

FLUID DIGEST®

Research Update from the Fluid Fertilizer Foundation

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Why PK applications in fall? Why fluids?

These questions seem to arise every fall. And if you remain among the skeptics, the following offer solid reasons why you should change your mind.

Avoid spring rush. Fall application of P and K clears the way for timely planting in the spring while others are lined up and fighting the rush to get their fertilizer applied.

Avoid economic loss. Resulting delays in planting, caused by bottlenecks in fertilizer supply lines during the spring rush, can cause serious economic loss.

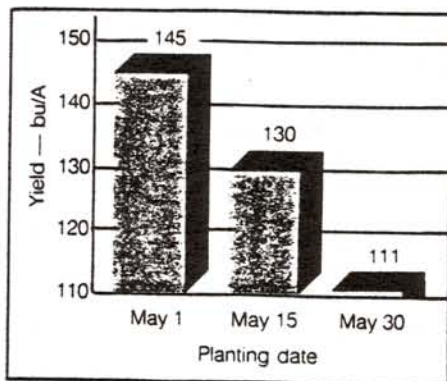


Figure 1. Effect of delayed planting on corn yields.

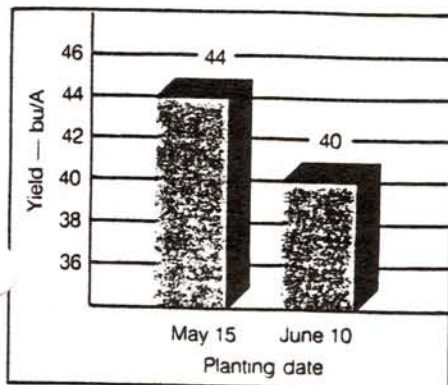


Figure 2. Effect of delayed planting on soybean yields (Iowa State University).

For example, studies in Ohio, Illinois, Iowa and Colorado show that one bushel per acre of corn will be lost for each day planting is delayed (Figure 1). Similarly, a one-day delay in planting of soybeans can cost, at current market prices, nearly \$1 per day (Figure 2) through reduced yields!

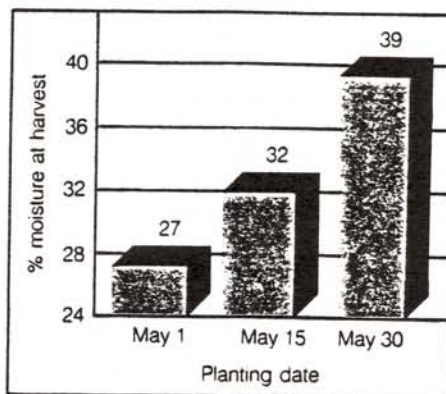


Figure 3. Effect of delayed planting on harvest moisture of corn (Modern Corn Production).

In addition to the economic loss suffered by reduced yields, delays in corn planting can cause increases in moisture content of corn at harvesttime by as much as .4% per day as shown in Figure 3. Resulting on-farm drying costs and moisture dock costs at the elevator can add up to substantial dollar loss.

Agronomically sound. Studies show that applying P and K in the fall is agronomically sound. Whether application is made in the fall or in the spring, difference in yield outcome is insignificant.

Price advantage. Certain price advantages are often provided when purchasing fertilizers in the fall.

Speed/precision. Finally, fluids are ideal for applying P and K in the fall because they are easy to handle and can be applied with speed and precision, as the banding studies of Barber of Purdue (December 1988 *Fluid Digest*) show, where corn yields improved up to 12 bu/A over broadcasting.

Take advantage of the time you have in the fall so that you're in control when the spring season arrives. It'll help you to operate more efficiently and improve that bottom line!

Season-long nutrition pays on corn

Gascho of the University of Georgia, FFF project leader there, reports that fluid fertilizers can be applied to corn via irrigation water and "fertigation" as late as the 12-leaf stage and significantly increase grain yields.

Supplemental NPKS applications were based on foliar tissue analysis at the 10- to 12-leaf stages, emphasizing the need for season-long crop nutrition based on constant monitoring of a crop's nutrient status.

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Foundation News from your Research Director, Julian Smith



As another crop year comes to an end, it will be for many a growing season of "what might have been"! Heavy spring rains in the eastern Corn Belt serve to remind us of the catastrophic effects of delayed planting on corn and soybean yields.

Moving westward, we are reminded of the drought of '88, since water shortage again has disrupted crop production west of the Mississippi and into the Great Plains.

