National Fertilizer Solutions Association

FLUID FACTS

NFSA AGRONOMIC NEWSLETTER

SOYBEANS RESPOND TO FLUID LIME IN IOWA

Dr. Reg Voss, Extension Agronomist, Iowa State University, reported on a project during the North Central Extension-Industry Soil Fertility Conference which showed the benefits of spring applied lime on soybean yields. (See Table 1). The benefits of low rates of ag lime to soybeans on some low pH soils is a market that should not be overlooked. When soybean breeders get a 5 to 7 bushel variety advantage in yield, they crow about it! Even with $5 beans, these increases from lime spell profit.

Table 1.

Effect of April-applied ag lime from three sources on 1990 soybean yields and October soil pHs (0 - 3 inches). Marshall silty clay loam, pH 5.67 (Western Iowa)

LIME RATE	SOYBEAN YIELD - BU/AC LIME SOURCE[1]					
LB/AC	FLUID LIME	pH	PELLETED LIME	pH	AG LIME	pH
0	43		43		43	
250	50	5.73	48	5.70	—	
500	50	6.03	47	5.73	50	5.77
1000	—		—		48	6.10

[1]*Effective calcium carbonate equivalent (ECCE) per ton of lime for the fluid, pelleted and ag lime lime were 1768, 1131 and 1594 pounds, respectively.*

PRE-SIDEDRESSED NITRATE-N SOIL TEST (PSNT) IMPROVES N RECOMMENDATIONS FOR CORN IN MICHIGAN

Dr. M.L. Vitosh and his colleagues from the Dept. of Crops and Soil Sciences, Michigan State University, reported on 53 on-farm demonstrations conducted during 1989 and 1990. Their report was part of the NC Extension-Industry Soil Fertility Conference. By using the PSNT and comparing the recommended sidedressed N rates with rates about double those recommended, the yields showed only an average differential of 2 bushels the first year (124 bu. vs 126 bu.), and 3 bushels the second (137 bu. vs 140 bu.). Significant economic advantages were apparent for using the recommendations based on the PSNT in all but four situations. Two of those were on irrigated sandy sites.

PRE-SIDEDRESSED (PSNT) AND PREPLANT (PPNT) NITRATE-N SOIL TEST RECOMMENDATIONS MISS THE MARK IN ILLINOIS STUDIES

Drs. H. M. Brown, R. G. Hoeft and E. D. Nafziger, Agronomy Dept., University of Illinois, reported on a two-year preplant (0 to 24 inches) and pre-sidedress (0 to 12 inches) nitrate-N soil sampling and N recommendation study in which rates of N were applied to determine the optimum yield and optimum rates of N. The optimum yields for the 45 site-years averaged 137.6 bu/ac (range 56 to 198 bu), while the average optimum rate of nitrogen was 67.4 lb/ac (range 0 to 212 lb).

In seventeen of the 45 sites the optimum N rate was zero. The average yield of the 17 non-responding sites was 125.8 bu/ac (range 56 to 198 bu). The nitrate soil test accurately predicted no N response on only three of the 17 sites. The average rate of N recommended for those sites would have been 106 lb/ac with the PPNT and 123 lb/ac with the PSNT. This indicates that a great deal of improvement is needed before either of these tests can be put into use. For the sites (25) that responded to N, the average yield was 147 bu/ac (range 71 to 189 bu), and the optimum N rate averaged 121.4 lb/ac.

8-YEAR STUDY SHOWS THE OPTIMUM N RATE FOR CONTINUOUS CORN

The same researchers (see above) reported the optimum 8-year average was 164 lb. N/ac. The range in optimum rates was 100 to 187 lb./ac. [Drought cut off the response. In most years moisture or rainfall is the major limiting factor. See Table 2]. At the optimum N rate it took an average of 1.12 pounds of N per bushel of corn or the output was 0.893 bushels per pound of N.

With $2.50 corn and $.25 per pound of N, that's a return of $8.92 per dollar invested. The 1.12 pounds of N/bu is an interesting value because that is the same average value that Munson's database shows to be the internal requirement of corn over a range of environments, hybrids, and yield levels from 93 to 338 bushels per acre.

12/91

Table 2.

Effects of 1991 rainfall in cutting-off corn response to nitrogen at two southern Illinois locations. Dr. Ed Varsa, Southern Illinois University.

N RATE LB/AC	CORN YIELDS—BU./AC BELLEVILLE (ADEQUATE RAINFALL)	CARBONDALE (DROUTH)
0	130	69
80	206	71
120	222	65
160	224	64
April-Sept Rainfall (inches)	25	16

FOLIAR FERTILIZATION OF SOYBEANS SHOWS PROMISE

Drs. Dale Blevins and Tim Reinbott, Agronomy Department, University of Missouri, reported at the NC Extension-Industry Soil Fertility Conference on their 1990 and 1991 foliar fertilization research. By applying foliar nutrients that included boron (B), calcium (Ca), magnesium (Mg), and phosphorus (P), applied alone or in all combinations in the form of boric acid, calcium acetate, magnesium acetate and pentasodium tripolyphosphate, they concluded that boron and magnesium seemed to be the elements giving the response.

