What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 1, NUMBER 1, 1991

FORAGE QUALITY TESTING

Jerry Cherney
Soil, Crop and Atmospheric Sciences

Forage quality is currently a hot topic, with varieties of alfalfa and corn being developed and marketed based on forage quality.

Until recently, there had been very little interest in improving the quality of forage crops through breeding. Interest in this topic has been generated, in part, by the ever increasing number of forage producers who are becoming aware of the importance of forage quality in a ration. Forage quality is an indication of how well a ruminant animal will perform on a given feed.

Methods of Forage Evaluation

For decades, forages have been evaluated visually. Color, odor, and texture are used to estimate forage quality. The best example of this is in the horse hay market, where visual appraisal is still the primary means for evaluating quality. Visual estimation of hay quality, however, is "in the eye of the beholder", and is not very useful, especially when a buyer cannot personally evaluate the hay before they buy it. Forage quality is extremely variable, and is dependent on a variety of factors including plant maturity, species, variety, soil fertility, and time of year. An objective evaluation is preferred over a subjective visual appraisal.

Laboratory Analysis

The best method of evaluating forage quality objectively is to have the forage tested at a commercial laboratory. Objective forage quality information allows the producer to develop an efficient feeding strategy to maximize net returns. Commercial laboratories will analyze the samples using conventional laboratory methods, or by using a near infrared reflectance spectrometer (NIRS), a machine which can accurately estimate forage quality. The NIRS method is as accurate as traditional laboratory methods, as long as the NIRS instrument is correctly calibrated. With either method, protein and fiber values are produced, and these values are used to estimate other forage quality parameters (total digestible nutrients (TDN), net energy of lactation (NEL), etc.).

Sampling Method Critical

The decision to test for forage quality is important, but it is more important to collect a representative sample for testing. In other words, a producer may be better off not testing for forage quality, as opposed to submitting an unrepresentative sample for testing. When a single alfalfa-orchardgrass bale was sampled properly using a coring device, and also sampled by simply taking a grab sample, forage quality analyses differed considerably.

A University of Minnesota study also showed large differences in quality between individual alfalfa bales from the same load of hay. The NDF value ranged from 34 to 54% among individual bales within the same load. These results demonstrate that there is significant variability within bales, as well as between bales.

Alfalfa-Orchardgrass Hay Bale Sampling Method

	Cored vs.	Grab Sample
CP	16%	13%
NDF	56%	63%
ADF	37%	42%
NEL	0.56 Mcal/lb	0.49 Mcal/lb

(see FORAGE, page 7)

DISEASE MANAGEMENT

The Hidden Value of Fungicidal Seed Treatment of Corn

Gary Bergstrom
Plant Pathology

Few practices in American agriculture are as universally applied or as taken for granted as is the application of protectant fungicide to field corn seed. Results of a recent USDA survey indicated that nearly all (> 95 %) field corn seed planted in the U.S. was treated by seed suppliers with a protectant fungicide for control of seed decay and seedling blights. The fungicide captan in various formulations accounts for 85-95% (or greater) of this seed treatment. Other significant seed-applied fungicides include thiram, EBDC's (mancozeb), TCMTB (Nusan), carboxin (Vitavax), and metalaxyl (Apron). In New York State virtually all seed is treated (98% with captan).

Benefits of Seed Treatment

What is the value of this universal cropping practice? And what would be the consequences if fungicides such as captan (which has been implicated as a carcinogen) became unavailable? Answers to these questions were the focus of a recent national survey of state specialists conducted by the USDA's National Agricultural Pesticide Impact Assessment Program. A majority of experts estimated average annual losses in the absence of seed fungicides at 4-8% in their state. Projected annual losses in the two major production states of Illinois and Iowa alone amount to 277 million bushels of grain valued at 559 million dollars (in 1985-1988). Average annual losses in New York were estimated at 7.5%, probably a conservative estimate based on the experimental results with corn silage yield presented below. Protectant seed-applied fungicides affect primarily the initial plant population, although secondary effects on seedling vigor may also affect other components of yield.