In this issue of *Fluid Digest* we will consider one important strategy that can be used to neutralize the effects of adverse weather conditions: *fall fertilization*.

For example, in many instances, fall fertilization can help to take the pressure off by leaving only planting and timely N application for the spring. This is especially useful in guarding against a protracted wet spring, such as many areas unfortunately experienced this spring.

Conversely, in dry conditions, early, deep rooting is essential. On many soils, this can be achieved by subsurface placement of nutrients in the fall — surface banding before primary cultivation, for example.

Fluid fertilizers offer management flexibility in either case, whether conditions are wet or dry. They are convenient, easy to handle and offer fast application with accuracy, thus assuring maximum fertilizer uptake by the plant roots.

Proper fertility alone, however, does not always guarantee highest economic yields. For maximum efficiency in fertilizer use, fertility must form part of an *integrated* management system that comprises a multitude of agronomic factors (see articles on intensive wheat management in this issue). If one management factor is deficient, the entire system is hampered. For example, if soil acidity is not corrected, NPKS efficiency will suffer. In other words, nutrients and pH must be in harmony.

Reflect on the season. Remember the high and low points. Build on strengths and correct mistakes. In the end, the payoff will be *profitable farming!*

J. Julian Smith, PhD.
Vice President, Research

Up to 1.5 tons/A Multi-nutrient fluids increase yields in grasses

Although nitrogen has been the primary nutrient traditionally used to enhance yields in grasslands, scientists are learning that failure to include other nutrients can limit yield and quality of forages.

FFF research by Moyer of Kansas State University shows that multi-nutrient fluid mixes increased tall fescue yields by more than a half ton per acre over those where just N was applied (Figure 4). In addition, inclusion of P, K, S, B and Zn with N increased forage nitrogen uptake by 24%, compared to N alone.

In another Foundation research project, data compiled by Haby of Texas A & M show that fluid NPKMg mixes on coastal bermudagrass increased dry matter by 1.5 tons/A over that where N was applied alone (Figure 4).

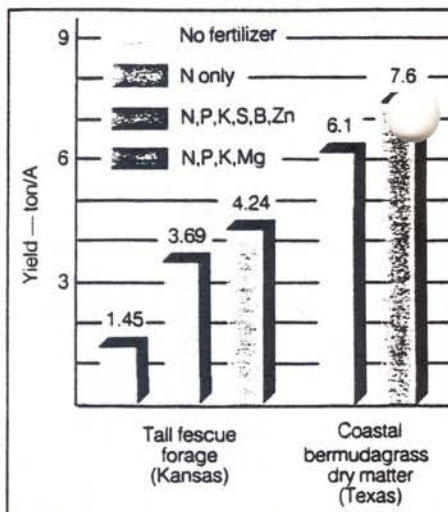


Figure 4. Effect of multi-nutrient fluid applications on grassland yields (Moyer, Kansas State University, 1985; Haby, Texas A & M, 1985).

Split applications used

Integrated management nets 116 bu/A of winter wheat for Illinois grower

Bob Wood, a grower from Jacksonville, Illinois, produced 116 bu/A of winter wheat this year with a test weight of 61.2 lbs/bu., using an intensive management system that included fluid NPK applications in the fall (prior to seeding at the rate of 110 lbs/A) and split N+S applications in the spring for a total of 135 lbs/A N and 20 lbs/A S.

Wood's dealer, Clayton Point Fertilizer, subscribes to and promotes the intensive management system used by Wood. The company's president, Dick Stiltz, says the proof

of the pudding is putting the system into practice on customers' farms, where it has enjoyed widespread success. He believes that a 140-bu/A yield target for his area is not unrealistic.

Many similar studies are identifying intensive management practices that have been adapted to U.S. conditions with a net result of higher profit levels for wheat growers. Significantly, the most successful studies are truly integrated crop management systems — not just nitrogen and fungicides!

More is involved in top winter wheat yields than just adding fertilizers and fungicides

Many of the wheat production practices employed by European farmers in intensive winter wheat cropping have been successfully adapted by U.S. growers. Fluid fertilizers have played a significant role in establishing the practice and elevating the yield of winter wheat in many areas of the United States.

