

FLUID DIGEST®

Research Update from the Fluid Fertilizer Foundation

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FFF-funded research refines PSNT

Because the amount of N left in the soil from a previous crop varies from one year to the next, technology to measure available nitrogen in-season is gaining popularity.

In-field determination of soil N levels cuts the time required for lab analysis and makes for more timely pre-plant or sidedress N applications.

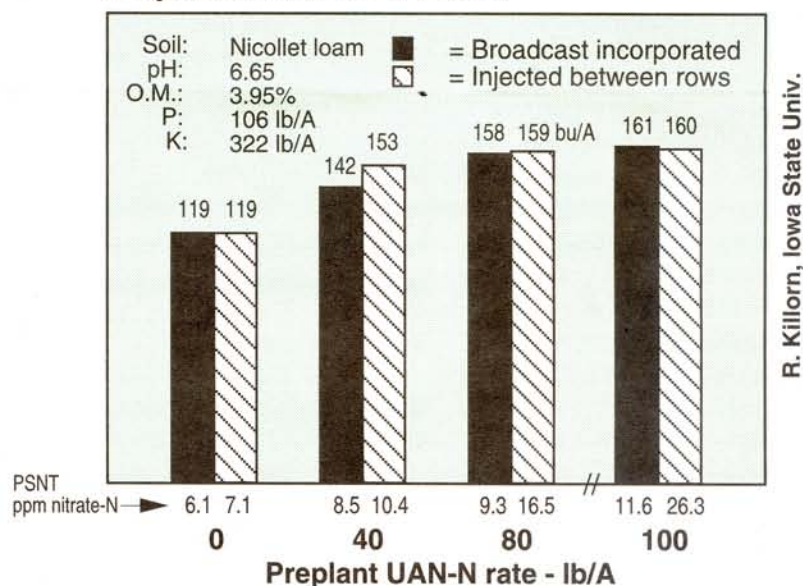
One tool currently being refined with the help of the FFF is the pre-sidedress nitrate-N soil test (PSNT). This in-season soil test can be used while the young corn is growing to indicate if more nitrogen is necessary to optimize yields.

However, FFF-sponsored research in Iowa shows that care must be taken when using the PSNT on fields that have had fertilizer N applied prior to planting. (Figure 1)

Research findings on the limitations of PSNT on fields with methods of application include:

- Difficulty of collecting a representative soil sample.

Figure 1 - Effects of preplant UAN on PSNT values (at V₆) and corn yields. (IA, 1991)



- PSNT critical levels (the nitrate-N level above which a response will not be expected) may need to be re-evaluated. Research found that with samples taken when corn was at the 6th leaf (V₆) stage a nitrate-N test level of 9.3 ppm (which is well below the

critical range of 21-26 ppm), there was no significant yield response to additional N.

Project leader: Dr. Randy Killorn, Iowa State University, (515) 294-1923. ■

Turning new technology into corn profits

As crop nutrient management becomes more refined, technology is combining soil tests with tissue measurements to detect yield-affecting nutrient deficiencies.

Leaf N concentration is one way of determining whether a crop has received adequate nitrogen. Because the leaf N concentration of corn is related to the amount of chlorophyll in the leaf, you can also use a chlorophyll meter to estimate N levels in corn. With proper calibration, it may be possible to

estimate the amount of N fertilizer required to attain optimum yield.

Here's a summary of preliminary findings of FFF-funded research underway in Iowa on the interrelationship between fertilizer rate, chlorophyll content, leaf N and yield:

- Chlorophyll content of corn leaves increased as N rates increased. Optimum yields were produced when chlorophyll contents were 52.5 when sampled at the 6th leaf stage and 53.5

for the 10th leaf stage of development.

- As chlorophyll content increased, so did yield.

Additional research may show how this technology can be used to help determine N fertilizer needs of corn. This could be particularly effective where N can be applied in irrigation water.

Project leader: Dr. Randy Killorn, Iowa State University, (515) 294-1923. ■

Improve UAN efficiency on no-till corn

As reduced tillage systems continue to gain in popularity, more refinements are being made to increase fertilizer efficiency in heavy residue.

Extensive research has been conducted in this area, but results are often contradictory and no general agreement has been reached on the most efficient way to apply fluid urea-containing fertilizers (especially UAN) to no-till corn.