Effects of captan seed treatment on corn seedling emergence and silage yield in three different planting situations in New York

Planting date/ location	Post-planting soil conditions	Plants/acre		Silage yield (tons/acre)	
Seed treatment:		nontreated	captan-treated	nontreated	captan-treated
12 June 89 Freeville	excessively wet	5,590	13,649 (+145%)	4.5	10.7 (+138%)
7 June 89 Ithaca	wet	17,279	20,038 (+16%)	7.1	8.2 (+15%)
25 May 90 Freeville	moderately moist	21,635	23,522 (+9%)	18.3	19.9 (+8%)

Local stand reductions due to seed rots and seedling blights range literally from 0 to 100%. Moderate stand reductions often result in minimal yield impacts due to compensatory abilities of surviving plants. Yield loss potential, and hence fungicide benefit, is greatest in areas where seed is planted into cool, wet soils (i. e., conditions conducive to pathogen development and nonconducive for rapid seed germination and seedling development). The need for seed treatment is relatively greater in conjunction with early spring planting.

Alternatives to Captan

All experts were asked to comment on the effects of banning captan while maintaining other seed fungicides. Many felt that thiram or EBDC's were virtually equivalent to captan in broad spectrum seed decay/seedling blight control. Ironically, these materials will be subject to EPA registration review before or at the same time as captan. Thiram also elicits a severe allergic response in certain seed handlers. TCMTB was considered comparable in Illinois in disease control but has been shown to be phytotoxic to certain corn genotypes. Metalaxyl is efficacious against Pythium spp. but controls too narrow a spectrum of disease organisms for use alone and metalaxyl resistance problems may develop in soil populations of Pythium spp.

Supplemental Planter Box Treatments with Insecticides

In most states, no further seed treatment is applied by the farmer. In a few states, including New York, a small but significant percentage of farmers (about 10% in New York) apply a planter box treatment of fungicide (primarily captan) in combination with insecticides.

Although enhanced seed rot/seedling blight control is expected from these applications, the principal purpose is control of seed corn maggot and other soil insects by the insecticidal component. Although not widely implemented, current Cornell

(see DISEASE, page 7)

Spring Oat Varieties for 1991

SEED & VARIETIES

Mark Sorrells
Department of Plant Breeding and Biometry

If they are to remain competitive, New York farmers must continually upgrade to new improved varieties as they become available. The Cornell Small Grains Breeding Program has been testing oat varieties in regional trials throughout New York State for about 70 years. Both county agents and farmers have been important to our regional testing program. They have donated time and space so that we can accurately test new varieties and breeding lines directly under farm conditions. Without such information, it would be impossible for us to identify and recommend improved varieties critical to increasing farming efficiency. Spring oats are an important crop on a many New York farms, not because of their cash value, but because of feed value, straw for bedding, and because oats tolerate marginal soils.

	Grain Yield		Test Weight		Lodging (0–9)	
Entry	5 years bu/a	2 years bu/a	5 years lbs/bu	2 years lbs/bu	5 years	2 years
Astro	79.2	70.8	31.5	30.5	1.2	2.4
Ogle	93.9	90.4	32.9	32.7	1.9	3.9
Porter	83.8	72.7	34.4	33.3	2.4	3.9
Newdak	96.3	91.3	33.4	33.1	2.6	4.2
White Ogle		84.7		32.8		3.3
Pennuda		54.1		39.2		2.9
Hercules		82.8		33.9		2.9

Ogle

Ogle, an Illinois variety, set new yield records across the U.S. when it was released in 1983 and its yield stability is still unequaled. Test weight of Ogle averages about two pounds per bushel higher than the older varieties and also has a higher groat percentage. Hull color of Ogle is yellow, which if you are concerned about appearances, could be a problem. Color does not affect the feed value.

