Cooperative Extension Service
Colorado State University
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AGRON-O-GRAM

APRIL, 1980

This is the first issue of Agron-O-Grams. It will be published monthly by our Extension Agronomy staff. The primary purpose of the newsletter is to provide timely information to the people of Colorado through our Extension agents, vocational ag teachers, leaders of commodity groups and organizations and others who work with farm people. Also, you will find one section called "Schedule of Events." If you will be having a program that is of interest to agronomy oriented people, please let us know and we will be very happy to list this event in Agron-O-Grams. Also, we would be very anxious to receive other kinds of appropriate information and your suggestions about how to really make this publication worthwhile.

James W Echols

James W. Echols
Extension Agronomist

OUR NEWEST EXTENSION AGRONOMIST

We are very happy to introduce Dr. Dwayne Westfall as a Soil Fertility Specialist. Dwayne was born and reared on an irrigated farm in southeastern Idaho. Dwayne obtained his Bachelor's Degree from the University of Idaho and his Ph.D. from Washington State University. From 1967 through 1973, Dwayne worked on fertility problems in rice and pastures and also pollution problems from return flow irrigation water at the Texas A&M Research and Extension Center at Beaumont, Texas. From 1973 to 1978, Dwayne was Senior Plant Nutritionist at the Great Western Sugar Company in Longmont. His responsibilities were to conduct a research and Extension program for Great Western Sugar in the area of soil fertility and plant nutrition. From 1978 until 1979, Dwayne was the Irrigation Agronomist on CSU's on-farm water management program at Lahore, Pakistan. During this time, he provided leadership and training for agricultural Extension officers in developing new techniques and agronomic practices for small farms. Dwayne, obviously, has a very excellent background in plant nutrition and soil fertility. He also has very excellent experience in carrying out applied research programs and the necessary Extension experience to conduct viable people oriented programs. We hope that Dwayne will be able to work at least half-time in the Extension soils area.

FARMYARD MANURE AS FERTILIZER

Dwayne G. Westfall
Extension Soils and Fertilizer Specialist

As we start to think about spring we realize that it is time to plan for the spring fertilization program. With the increasing price of commercial fertilizer we need to remember that farmyard manure is a good source of plant nutrients, and its place in the spring fertilization program should not be forgotten. Manure contains nitrogen (N), phosphorus (P), potassium (K), sodium (Na), calcium (Ca), and magnesium (Mg) plus several micronutrients. The actual concentrations of each nutrient will vary depending upon the age of cattle in the feedlot, ration, amounts of bedding used, the way the manure is handled, etc. Some representative high, low and average compositions of farmyard cattle manure, on the dry weight basis, are as follows: (high-low(average), respectively) % N=1.59-0.64 (1.04); % P=0.54-0.31 (0.41); % K=1.40-0.85 (1.09); % Na=0.32-0.15 (0.23); % Ca=1.03-0.62 (0.78); % Mg=0.50-0.30 (0.40). Zinc (Zn) and Iron (Fe) levels may average about 0.068% and 0.008%, respectively, which could supply about 1.4 lb. Zn and 0.2 lb. Fe/Ton of manure applied.

The amount of N that will be available to the crop the first year is dependent upon the N composition of the manure. About 75% of a fresh bovine waste of a N content of 3.5% will be available the first year of application, while only 35-40% of a dry corral manure of a N content of 1.5-2.5% will be available the first year. When the N content of the manure is as low as 1%, only 20% will be available the first year.

Manure handling also has a great influence on its nutrient content. If fresh manure is piled for 3 months and not disturbed, the available N content may decrease by as much as 75% while the total N may decrease by 20%. Contrary to this, the available P may increase by 30%. Total P and K remain unchanged.

If manure is not incorporated into the soil shortly after application a considerable amount of the N may be lost to the atmosphere. At 70^{o}F with a wind speed of 8.5 MPH it has been reported that 25% of the N may be lost in 12 hours; in 3½ days this loss may increase to 36%. If no wind is blowing the loss in 12 hours may approach 8% and in 3½ days 32%. It is imperative that farmyard manure be incorporated immediately after application.

