FROM THE GROUND UP

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AGRONOMY NEWS

Volume 13, Number 10 October 1993

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NEW NITROGEN RECOMMENDATIONS FOR CORN

The CSU Soil, Water, and Plant Testing Lab has modified the way it calculates nitrogen (N) requirement for irrigated corn production. This modification was needed to remove the insurance factor from our old recommendations. In the past, it was considered important to avoid limiting corn yields due to under fertilization. Environmental concerns about farming practices now mandate a more conservative approach.

The new CSU N algorithm for corn has been adopted from the University of Nebraska. They have conducted over 100 site years of research to develop a regression equation which will predict N needs over a range of environments. We feel their approach is conservative, yet should not penalize producers economically.

The N recommendations for corn, forage sorghum, and sudan on page 8 of the current "Guide to Fertilizer Recommendations in Colorado" (XCM-37) are now outdated and should not be used to make recommendations to producers. Instead, use the new algorithm for irrigated corn production.

New Algorithm for Irrigated Corn Production

N Rate (lb/A) = 35 + 1.2 x expected yield (bu/A)
- 8 x ppm NO_3-N in top 2 feet
- 0.14 x expected yield (bu/A) x % organic matter
- other N credits (lb/A) (such as manure, irrigation water, or legumes)

Example:

Yield goal	= 175 bu/A
Soil test	= 10 ppm NO_3-N in top 2 feet
OM	= 1.5%
Previous crop of dry beans (alfalfa credit is 50 lbs N/A)	= 30 lbs N/A credit
Irrigation water NO_3	= 5 ppm NO_3-N (application = 2 acre ft)

N rate (lb/A) = 35 + 1.2 x 175 bu/A
- 8 x 10 ppm NO_3-N
- 0.14 x 175 bu/A x 1.5% OM
- 30 lb N legume credit
- 24 inches pumped x 5 ppm NO_3 x 2.7/12

= 71 lb N/A

The equation may appear complicated, but if you examine it in sections, it becomes more understandable:

1) The first part, 35 + (1.2 x expected yield), comes from a multiplication factor of 1.2 lbs of N per lb of grain, plus an additional amount of 35 lbs N determined through the regression equation. *Our previous equation used a factor of approximately (1.35 x expected yield).*

2) The second factor, 8 x ppm NO_3, is based upon the average NO_3-N content of a 2 to 4 foot sample, multiplied by a factor of 8. *The old CSU equation used 3.6 x ppm NO_3-N/ft soil sampled.*

3) The third component of this new algorithm is a factor for soil organic matter mineralization. It factors an interaction between crop yield and OM. The assumption is that a higher yielding crop will take up more N from the pool of mineralized N. For example, a 200 bu crop grown on a soil with 1% OM will use 0.14 x 200 bu/A x 1% OM = 28 lb N.

A 100 bu corn crop would remove 0.14 x 100 x 1% OM = 14 lb N. *The old equation credited 30 lb N/% OM regardless of crop yield.*

4) The fourth part of the equation is the other N credits. These have not changed from the values in the "Guide to Fertilizer Recommendations" with one exception. In situations where producers do not have a lab analysis of applied manure, credit 10 lb available N/dry ton manure *instead of the old value of 5 lb N/ton.*

To properly determine N application rate, it is important to sample to at least a 2 foot depth. A 1 foot sample could overestimate NO_3-N level, resulting in a lower N recommendation and possibly lower yields.

Using the new N fertilizer recommendations can help to minimize groundwater problems and improve profitability.

The results from the new equation may vary significantly from our old recommendations. For example, the highest recommended rate from the old table was 250 lb/A for low testing soils with less than 0.5% OM. The highest recommended rate with the new algorithm is approximately 190 lb/A. New recommendations producers receive are lower than previous rates. At the present time, these rates appear judicious under proper management practices. We would like to hear of farmer results and their response to this approach. We are pursuing research (in cooperation with front range Extension agents) to develop tools to help us better predict N sufficiency in growing crops. The in-season soil test and the chlorophyll meter are promising tools to help fine tune N fertilizer rates.