Porter

The most popular white oat in New York is Porter which was bred in Indiana. This variety is two or three days later to mature than Ogle but its test weight is nearly two pounds per bushel higher. These traits make it a popular oat for the horse feed market.

Newdak

We have recently co-released an excellent new oat variety called Newdak (name comes from New York and North Dakota) that was bred in North Dakota. Certified seed will be produced in 1991 so seed will be available to farmers in 1992. Newdak out-yields Porter by more than 10 bushels per acre; its test weight averages a half a pound higher than Ogle and it has white hull color. Both Porter and Newdak are more susceptible than Ogle to lodging.

Hercules

Another variety that has recently been introduced is Hercules. This variety was developed by Dr. Marshall (USDA-ARS) at Penn State University and has high test weight, yellow hull color, and good lodging resistance.

The older oat varieties Garry, Astro, and Orbit have been replaced by Ogle and Porter because they have much higher grain yield and test weight as well as improved disease resistance.

Pennuda

Pennuda is a new naked-seeded oat variety that has no hulls because the groats thresh free. Recent interest in this crop as a premium feed for horses has prompted people to replace corn with naked oats. Since there is no hull, total digestible energy is about 90% and crude protein ranges from 16 to 21%. The primary disadvantage of Pennuda is that grain yield is 25 and 40% lower than Porter and Ogle, respectively, over two years. Since hulls normally account for about 25% of the harvest weight, actual groat yield is only slightly below that of other varieties. Pennuda has excellent lodging resistance and high test weight. Certified seed will be available on a limited basis in 1991.

Each of these varieties has special characteristics that will adapt them to specific farming situations. Try more than one and chose the one that works best in your operation.

FARM MANAGEMENT

Outlook for Field Crop Inputs for 1991

George L. Casler
Department of Agricultural Economics

The big thing on most people's minds relative to farm input prices is the effect of oil prices due to the Mideast situation not only on fuel costs but on the prices of other inputs as higher energy prices work themselves through the system.

It is quite clear that overall prices for crop inputs will be higher in 1991 than in 1990. This will place a premium on adjusting input levels if farmers are to be able to keep costs per acre from rising as fast as prices.

Fuel

Prices paid by Northeast farmers at the time of quarterly data collection in October 1990 for gasoline and diesel fuel were 30 to 50 percent above prices earlier in the year -- prior to the invasion of Kuwait -- and prices continued to rise after October.

While oil prices in late 1990 were higher than would seem to be justified by the basic supply and demand situation, uncertainty probably is a major factor underlying the level of oil prices. While a peaceful settlement of the Mideast situation would likely lead to a large drop in oil prices, prices may not immediately return to pre-invasion levels. Fuel prices at planting time in the spring of 1991 could be anywhere between the levels of last spring and somewhere above the levels of late 1990. One cannot make a statement about the most likely fuel prices in 1991 without predicting how soon a settlement will occur and what form the settlement will take. Farmers as well as others should be prepared to pay higher fuel prices in the spring of 1991 than a year earlier.

1990-91 Price Increase 1991 Oil Price		
	$30/barrel	$40/barrel
Energy	+13%	+25%
Fertilizer	+3.5%	+7%
Pesticides	+1%	+3%

Inputs

Higher energy (oil) prices put upward pressure on the prices of many other inputs, particularly those where transportation is a significant component of the price. Therefore, higher energy costs will tend to push up the price of items such as fertilizer, chemicals and seed. In the longer run, for inputs where energy is a significant input into the process of producing that input, the price of the product at the factory or plant door will increase.

The general rate of inflation in the United States during much of the 1980s has been around 4 percent and a bit higher in the last two years. This has a tendency to push up input prices at about the same rate unless production processes become more efficient, which, of course, does occur over time for some inputs.

The demand for inputs by farmers also has an impact on prices. For example, when plantings are down, prices of fertilizer, chemicals and seeds may fall as suppliers try to reduce inventories. The opposite occurs when plantings increase.