Application of 0.25 lb of B/ac and 0.5 lb of Mg began at flowering (R-2 growth stage) and were repeated roughly every other week for two to four applications with good results. Significant responses are shown below for three locations in 1990.

FOLIAR TREATMENT	SOYBEAN YIELD-BU/AC LOCATION MT. VERNON	BRADFORD	DELTA CENTER
None	34.4	43.2	44.6
B	—	—	48.1
B + Mg	42.7	46.8	48.9
Increase	8.3	3.6	4.3

In 1991 at the Bradford site yields were in the 70+ bu/ac range. There was no response to the boron-magnesium treatment. However, at the Mt. Vernon location B + Mg increased the yield by 5.6 bu/ac. Dr. Blevins has promised to write a more detail report for us on their research.

CHLOROPHYLL METER LOOKS PROMISING FOR DIAGNOSING IN-SEASON N CROP NEEDS

Dr. D. D. Francis, J. S. Schepers and M. F. Vigil, USDA-ARS and University of Nebraska have been studying N rates on corn and the relationship between nitrogen contents of leaf disks samplings, and Minolta SPAD 502 Chlorophyll Meter readings taken at different times during the season. Different corn hybrids were also part of the study. This research was also reported at the NC Extension-Industry Conference. The general relationships among corn yield, N content of leaf disks sampled at pollination and chlorophyll meter readings with increasing rates of N are shown in Figure 1. Corn yields of 12.5 Mg/ha are approximately equal to 200 bu/ac and 225 kg/ha is about 200 of N per acre. Early chlorophyll meter readings can be used with soil nitrate-N values as a guide to provide supplemental N through irrigation systems.

FIGURE 1.

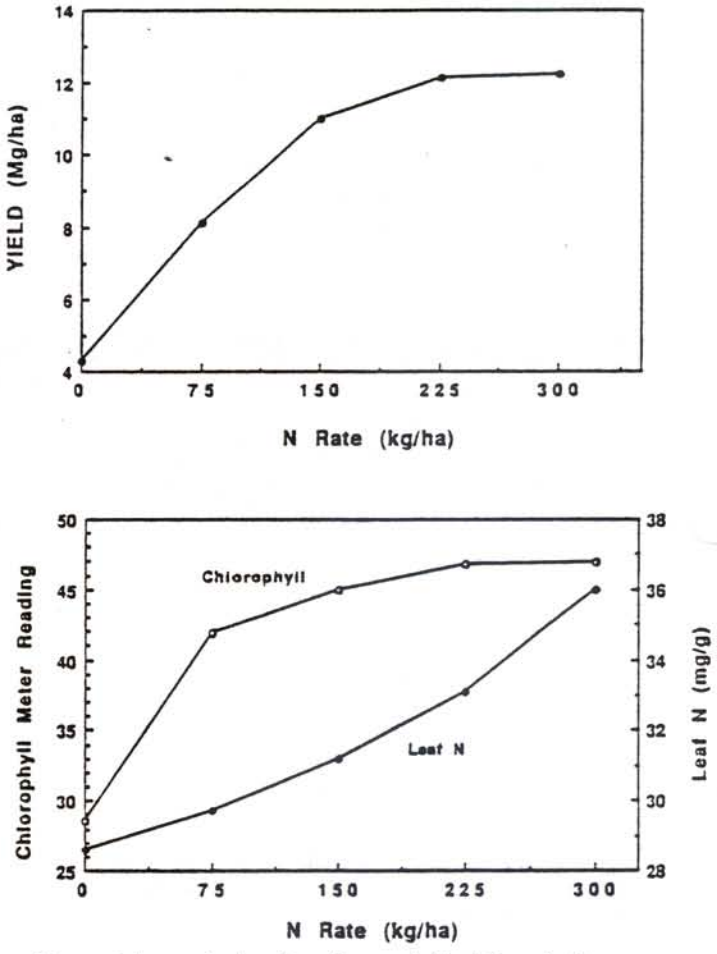

Figure 1. Interrelationship of corn yield, chlorophyll meter readings, and the N content of corn leaf disks sampled at pollination with rates of applied nitrogen. (D. D. Francis, J. S. Schepers, and M. F. Vigil. USDA-ARS and Univ. of Nebraska).

Copies of the 1991 Proceedings of the NC Extension-Industry Soil Fertility Conference can be purchased by writing to the Potash & Phosphate Institute, 2801 Claflin Rd., Suite 200, Manhattan, KS 66502.