Determining the correct amount of fertilizer N to apply is only the first BMP for nutrient management. Nitrogen source, timing, and irrigation water management are extremely important components of N management. Using the new N fertilizer recommendations can help to minimize groundwater problems and improve profitability. ▫Waskom and Self

ESTABLISHING YIELD GOALS

Setting realistic yield goals is a critical component of making sound fertilizer recommendations. Fertilizer N recommendations are based upon a yield goal submitted by producers with their soil samples. Overestimating yield goals results in excess N applications, leading to loss of farm income and potential groundwater contamination.

Fertilizing for a 200 bu/acre corn crop when other conditions such as limited irrigation water will only allow a 150 bu/acre yield, may result in 50-60 lbs/acre of excess N being applied. Rather than asking a producer his **yield goal**, crop advisors should encourage producers to establish a **yield expectation** based upon historical yield averages.

Example 1. N rate recommendation using the new CSU N algorithm at 2 yield levels.

Assume:	5 ppm NO_3 in top 2 feet 1% OM no other N credits*

@200 bu/A:
35 + 1.2 (200 bu/A) - 8 (5 ppm NO_3-N) - 0.14 (200 bu/A) (1% OM) = 207 lb N/A

@150 bu/A:
35 + 1.2 (150 bu/A) - 8 (5 ppm NO_3-N) - 0.14 (150 bu/A) (1% OM) = 154 lb N/A

*Assuming no other N credits is seldom correct. We need to encourage producers to always account for manure, previous crop residues, irrigation water NO_3, and subsoil NO_3.

Yield expectations should be established on a field-by-field basis. The five most recent yield averages for each field should represent an obtainable yield. If a recent crop has been lost to hail or other disaster, that year's yield should be omitted from the average. Colorado State University suggests that a producer add 5% to their five year yield average and use this value as their yield expectation. Changes in farm management or the adoption of new hybrids may warrant increasing yield expectations slightly above 5%.

If the crop season and growing conditions appear to be above average, producers can adjust N rates upwards at sidedressing or by applying N through irrigation water. In-season soil or plant tissue analysis may be utilized to determine if additional N is required. The key to setting realistic yield expectations is to base them on actual field averages plus a modest increase for improved management and good growing conditions. ▫Waskom

To think in terms of yield expectation (based on historical yield averages) rather than yield goal can help prevent application of excess N.

IMPROVING NUTRIENT USE EFFICIENCY

Efficient use of every pound of plant nutrients, regardless of source, should be the goal of every farmer. Increased nutrient use efficiency can lead to better yields, higher profits, and reduced environmental concerns.

A few background facts are in order. In the last 50 years while the ratio of farms per citizen has fallen from 1:15 to 1:120, the number of people fed by one farmer has increased from 20 to more than 120. Corn yields have quadrupled and wheat and soybean yields have more than doubled. Projections are that yields of most of our common agronomic crops will double in the next 40 years. How? Sound nutrient management and higher nutrient use efficiency will be a major factor in that scenario. Commercial fertilizer will be a major source of plant nutrients in coming years. Emphasis on best management practices (BMPs) will continue to improve how efficiently fertilizer is used. For example, 1992 data shows U.S. corn growers produced an average of 131 bushels per acre, applying only 127 pounds of nitrogen per acre. The 1.03 bushels of corn produced per pound of nitrogen applied represents an extension of a continued trend of improved fertilizer use efficiency.

Improvements in fertilizer use efficiency, as illustrated by the above figures, offer evidence that nutrient BMPs are being utilized by U.S. farmers. BMPs help improve nutrient use efficiency by increasing nutrient uptake by plants and reducing nutrient losses from the soil. Nutrient BMPs include soil testing (matching nutrient rates with soil test results and achievable yield goals), nutrient placement, timing of nutrient applications, use of fertilizer additives (nitrification and urease inhibitors), and accounting for all possible nutrient sources in the management system.