The USDA has projected 1990-91 price measures for energy, fertilizer, and pesticides based on $30 and $40 oil prices in 1991. These increases are based on oil prices only; any inflationary or supply-demand changes would be in addition to these changes. The price projections include the impact of energy prices as discussed above as well as inflationary and supply-demand considerations.

Total fertilizer use in the United States in 1991 is expected to be about the same as in 1990, so increased demand will not be a major factor in 1991 fertilizer prices. Prices in 1990 were somewhat lower than in 1989 but are expected to increase 5 to 9 percent in 1991 due to the impact of energy prices on both production processes and transportation.

Prices for agricultural chemicals, in general, have been increasing for the last several years. Between 1989 and 1990, pesticide prices, as measured by the USDA price index, increased about 5 percent. A 3 to 5 percent increase between 1990 and 1991 is likely unless energy prices decline soon.

Seed prices are also expected to be 3 to 5 percent higher in 1991 than in 1990.

A Pre-Sidedress Nitrogen Soil Test for Corn: An Update

Stu Klausner
Soil, Crop and Atmospheric Sciences

SOIL FERTILITY

Background

Nitrogen (N) is needed in large amounts for corn production. The amount of N fertilizer required for maximum profit varies from field to field depending on the amount of N supplied from nonfertilizer sources, such as soil organic matter, crop residues, and manure. However, the availability of N from these organic sources is difficult to estimate because of the complex behavior of N in the soil.

Crops cannot use organic N directly. The organic N must be mineralized (decomposed) by microorganisms to plant available nitrate. Whether this nitrate is used primarily by a crop or lost to the environment depends on rainfall, temperature and soil properties. Therefore, the quantity of available N in the soil and the potential for its loss is constantly changing. Traditional soil testing methods that work well for other plant nutrients do not work for rapidly changing N.

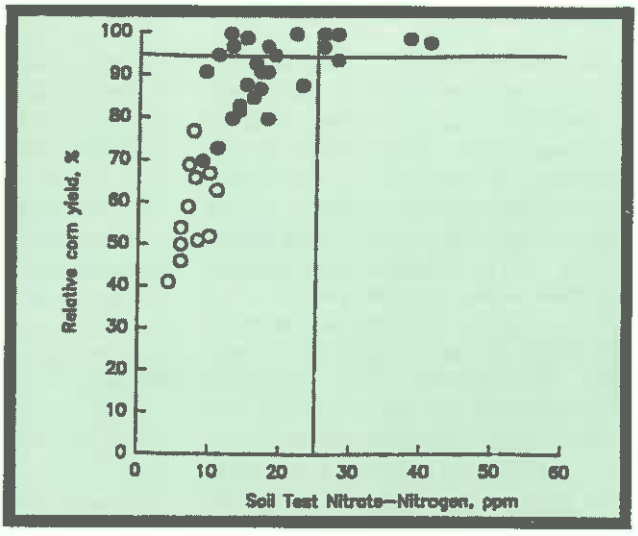
Nitrogen management is critical to ensure an adequate supply for crop production with a minimum loss to groundwater. The fertilizer recommendations for N would be improved if a soil test could be developed to estimate N availability from organic sources already present in the soil. We are currently evaluating a pre-sidedress soil test for nitrate in N.Y. The idea behind the soil test is that the amount of nitrate in the soil, when corn is about 6 to 12 in. tall, is strongly related to the amount of N that will become available during the rest of the growing season. Timing of the soil sample is critical because the field must have dried down enough to reduce the threat of N loss, and warmed up enough so that conversion of organic N to nitrate is well under way.

Preliminary Results

The results from 40 field trials are shown in the graph as the relationship between relative yield and soil test nitrate. Relative yield is defined as the percent of the maximum yield obtained without fertilizer. Fields with relative yields close to 100% had sufficient available soil N and little to no fertilizer N would be needed to optimize yield. Relative yields below about 95% (horizontal line drawn on the graph) indicate that soil N was probably not adequate and the addition of N fertilizer would have been profitable.