Integrated management

Contrary to popular belief, intensive wheat management is not just a question of increasing nitrogen rates and using fungicides. It involves a multitude of integrated management factors geared to producing a profitable crop. Paramount among considerations are:

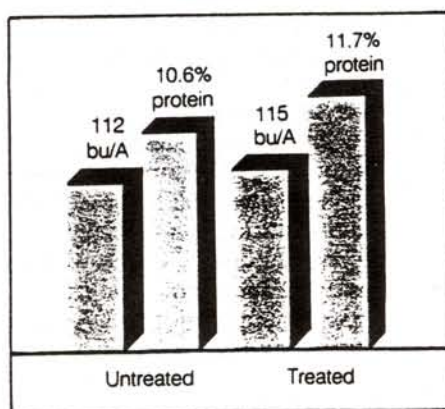


Figure 5. Protein improvement in winter wheat from late foliar application of N.

Varieties. Plant breeders have done a tremendous job of providing disease- and lodging-resistant varieties. Modern varieties are better able to exploit favorable disease-free, nutrient-rich environments.

Seeding rate. High plant counts arising from a seeding rate of 140 to 180 lbs/A provide the necessary crop structure for high yields. The majority of European wheat crops are drilled at 4- to 5-inch row spacings.

Liming. Soils must be limed to at least pH 6.0 to 6.5 to assure against soil acidity.

Fall application. P and K are applied with a small amount of N before planting in the fall. Fluids ideally fit

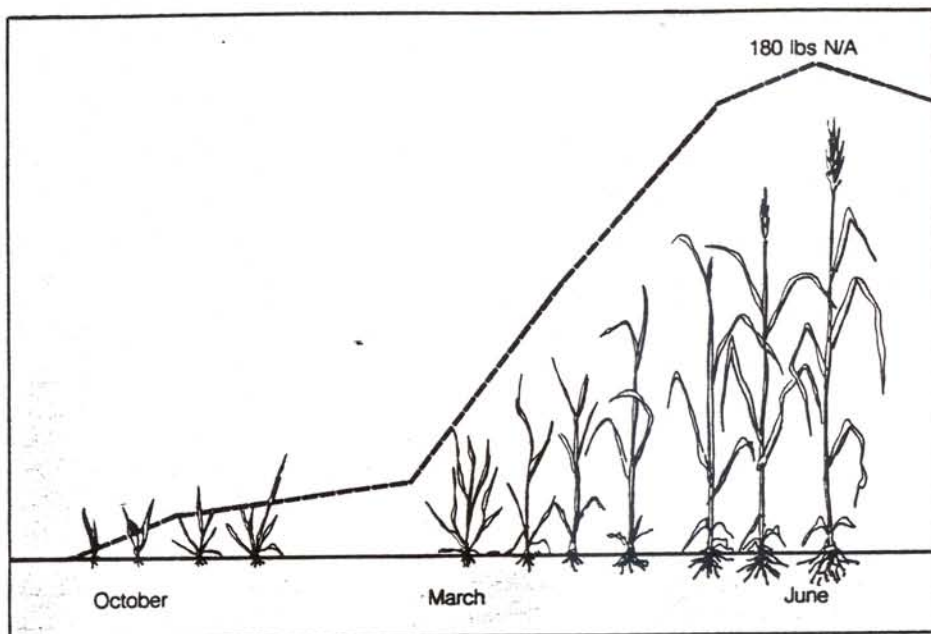


Figure 6. Nitrogen uptake by winter wheat throughout growing season in relation to crop growth.

the role because of management flexibility. "Weed and feed" mixes residual herbicides with fertilizers, saving time and labor. Where broadcasting is not desired, banding PK offers useful yield increases in some situations.

Weed control. High-yielding wheat fields are clean. Weeds must be controlled or yields will suffer.

Scouting. Plots must be scouted and diseases dealt with appropriately.

Growth regulators. Where lodging is a problem, use of a growth regulator to strengthen straw and improve crop standing is advised.

Application method. Fluids can be banded or broadcast. In the latter case, any leaf burn observed in early spring is transient and will not affect yield. In the case of banding UAN, up to 10-bu/A yield improvements (over broadcasting) have been recorded.

Split applications of N in the spring are consistently superior to single applications. Split topdressings are efficient, economical and environmentally sound.

Late-season foliar applications of

NPK fluids have improved yield and protein content (Figure 5) and test weight and disease control in a number of studies. In areas where premiums are paid for high protein content, late-season foliar application should be a definite consideration.

Timing. Fluids offer timely, convenient, fast application so that N application coincides with time of peak plant demand (Figure 6).

Nitrogen's role

Though we've established that nitrogen fertilizer is far from the sole genie that produces high crop yields, it does, nevertheless, rank as one of the key ingredients required to successfully manage and produce top yields in an integrated wheat program. And ideally suited to such intensive winter wheat management are fluid nitrogen or nitrogen/sulfur sources. A 120-bu/A winter wheat crop of 11% protein, for instance, will require over 160 lbs of N. Failure to supply N at the appropriate rate and time will result in yield loss. Rates in excess of 200 lbs N/A are not uncommon in Europe in extremely high-yielding crops.