FFF-sponsored research at Pennsylvania State University has taken a closer look at applying UAN solutions to no-till corn. Timing, method of application, source and effects of amendments (ATS and NBPT) on yields were compared in the study. (Table 1)

Table 1 - Increased yields (3-year average) of no-till corn from 100 pounds of UAN-N alone and with ATS (ammonium thiosulfate) or NBPT (n-butyl thiophosphoric triamide) amendments applied at different times and method of application. (R.H. Fox, Penn. State University)

Increased corn yield - bu/A				
Method and time of application for no-till corn				
N Source with amendment	Sprayed at planting	Dribbled at planting	Dribbled at sidedress	Difference for method and time of application
UAN	29	44	59	30
UAN + ATS	33	52	51	19
UAN + NBPT	50	47	53	6
Difference for amendment	21	8	8	

Results indicate:

- Average yields and N uptake with the sidedressed dribbled UAN were not significantly lower than with the sidedressed injected. So the less expensive dribbled sidedress treatment

may be the most cost-effective treatment.

- N use efficiency was greater with the dribbled at-planting applications than with the sprayed at-planting applications.

- NBPT applied with UAN as a spray-broadcast treatment was effective in increasing yield and N use efficiency over UAN or UAN + ATS treatments.

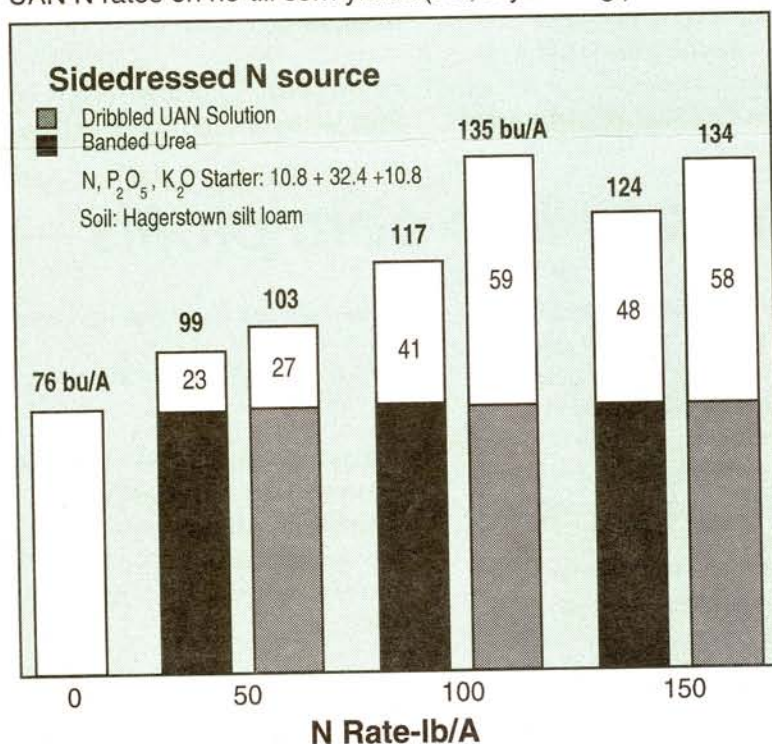
- Amending UAN with NBPT increased the efficiency (reduced volatilization loss) over sprayed UAN and UAN + ATS treatments.

- Amending UAN with ATS had little effect on N fertilizer use efficiency of sprayed UAN, although it may have slightly increased yields and N uptake of dribbled UAN. (Table 1)

- Dribbled sidedress applications were generally superior to at-planting dribbled applications. (Figure 2)

Project leader: Dr. Richard Fox, Pennsylvania State University (814) 865-1169.

Figure 2 - Effects of sidedressed banded urea or dribbled UAN N rates on no-till corn yields. (PA, 3-year avg.)



R.H. Fox, Penn. State Univ.

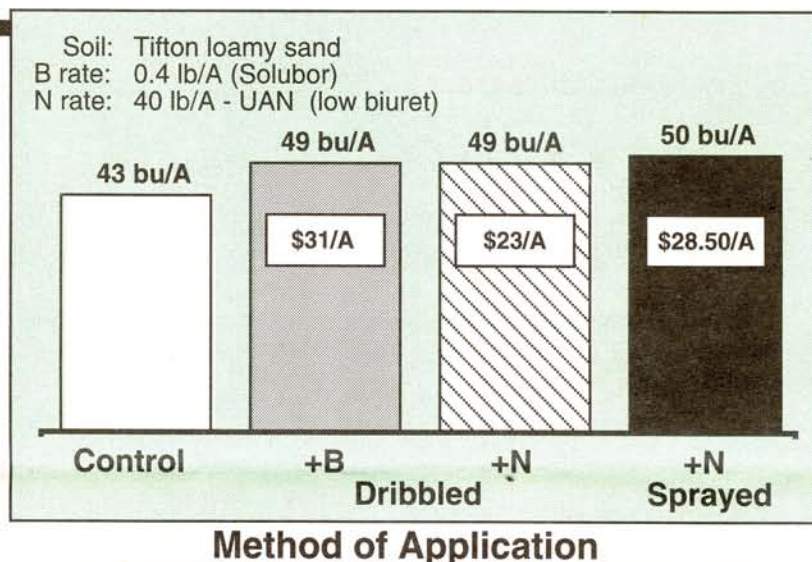
Late season N and B may boost soybean yields

Although soybean yield responses to fertilizer N vary, recent research in Georgia shows that yield increases are possible with fertigation during pod fill. (Figure 3)

When planning a high-yielding soybean fertility program, consider the following preliminary findings:

- Late-season application of N can result in significant yield increases, but responses are often cultivar and climate dependent.
- The greatest response has occurred in irrigated beans which are managed for high yield.