The value of the N and P in farmyard manure will often equal $2.00-3.00/T. One must subtract the loading and hauling charges from this to determine the actual value to the farmer. The improvement in soil aggregation, soil tilth, organic matter content, water infiltration rate and holding capacity, etc. are some of the additional benefits of farmyard manure use that may actually be more important to the farmer than the value of the nutrients applied. Regardless of the reason for its use, the place of farmyard manure in the spring fertilization program should not be overlooked.

MANAGEMENT INFORMATION FOR CORN

Bob Croissant
Extension Agronomist
Eastern Colorado

Corn will be the principle topic that I'll talk about in this first edition of the "Agron-O-Grams." First, the 1979 Variety Trial General Series Publication 968 will be coming from the printer in a few days. I'll mail you a copy when it arrives. Within this publication you will find data from 20 different corn experiments in Colorado. You will also find summaries over a three year period on most of the locations. When you consult with farmers concerning recommended varieties, you have to keep in mind that the information presented is what happened in 1979 in that site. To expect identical results on another farm or next year is absurd. By studying varietal performance over a period of years and determining all the agronomic information concerning each individual farmer you will be able to weed the variety list down to a dozen or so different varieties. I will get into test plot interpretation in a future issue to help you understand just how accurate they are and how to use the data.

I have just received information concerning irrigation studies in corn and sorghum from our neighboring state, Kansas. This information parallels research done, by Dr. Danielson a number of years ago, indicating the best time to irrigate. The following corn grain yields in bushels per acre for 1974-76 are shown below:

Treatment	Tribune, KS	Manhattan, KS
One irrigation one week before tassel	105	98
One irrigation during silk emergence	108	117
One irrigation at blister stage	98	83
Three irrigations at all three above stages	147	141
No irrigation	61	72

Each irrigation provided 6" of water at Tribune and 4" at Manhattan.

Conclusions of these results show that corn will give the greatest response to water applied during early silk emergence and slowest to the blister stage application. Corn responded well to three in-season applications. With the price of energy skyrocketing we will expect many irrigators to try and cut back on total water applied to corn. By using these guidelines yield levels should remain high. It is obvious that soil types, field slope, and other factors such as irrigation methods dictate difference in the number of irrigation in the other locations.

Dr. Bob Danielson at CSU experimented with corn irrigation in 1973 at Fort Collins. The treatments here resulted of 2" irrigations applied at various stages during the silking period. The following table shows data from this experiment:

CORN GRAIN YIELD VS. IRRIGATION TIMING
(Average of Two Populations & Three Replications)

Treatment	Bushel Grain Yield (15.5% Moist.)
0 Irrigation	74
1 Irrigation at 5% silking	119
1 Irrigation at 32% silking	113
1 Irrigation at 73% silking	109
3 Irrigations with 2nd irrigation at 5% silking	147
3 Irrigations with 2nd irrigation at 32% silking	142
3 Irrigations with 2nd irrigation at 73% silking	137
4 Irrigations with 3rd irrigation at 5% silking	163
4 Irrigations with 3rd irrigation at 32% silking	157
4 Irrigations with 3rd irrigation at 73% silking	146
5 Irrigations	158

We can draw several conclusions out of this experiment:

1. The 5%-silk irrigation always yielded more grain than the later irrigations, regardless of the number of irrigations.
2. One well-timed irrigation yielded 73 percent of the best 4-irrigation treatment and 81 percent of the best 3-irrigation treatment.
3. The greatest water use efficiency was with the low-irrigation treatment (59.5 bushels per acre-inch for one 2-inch in season irrigation versus 20.4 bushels per acre-inch for four irrigations).
4. About 80 percent pollination occurs in about 4 days. 80 percent silking requires 7-14 days, depending upon moisture availability.
5. Grain maturity did not appear to be affected by irrigation treatments.
6. Corn dry matter yield was equally affected by irrigation timing but timing was less critical with more irrigations.