For correct pH

Time to apply fluid lime!

The practice of applying fluid lime in the fall is unquestionably a part of good farm management and sound agronomics. The benefits are manifold:

Corrects soil acidity

We all know soil acidity reduces crop yields in many regions of the United States. Low soil pH can cause deficiencies of phosphorus and molybdenum in plants — even if fertilizers are applied. Aluminum and manganese toxicities can also occur.

Application of ammoniacal N fertilizers — those composed of ammonia, urea or ammonium salts —

can cause low soil pH or soil acidity. Note in Figure 7 how soil pH in no-till corn drops steadily as the rate of N applied increases from 0 to 300 lbs N/A.

The answer to such problems and the best assurance against yield deficiencies in crops is to raise soil pH to acceptable levels, usually ranging from 6.0 to 7.0, by applying fluid lime during the fall.

Reacts quickly

The small particle size of the finely ground limestone, mixed with water (or fluid fertilizer) and a small amount of clay in fluid lime, allows it to neutralize soil acidity more rapidly than ag-lime whose particles are larger and vary in size, making ag-lime difficult to spread evenly. Figure 7

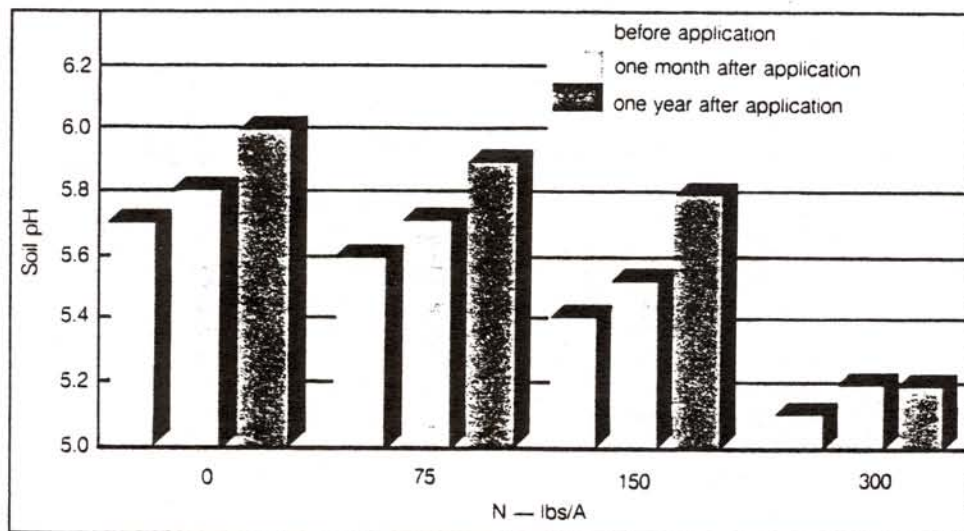


Figure 7. Effect on soil pH of N rate and elapsed time after fluid lime application (Grove and Blevins, University of Kentucky, 1985).

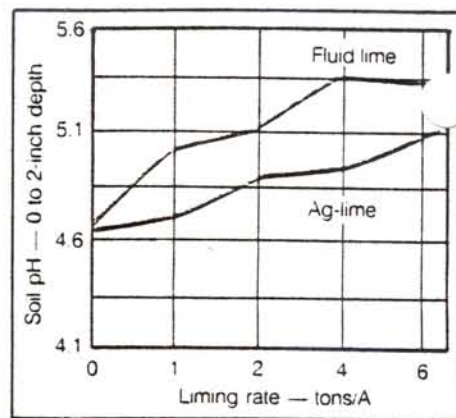


Figure 8. Effect of lime source on pH one year after application (Grove and Blevins, University of Kentucky, 1985).

shows that pH increased only one month after application of fluid lime. The comparison with ag-lime in Figure 8 shows that *one* ton of fluid lime outperformed five tons of ag-lime at the 0 to 2-inch depth in no-till corn, just one year after application!

Other benefits

In addition to reducing soil acidity and doing it rapidly, fluid lime also allows:

- dust-free application
- precise application
- low application rates, especially to correct a thin surface layer of acid soils in no-till fields
- even application, especially on sloping land
- fast penetration into soil from topdress application
- application with herbicides, small seeds and K



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