The graph shows that relative yields increase when soil test nitrate increase, indicating that there is some relationship between the soil test and the potential of the soil to supply N. The vertical line in the graph shows the critical level. Fields testing above the critical level of 25 ppm nitrate-N did not need additional N while those fields testing below 25 ppm probably needed more N for maximum economic yield. The black circles represented corn fields where manure was used or a sod crop was plowed down within the last two years.

The open circles represent fields where there was no recent use of animal or green manures. The results show that fields with large organic N inputs have the higher soil test values, higher relative yields, and therefore need less N fertilizer.



Summary

The soil test looks promising for helping farmers identify fields that do not need anymore N. The soil test is still not developed well enough to accurately estimate the amount of N fertilizer to apply on fields that test below the critical level. Hopefully we can improve upon this. Our current fertilizer N recommendations, based on soil type, rotation, and manure rate, have worked out well in these field trials. We will keep you up to date as new information develops.

SOIL INTERPRETATION

Soil Surveys and GIS: Basic Tools for Environmental Assessments

Bill Waltman
Soil, Crop and Atmospheric Sciences

Following the 20th anniversary of Earth Day, there has been a quiet, but steady surge from the public and local governments to more fully participate in the environmental review process for projects involving the siting of municipal landfills, hazardous waste incinerators, low-level radioactive waste repositories, as well as the nonpoint source "remedial action plans." As local governments become more involved with environmental review, they soon realize the importance of the soil surveys in their county and the need for more sophisticated tools to handle soil survey and other natural resource data.

Four Laws of Krynine:
"Let us see things in their proper places."
"Let us know what we are talking about."
"Let us think straight."
"Let us not fool ourselves."
- Paul David Krynine
Famous Sedimentologist

After rediscovering the county soil survey, local governments often face the task of trying to integrate the soil maps with land use data, transportation corridors, human and livestock populations, vegetative cover, climatic zones, agricultural districts, watershed boundaries, bedrock and surficial geology, and the occurrence of aquifers. Without a geographic information system (GIS), it is exceedingly difficult to understand how these environmental siting factors spatially relate to one another in a county. Soil survey maps are some of the most detailed maps ever created, but in addition can represent approximately 80 soil properties and land use interpretations, and therefore, GIS has almost become a necessity for inventorying and analyzing soil survey information. Also, GIS has become the focal point of most watershed (or water quality) studies because of its ability to integrate so many data layers that watershed modelers use. In many respects, GIS helps us follow Krynine's first law: "Let us see things in their proper places."

What is a GIS?

A geographic information system is basically a computerized mapping system for capture, storage, retrieval, and analysis of spatial and descriptive data (Marble et al., 1984). Although there are fundamental differences in the design, most geographic information systems, however, share four basic components or subsystems -- data input (digitizing), database management system, analysis (statistical/spatial), and graphic display or reporting capabilities.

Regardless of the hardware or software differences among the various geographic systems, it should be remembered that the most effective GIS is the system that provides the appropriate data to answer the questions of decision-makers. In most instances, having the appropriate resource map, database, or data layer needed to address the problem becomes far more important and often more limiting than the capabilities of a particular GIS software.

GRASS and Soil Survey

The USDA/Soil Conservation Service, Cornell University Soil Information Systems Laboratory, and Agronomy Extension Land Resource Analysis Laboratory have adopted the USDA/SCS version of the Geographic Resource Analysis Support System (GRASS) as its geographic information system. GRASS was originally developed at the US Army Corps of Engineers Construction Engineering Research Laboratory (USA-CERL), Champaign, IL, in the early 1980's and was later adapted by the Soil Conservation Service for nationwide implementation in field offices as a tool for soil and water conservation planning. GRASS is also supported by the National Park Service, US Geological Survey, NASA-Goddard Space Flight Center and -Stennis Space Center, and NOAA. GRASS has been developed and distributed as a public domain system, which means it is available at cost. To cooperators with the USDA/SCS, such as local governments, the software is available at no charge.