A 1974 experiment on corn at the Rocky Ford CSU Experiment Station also showed that high moisture stress during silking affected corn grain yields significantly. Don Miles, irrigation engineer, reported the following:

Moisture Stress		Water Applied	Average Yield/Acre (bu.)
Pre-silk	After Silk	(inches)	@ 120 lb. N/Ac.
High	High	8.2	162 c
Medium	Medium	11.2	174 ab
High	Medium	9.1	182 a
Medium	High	10.3	166 bc

Average grain sorghum yields in the same two locations in Kansas showed less variation in yield between 1 and 3 irrigations than did the corn. It is obvious that grain sorghum is more flexible regarding water needs than corn. In these Kansas sites there is approximately 10 bushels difference between one irrigation and no irrigations and another 10 bushels difference between 1 and 3 irrigations. In Colorado our climatic conditions limit yield a high percent of the time. More irrigation studies are needed in this area.

Soil Testing Pays Dividends

Dr. P. N. Soltanpour, Extension Professor

Before we realize it, the spring will be upon us. Therefore, growers should plan to test their soils, as soon as conditions allow, before deciding on fertilizer rates they should use. Soil testing when done properly pays big dividends.

With the escalating cost of energy, there is no alternative but to pay more for fertilizers. Nitrogen, the most important ingredient in fertilizer for Colorado soils, is usually made from natural gas. Also phosphate, potash and micronutrient fertilizers require energy for their mining and processing.

Proper soil testing is the most economical way for determining the fertilizer needs of crops. Soil testing will tell growers the kind and amount of fertilizer for each crop.

The first and most important step in soil testing is obtaining a representative sample from farm fields. If the soil sample is not representative, then it is better not to soil test at all. Take at least 20 cores from each field to obtain a representative sample. If there are problem areas in a field, these should be sampled separately. The cores should be mixed thoroughly in a plastic tub or bucket and one sample (about one pint) from the mixture should be obtained to represent the sampled field. This sample is called a "composite sample." A stainless steel probe or a clean shovel should be used to take the soil samples from the plow layer. For additional information, growers should take subsoil samples (from plow depth to 24 inch depth). Subsoil samples should be obtained in the same manner prescribed above for the plow layer samples. Sample bags should be marked properly and the soil samples should be air dried as soon as possible. Air drying may be done by spreading the samples on a clean sheet of paper in a dust free room.

Include a completed information sheet with each sample. Give the field ID, depth, previous crop, intended crop, yield goal, irrigation practices, manure rates if any, last years yield, and fertilizer rates and any problems observed in the field such as suspect nutrient deficiency symptoms.

The soil testing laboratory will analyze samples and make a fertilizer recommendation based on the information supplied and the soil test results.

A word of caution is in order. The grower should select the soil testing laboratory very carefully. Experiments in Nebraska, Kansas and Idaho have shown that some unscrupulous soil testing laboratories recommend excessive amounts of fertilizers or fertilizers that are not needed. The results show that these recommendations have cost the farmers many dollars without returning one cent. Make sure that the soil sampling is done properly or else no matter how reputable the soil testing laboratory is, the fertilizer recommendations based on the analysis of a nonrepresentative sample may cost you many dollars.

STOP EROSION TO MAINTAIN PRODUCTIVITY

Ken Brengle
Extension Dryland Soils Management Specialist

Did you know that to maintain the productive capacity of a soil, the maximum allowable soil loss by erosion is 5 tons per acre per year? Did you know that the estimated average soil loss in the High Plains of eastern Colorado is 11.5 tons per acre per year?

Why do we have this high erosion rate when there are management systems available to hold soil loss within tolerable limits? It is easy to say that farm operators have just not accepted the improved systems. However, we as Extension personnel have not been effective, and in many cases not active, in trying to influence the farmer to adopt conservation systems.

Many may feel that this is a job for the Soil Conservation Service. It is their primary responsibility and they are doing a very good job. But as agricultural advisers in eastern Colorado, it is our job to cooperate with the local Soil Conservation Districts on this very important matter.

We in Extension do not have contact with every farmer in eastern Colorado and neither does the Soil Conservation Service. Therefore, more farmers can be reached between the two agencies and every farmer you influence to sign up for, and adopt, a conservation farm plan will be putting wheat in the bin in the year of 2000 A.D. when it is estimated that world food production will become critical.

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