Figure 3 - Effect of boron or nitrogen on irrigated soybean yields and profit. (GA, 1991)



G. Gascho, Coastal Plain Station, Univ. of Ga.

- This practice is most effective when water or other cultural factors are not limiting.

- In 1991 the higher yields were obtained with a combination of 40 lb/A

of N (urea solution) and 0.4 lb/A of B as Solubor.

Project leader: Dr. Gary Gascho,
University of Georgia-Tifton
(912) 386-3329.

Manage N and P for top winter wheat yields

Kansas research on fertility management of winter wheat shows the importance of balancing nutrients for optimum yields and environmental improvement. By using adequate P

with nitrogen, you can increase nitrogen use efficiency and leave less residual or carryover N in the soil. (Figure 4)

Indications are that N and P work together:

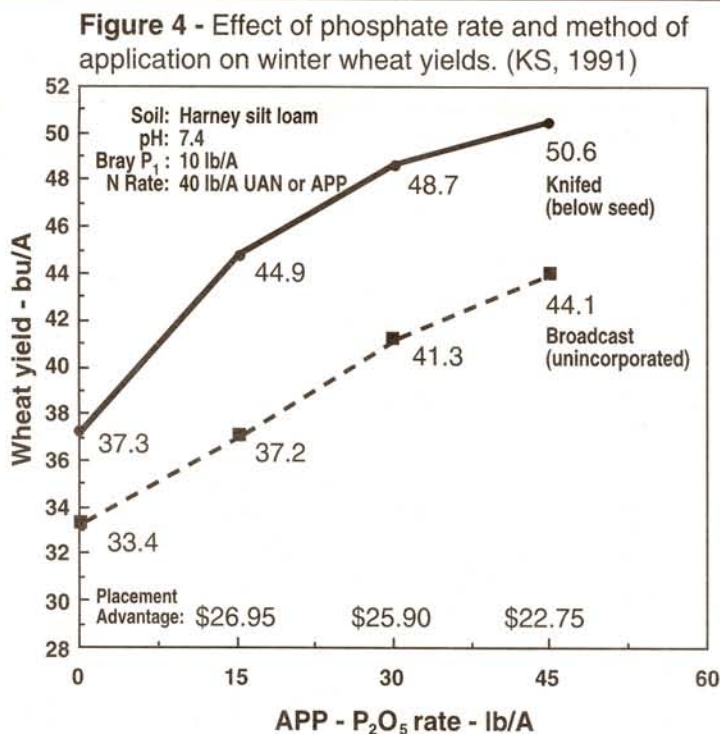
- N recovery (the amount of available N taken up by a plant) decreased with increasing N rate, which was expected. However, by increasing the P rate, N recovery increased.

- Band (knifed) application of P as compared to broadcast increased apparent N recovery.

- Increasing fertilizer N recovery with increasing P rate reduced the N left in the soil profile after harvest.

- Profile nitrate-N content (the amount of N present in the top 12 inches of soil) was lower for knifed-in P than for broadcast P at the end of the season.

Project leader: Dr. John Havlin, Kansas State University (913) 532-7211.



J. Havlin, Kansas State Univ.



FOUNDATION NEWS

*from your
Vice President
of Research
Dr. Bob Munson*

President Ed Dwyer appointed the FFF Study Committee, chaired by Dick Stiltz, Clayton Point Fertilizer, to provide guidance regarding research, establishing goals and future objectives for Foundation activities. Following a teleconference, the Committee will hold meetings prior to the Board meeting in Memphis during Round-Up. A questionnaire was developed to help bring together views of the

Committee. We will keep you posted on developments. This effort will help us focus on the future.

Efforts are being made to coordinate Association and Foundation membership and support efforts. The membership committees will meet jointly in Memphis during Round-Up.

During 1992 the Foundation is funding 20 projects in the U.S. and Canada. The 1992 Research Symposium Proceedings titled, "Creating the Future through Research" has been published. Extra copies may be purchased through the Foundation office.

The next brochure to be developed will be on wheat-soybean double crop production. ■

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