alluvial aquifers along the South Platte and Arkansas Rivers. It is one intention of the Bill that additional areas do not become problems while relieving existing problems in these areas.

The bill has a three-tiered response. The first level of response is to provide some regulations on sites where large volumes (55,000 pounds/year) of chemicals are handled. Along with this are development of "best management practices" (BMPs) for chemical use for different crops and different locations throughout the State. The development of the BMPs is my prime responsibility. The BMPs will look at ways in which chemical applications can be reduced without eroding profit margins, and how irrigation application can be more efficient to reduce the potential movement of the chemicals into the groundwater. Most of the BMPs should be consistent with many current management trends toward more efficient resource use aimed at developing more sustainable agriculture. After some discussion with growers, I wonder if the groundwater problem in the San Luis Valley is more a historic one from previous less efficient management practices than reflection of current management.

At a level one response, the use of BMPs is voluntary. In practice it would be very difficult and expensive to enforce compliance. Compliance with BMPs is done further along the South Platte in central Nebraska, and it is a real major paper chase for farmers to obtain their chemicals each year. Let us hope Colorado does not follow that example. However, Senate Bill 90-126 does have provisions for enforcement if necessary. The

second level response is for the Commissioner of Agriculture to designate areas with contaminated aquifers as Agriculture Management Areas (AMAs). If this happens, then Agriculture Management Plans (AMPs) will be developed and distributed for all crops produced in the area. These will be based on the BMPs but compliance will remain voluntary. In the final level of response, the Commissioner of Agriculture working with the Water Quality Commission will mandate compliance with the AMPs and initiate the necessary procedures to assure compliance. However, as I mentioned earlier, at present this is a precautionary inclusion in the Bill as there are only limited problems in the State, and these problems may not be reflecting current management. To the best of my knowledge, there are no plans to move beyond a first level response of developing and promoting BMPs. From my discussions with farmers to date, I can not see any need to go beyond the current response level. (Tinsley)

WATER TESTING KITS

Water testing kits are becoming more popular with Extension agents around the state. Kits offer information about water quality quickly with little investment in equipment. Most kits, however, depend on comparing colors derived from mixing samples with reagents to a color chart. Comparing colors is considered a semi-quantitative method for analyzing a sample, since the results are not exact. If water testing kits are utilized as a service for people to assess water quality, there are a few points that should be kept in mind:

1. Get completely organized before starting. If lab analysis is to be used for comparison tests, be sure to assess the quality of the data from the laboratory by using check samples.
2. Have the laboratories compare results prior to the beginning of a testing program to prevent discrepancies.
3. If several labs are involved, have the samples analyzed in the same way to minimize differences in results due to variations in methodologies.
4. Obtain samples in polyethylene containers with plastic caps. Rinse sample bottles with sample at least 3 times if possible.
5. Samples should be removed under normal operating conditions.
6. Keep samples refrigerated at 4°C.
7. It would be ideal to analyze the water at the site. Kits are beneficial for on-site analysis, which helps eliminate potential sampling problems.
8. Analysis for nitrates should be performed within 48 hours of sample collection.
9. Standards should be replaced on a regular basis, depending on the desired analytes. Nitrate standards may need to be replaced every 2 to 4 weeks.
10. Recheck old standards against new ones to assure no contamination has occurred in the old standards.
11. Have samples and standards checked by a lab periodically.
12. Samples high in an analyte should be checked again on another day. or with a new sample.
13. If colors are being compared between a sample and a color chart, it is advisable to do so in a well-lit area with a white background to make

comparison more uniform.

14. Testing should be performed in an area that is neither too cold nor too hot.

15. Keep in mind that cadmium reduction for metals is tricky, even in the laboratory. Mixing times that are too short or too long can affect color development.

16. Turbid or discolored samples may be difficult to analyze. Turbid samples may have to be filtered through a 0.45 um filter and discolored samples may have to be diluted or passed through charcoal before analysis.

Utilizing kits for water analysis requires about as many precautions as when water is analyzed in the laboratory. Some of the points mentioned here may help reduce some of the variability that could occur. (Self)

CONTROL OF ALFALFA WEEVIL

The alfalfa weevil is the most significant insect pest problem limiting alfalfa production in Colorado. Now is the time to begin considering strategies for detection and control of this insect pest. Information pertaining to identification, the life cycle, and control of this pest is in SIA bulletin 5.500.