Soil fertility researchers at Colorado State University are heavily involved in work evaluating the above BMPs. ▫Follett

HARVESTING EARLAGE FROM FROSTED CORN FIELDS

Because of early fall frosts, corn farmers are studying methods to harvest high moisture corn. Some of this grain will be difficult to dry to acceptable storage moisture levels.

Earlage is one method to utilize ear corn that is too wet to store as grain. The components of corn, when the grain milk line is about half way down, are shown in Table 1.

Table 1. Components of the corn plant

Component	% in DM
Grain	46
Stalk	23
Leaf	11
Cob	11
Husk	9

Historically, harvesting the whole plant has the advantage of providing the most nutrients per acre. It has its disadvantages though, as it is lower in energy and must be supplemented with additional grain in feeding rations. Whole plant silage has large amounts of water that must be transported. In addition, silage harvest leaves very little residue in the field to prevent erosion.

What is the treatment for frostbite in corn?

Earlage (high moisture snapped ear corn) is normally harvested at 30% moisture; however, it may be harvested at moisture of 20 to 40%. A typical nutrient analysis of earlage is shown in Table 2.

The primary disadvantage of earlage is the variation in forage content and the need to supplement additional grain to provide the energy levels for finishing rations. Dry ground ear corn is approximately 80% grain and 20% cob. Earlage is often assumed to be 75% grain and 25% cob, husk, and stalk. However, as earlage moisture level decreases, the percentage of forage in the dry matter increases. It is suggested that earlage be ground through a 1" screen or less. Nebraska specialists recommend ¾ to 1" screens for grinding earlage more than 28% moisture and ½ to ⅝ screen for drier material.

Harvesting and feeding earlage can be an effective way to utilize high moisture corn. It is important to stress moisture control characterizing feeding value. Analysis will determine if earlage can provide all or most of the roughage in the ration. The specific amount of grain that needs to be added depends on the fiber level of the earlage. ▫Croissant

Table 2. Typical nutrient values for silage made from the corn plant

	Silage type			
Item	Whole plant	Ground ear	Snapped ear	Grain
Dry Matter %	35-40	65-75	65-75	70-75
Grain to Roughage Ratio	50:50	80:20	75:25	100:1
Crude Protein %	8.1	8.9	9.0	10.0
TDN %	70	80	76	90

STATE SEED LAW: RULES AND REGULATIONS

The Colorado Seed Law rules and regulations have been written and adopted by the State Ag Commission. These regulations will become final after a public hearing to be held on November 1, 1993.

Registration fees described in the new seed law regulations are as follows:

Seed Labellers	$200/year
Custom Seed Conditioners	$200/year
Farmer Seed Labellers	$75/year
Retail Seed Dealers	$25/year
Additional Locations of above	$25/year

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

Revised labelling requirements are as follows. The label for agricultural seeds such as wheat must contain the kind and variety of seed, a lot designation, the origin, percentage by weight of weed seeds, and the rate of occurrence of restricted weed seeds. The percentage of other crop seeds, germination percentage (including hard or dormant seeds), the calendar month of the seed test, and the name of the labeller must be on the label. If the seed is treated, a label showing the type of treatment must be included.

Also contained in the new regulations is the noxious weed list. There are twenty seven prohibited noxious weeds listed. Seed lots containing prohibited noxious weed seeds cannot be sold. There are fifteen restricted noxious weeds listed with allowable limits. These must be listed on the label.

Additional regulations state that all bean seed planted in Delta, Montrose, or Mesa counties must be apparently disease-free. This can be accomplished by use of certified seed or by seed that is accompanied with an official phytosanitary certificate.

Violators of any of the above rules can be charged with a civil penalty of up to $2500 per violation. Complete copies of the State Seed Law and the Rules and Regulations should be available soon from the Colorado Department of Agriculture. ¤Stanelle

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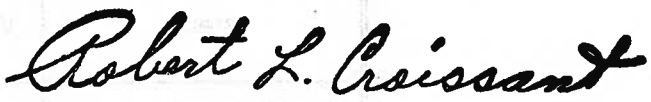
Sincerely,



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