Cooperative Extension
Colorado State University, Fort Collins, Colorado 80523

Colorado State University

AGRON-O-GRAM

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CORN WATER USE

Water use by corn varies during rapid growth between .25 to .35 inches per day. The critical growth stage, when adequate soil moisture is necessary, is during pre-tassel to silking. Soil moisture deficits during this period will depress yields more than equal stresses at other growth stages.

You say, "Sometimes I just can't keep up during these summer months." Now is the time to evaluate effectiveness of deep irrigation. Deep soil water serves as a reservoir supplying extra water during shortages. Healthy roots can extract water from lower levels as the season progresses (Table 1).

Table 1. Average root depth of corn in feet at various stages of growth.

Growth Stage	Root Depth
12 Leaf Stage	2.0
Early Tassel	2.5
Silking	3.0
Blister	3.5
Dent	4.0

Moisture restrictions in the soil will limit penetration resulting in dry subsoil or "soil sandwiches." Soil sandwiches result when a dry soil layer has moisture both above and below it. These conditions are common with center pivot irrigation on the fine textured soils. Soil water availability varies depending on soil type as shown in Table 2.

Table 2. Inches of available water per foot of soil.

Soil Texture	Available Water
Coarse Sand	0.5
Very Fine Sand	1.2
Sandy Loam	1.9
Silt Loam	2.1
Silty Clay	2.6
Clay	2.8

By calculating, it is easy to see that for example, an ET rate of .30 inches per day equals 2.1 inches per week. To maintain soil moisture levels, another 2.1 effective inches of water must be added each week. Many times dry sub-soil can occur unnoticed then it is too late to prevent yield loss. Pre-irrigation before planting is an excellent way to combat this problem.

Corn will extract water from the soil at varying rates depending on the growth stage as shown in Table 3.

Table 3. Weekly evapotransporation (ET) of corn in inches of water.

Week	Growth	ET
1	Seedling	0.4
2	2-4 Leaf	0.4
3	4-6 Leaf	0.6
4	6-8 Leaf	0.8
5	8-10 Leaf	1.1
6	10-12 Leaf	1.4
7	12-14 Leaf	1.4
8	14-16 Leaf	1.5
9	Pollination	2.3
10	Pollination	2.3
11	Grainfilling	1.8
12	Grainfilling	1.8
13	Grainfilling	1.8
14	Grainfilling	1.7
15	Grainfilling	1.7
16	Maturity	1.6
17	Maturity	1.6

Any method that you can use is of value to monitor soil moisture levels. Irrigation scheduling will help provide guidelines for water needs of the crop. Timing irrigation by the "feel" method or evaporation pans is an effective aid. The use of electrical resistance blocks, teniometers or neutron probes are of value to those monitoring large acreages. (Croissant)

CROPS TESTING UPDATE

Irrigated corn test plots are planted at Rocky Ford, Yuma, Proctor, Wiggins and Eaton. A dryland corn plot is planted at Fleming. All are in very good condition. Irrigated bean experiments are planted at Burlington, Yuma, Julesburg and Eaton. The Julesburg site has herbicide injury but all other sites are in excellent condition. Dryland sunflower plots are planted at Burlington, Vernon, Julesburg and Sterling. An irrigated plot is at Burlington. Some stand problems exist at all locations, but useable data should be obtained.

All of the eastern Colorado wheat plots are harvested. We are analyzing the data and the first mailing to Extension Offices will made on July 30. Our crops testing staff, Jim Hain, Cindy Johnson and Chris Fryrear have worked very hard to make the program successful. Our secretary, Doreen Jordan, has been a great contributor to the program. Bill Busch, recently retired as a farmer at Prospect Valley and moved to Fort Collins, has worked for us as a part-time employee since April and has a lot of knowledge and experience. Thanks to extension agents and cooperators for making our program function. (Echols)

EASTERN COLORADO DRY BEAN FIELD DAYS

The Colorado State University Cooperative Extension program and the Colorado Dry Bean Advisory Board/Administrative Committee have scheduled four field days for 1990. The field days will feature extension and research personnel from CSU covering topics regarding varietal selection, disease and insect control, agronomic management and other pertinent subjects. Each field day will take place at a test plot of a local cooperator. The date, location, directions to the field days and extension contact are shown below.

Date Time	Location of Coop.	Directions to Field Day	Extension Contact
8/10 2:00	Eaton Croissant	2 S of Eaton to Rd 70, 1-1/8 E	Probert 356-4000
8/20 4:00	Burlington Sircy	N on 385 to Golf Course, 2-1/2 E	Meyer 346-5571
8/21 10:00	Yuma Weathers	E of Yuma on Rd 34 to Rd K, S to Rd 37	Richardson 332-4151
8/21 4:00	Julesburg Hodges	S of Julesburg on Rd 385, E to Jct of Rd 20 & Rd 49, 1/2 S	Lancaster 474-3479

NEW EMPLOYEE UPDATE

The Soil Testing Laboratory would like to introduce Diane Gelbaugh as Assistant-to-the Manager. Diane is replacing Caryn Delehoy who left July 1 for another position at a private laboratory. Diane started full-time on July 12. Diane's previous experience is with the Rocky Mountain Forest and Range Experiment Station in Fort Collins where she had been working since 1988. Diane has a degree in the biological sciences from Kent State University and while there, she held jobs of receptionist and laboratory assistant while pursuing graduate courses in aquatic ecology. Diane was a physical science technician with the USDA which invòlved her in the analysis of plants and water. Many of the analytical methods that she used are also utilized by the Soil Testing Laboratory.