Briefly, the alfalfa weevil overwinters in the adult form in the crowns of the alfalfa plant or under leaves and debris. Adult weevils are small, 1/4-inch, brownish-grey snout beetles, with a darker brown band down their back. The adults emerge in the spring and begin chewing holes in young alfalfa leaves as soon as they emerge. In early April the female weevils begin to chew holes in stems and lay 1 to 40 eggs in each cavity. The eggs are small and bright yellow, although they will darken as they near maturity. Eggs hatch in 1 to 2 weeks. The newly-hatched, yellowish-green larvae will feed within the stem for a few days before moving to the opening leaf buds at the tips of the stems. Later, they feed on the leaves, producing a characteristic ragged or skeletonized appearance. Severe damage gives the field a grayish or whitish cast. Larvae usually can be found in the field for 1 to 2 months, mostly during May and June. Weevil feeding not only causes losses in crop yield but also affects crop quality.

Population numbers of the weevil can reach what are called economic thresholds by mid-April in southern Colorado or by mid-May in northern Colorado. Economic thresholds are weevil populations which have been found to cause economic yield losses and would warrant control by insecticide or harvesting. However, a more appropriate means of predicting the development of weevil than the calendar date is the use of accumulation of heat units from January 1, using a base development temperature of 48° F. Heat units calculations for each single day are determined using: {(Maximum Temp + Minimum Temp)/2 - 48°}. This calculation would be performed for each day from January 1 and up to the date of interest. Research has shown that an early peak of 3rd stage larvae from overwintering eggs can occur after an accumulation of 325 heat units and a second major peak from spring-deposited eggs may follow at 575 heat units. One could then use these calculations to begin scouting for potential weevil damage.

All fields will usually not have infestations high enough to warrant control measures. Each field should be surveyed to determine the degree of infestation before control decisions are made. Survey techniques can be found in SIA bulletin 5.500. Infestation levels can be determined by calculating the percentage of damaged terminals (tips), by counting the number of larvae per stem, or by counting the number of larvae captured with a standard 15-inch sweep net.

The economic threshold for alfalfa weevil control is dynamic, changing with height of the crop. As crop growth increases, the degree of infestation necessary to cause economic loss also increases. The Certified Alfalfa Seed Council (Davis, CA) has produced a brochure containing several threshold recommendations for alfalfa at various growth stages (Table 1). These recommendations utilize several factors such as accumulated heat units, crop height, proportion of terminals (tips) damaged, and control options.

Table 1. Economic Threshold.

Heat Unit	Ht. (in)	Tips Damaged	Opt
300	<6	25%	1
400	9	50%	2
500	12	75%	3
600	15+	75-100%	4
750	Cut	50%	5
800			6

Options

1. Reevaluate in 7 days. If the number of larvae average at least one per stem and damage is increasing, spray with long residual insecticide.

2. Spray with a long residual insecticide if larvae average one or more per stem.

3. Spray with short residual insecticide. If field is cut at this time, reevaluate field after cutting and treat within 7 days if weevils are still active.

4. Best to cut and remove crop; spray stubble within 7 days if weevils are still active.

5. In no regrowth within 4-5 days of cutting and weevils are present, feeding on "bark" of old stems, spray immediately.

6. Beyond need for control measures. Weevil population gone or declining.

SIA bulletin 5.500 or the insecticide label should be consulted before choosing the appropriate insecticide for each situation. The length of residual of the insecticide will be one of the more important factors when choosing the appropriate one. Additionally, toxicity of the insecticide to honey bees may also be an important consideration. (Shanahan)

ALTERNATE CROP BULLETIN

The Alternate Crop Technical Bulletin LTB90-3, by D.L. Johnson and R.L. Croissant has been reprinted and is now available in quantity. Original distribution has been financed by the Alternate Crop budget and Dr. Dennis Lamm. The Free Copy supply is depleted.

Additional copies are available at cost by writing to:

Alternate Crops Bulletin
Attn: Jeri Dreher
Department of Agronomy
Colorado State University
Fort Collins, CO 80523

The price of each bulletin is $3.00 plus postage and handling. ($1.50 parcel post or $2.00 first class mail).

Call for information 303/491-6201. (Croissant)

Where trade names are used, no discrimination is intended, and no endorsement by the Cooperative Extension Service is implied.

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Sincerely,

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