In the Land Resource Analysis Laboratory, GRASS has been used to: 1) provide basic soil survey digitizing, 2) map areas of the Genessee River Watershed where the soils are vulnerable to atrazine leaching, 3) generate aquifer or groundwater maps (used in well-head protection) in the Finger Lakes Region, 4) identify suitable croplands and landscapes (statewide) for the application of

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Therefore, proper sampling technique must involve using the proper sampling equipment, and taking an appropriate number of subsamples.

Laboratories Should be Certified

Several years ago, a USDA laboratory sent out the same forage sample to 7 different testing labs in the Midwest. The NDF value for this sample varied from 48 to 58% across laboratories. This test was not meant to be an attack on private labs to damage their credibility, although it was viewed as such by several labs. It was meant to encourage labs to become certified. Certification is one method of motivating labs to maintain high standards for accuracy.

Laboratories can be certified by the National Forage Testing Association, P.O. Box 371115, Omaha, NE 68137; Tel. (402) 333-7485. This is a voluntary program designed to identify laboratories that have been shown to produce accurate results. It does not mean that a laboratory that is not certified does not analyze samples accurately. However, the program does help to maintain high standards.

In New York, Northeast DHIA was the only laboratory certified for 1990. In Pennsylvania, Eastern Laboratory Service, Mushroom Research Data Corp., Pennfield Corp., and Quakertown Veterinary Clinic were certified for 1990. In Vermont, Farm Agricultural Testing Lab was certified for 1990. Certification is done each year, to help maintain laboratory performance.

Summary

Forage quality testing is critical to producers, especially in a period of falling milk prices. Anyone interested in enlarging their profit margin (or simply having a profit margin) cannot afford to leave forage testing to their senses (sight, smell, and touch). Although forage testing may be seen as bothersome, and as an expense, it should be viewed as an investment which is guaranteed to bring back high returns.

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soil insects by the insecticidal component. Although not widely implemented, current Cornell Cooperative Extension recommendations include planter box application to all corn seed in New York of a registered seed treatment product containing diazinon for the control of seed corn maggot. It is recommended that all corn seed to be planted into a sod be treated with a product that also contains lindane (a restricted use pesticide) for the control of wireworms. Major agronomic and economic benefits are derived from protectant fungicide seed treatment, a practice which costs corn growers less than a dollar per acre and which represents an environmental input of less than 0.015 pounds of pesticide active ingredient per acre. The loss of the protectant fungicides captan and thiram prior to availability of alternative chemical or biological seed treatments would be devastating to U.S. and New York corn production.

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municipal sewage sludge, 5) evaluate potential landfill sites in Tompkins County, 6) evaluate agricultural and groundwater impacts from a proposed hazardous waste incinerator in the central Susquehanna Valley (Union Co., PA), and 7) provide corridor analysis for prime agricultural lands, hydric soil, soil corrosivity, surficial geology, and depth to bedrock for the proposed Iroquois Gas Pipeline. Thus, GRASS can become an effective tool in testing environmental "impact" scenarios and prioritizing watersheds for nonpoint source pollution studies. All of these projects rely upon digital soils information to answer the questions being asked by both the public and the regulatory agencies.

Calendar of Events

February 5-8, 1991	Weed Science Society Annual Meetings, Louisville, KY
February 14-15	Northeast Corn Improvement Conference, Baltimore, MD
February 21-23	New York Farm Show, NYS Fairgrounds, Syracuse, NY
March 2	Transitions Conference, SUNY Cobleskill, Cobleskill, NY
March 18-20	Farming for the Future, Warren Hall, Cornell U., Ithaca, NY
April 1-4	Water Quality Workshop, Sheraton Inn, Ithaca, NY
July 7-10	Northeast Agronomy Meeting, Rutgers U., New Brunswick, NJ

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