Diane's primary responsibilities will be answering customer questions, keeping track of samples, preparing reports and billing. Her laboratory background certainly prepares her to meet the challenges that this job presents. Everybody at the Soil Testing Laboratory welcomes Diane aboard. (Self)

SCORCH

Scorch can occur on most irrigated crops in Colorado but it is most commonly found on corn. You can observe scorch during the rapid growth period when plants are about three feet tall up to the tasseling period. The extreme heat induces high evapotranspsiration rates and results in desiccation of leaf tissue. This causes the upper leaves to turn white and have a scorched appearance. If this condition occurs before all the leaves have emerged, any new leaves appearing remain green until additional stress occurs.

Scorch usually appears on corn irrigated with center pivots, especially on the side favoring hot, drying winds which move across the pivot. Rangeland or fallow is very often adjacent to the corn field.

Yield losses may be severe depending on the total situation in each field. Often yield losses are related to low soil moisture during the pre-tassel period.

Scorch may appear even though the soil profile is moist, however several other factors may intensify the symptoms. Plants affected with stalk rot usually show symptoms early because of the limited ability of the plant to take up water. Rootworms may have destroyed many roots, again limiting water uptake. Hardpans or shallow irrigations will cause poor root development, thereby reducing uptake efficiency. The tempratures that cause scorch can vary depending on soil moisture, wind direction and speed. Some hybrids are more susceptible to scorch than others. (Croissant)

TROUBLE SHOOTING NUTRIENT PROBLEMS

The growing season is an excellent time to scout fields for nutrient stresses as well as other problems. Although the early growing season is too early to actually predict final yields, much of the potential yield has been set. By shortly after emergence, the farmer knows how good a job he has done on such practices as seedbed preparation, stand establishment, early season weed control, planting date, fertilizer application, etc. There are, however, uncertainties about later season disease, weed and insect pressures and weather conditions that may have a major impact on final yields. Early season field scouting allows the farmer to note any problems that exist with the possibility of correcting, or at least gaining knowledge, to make adjustments for next year.

Many nutrient deficiencies show on young plants more than on more mature plants. This is especially true for the micronutrients. Nutrient deficiencies frequently show up as problem areas within a field with good and poor growth areas. The assessment of any poor growth condition should be approached in a systematic matter and no conclusions drawn until all facts are examined. The symptoms that the plant displays may be secondary to the real reason for the poor growth.

The first observation should be the field pattern or the poor growth. Making observations as to pattern (streaks, random, etc.) and interaction with soil types are important clues. You should also get a history on the field for such things as seedbed preparation, previous crop, fertilizer rate, method of application, herbicide use, etc. You should also note whether the poor growth is unique to this field or areas. Do other fields planted to the same crop show similar symptoms?

After the general field observations are made, examination of individual plants should be made including the root system in both the good and poor growth areas. If inspection of individual plants coupled with the general field observation does not lead to an obvious answer, then samples should be taken to further aid in the diagnosis.

The type of sample to collect will depend on your assessment of the problem whether it is a disease, insect, herbicide injury or nutrient problem. For assessment of nutrient deficiencies, it is recommended to collect a separate plant and soil sample from both the good and poor growth areas. This allows comparison of analytical test results. For relatively young plants, 12 to 15 plants should be selected from each growth area. Each soil sample should consist of 10 to 15 cores taken nearby being careful to avoid any starter fertilizer bands. (Follett)

TISSUE TESTING

Tissue testing (plant analysis) can provide a very accurate assessment of the nutritional status of the plant itself. While measuring soil fertility provides an excellent means of determining nutrient deficiencies, it is sometimes difficult to quickly correct deficiencies in growing plants by the application of soil fertilizer. This may be especially true if deficiencies show up just prior to flowering or fruit set. Stress during reproductive development will decrease yield.

Plant analysis can serve to not only detect nutrient deficiencies, but also toxicities and mineral imbalances. We receive plant samples suspected of being affected by road salts used to melt ice and snow during the winter. These samples frequently contain large amounts of sodium or calcium.

Plant analyses can help monitor the effectiveness of fertilizer practices, mineral removal in crop residues, estimate the nutritional status of regions, predict crop yields, and estimate nutrient levels in diets available to livestock. Plant tissues should be collected according to Service-In-Action (SIA) No. .116 where the most common crop plants are listed along with the tissues to sample.

It is desirable to remove dust from samples collected with distilled water. Once dirt has been removed, the samples can be sent to the laboratory. Ideally, samples should be dried before sending them to the laboratory. This can be accomplished by either air drying or oven drying at about 100°F to prevent mold. Fresh samples should be sent the same day they were collected, placed in sealed plastic bags, packed on ice and sent by overnight express mail.

When samples are received, they are usually dried if received wet and ground through a 60-mesh screen. The Soil Testing Laboratory can also test for other elements including nickel, cadmium, lead, vanadium, titanium, arsenic, selenium, mercury, aluminum, molybdenum, strontium, boron and barium. Samples requiring NO_3-N or SO_4-S should be dried as quickly as possible to avoid nutrient losses. Plant analysis is best utilized when good tissues of plants from an unaffected area can be compared with bad tissues from an affected area. (Self)

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Sincerely,

Robert L. Croissant

Robert L. Croissant
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