Why Fluids?

The benefits have everything to do with improved crop yields, crop quality, environmental stewardship, and profitability — that's why.

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Summary: *The modern fluid fertilizer industry, and the advantages/benefits associated with fluids, date back to the early 1950's. Over the years vast numbers of fluid dealers (many now spread well beyond U.S. borders) have indeed proven the value of this product in improving crop yield, quality, value, performance, and profitability. Additionally, the versatility and adaptability of fluids have resulted in an ever-increasing appeal in today's farm market.*

Top 10 lists are ever popular in our culture today – so what are the top 10 advantages of fluid fertilizers? Ask a handful of farmers and dealers and you likely will come up with a handful of different answers. There are so many, and the advantages so varied, that it is not possible to come up with a single top 10 list that everyone can agree to! Some advantages benefit everyone. For others their appeal depends on the specific situation involved. Typical benefits noted include things such as: a wide variety of fertilizer placements, homogeneous blends, best adapted for split applications, high nutrient use efficiency, handling conveniences, provides environmental benefits, required for fertigation, best suited for variable rate application, and many other benefits that give fluids a distinct economic appeal. While it is not possible to name the definitive top 10 benefits of fluids that apply in all situations, my top five benefits of fluid fertilizers should broadly fit most everyone. A more in-depth discussion of each of these benefits will be presented in future issues of the Fluid Journal.

Top Five

Since each of these benefits tends to overlap and interact with each other, we need to start with number five and build our way up to the number one benefit.

#5 ..... Logistics

Logistics is the organization, distribution, handling, and application of crop nutrients in an efficient, cost effective manner. There is no doubt that fluid fertilizers excel in providing efficient logistics, which allows for the necessary timeliness of crop production practices required for efficient crop production. At the top of the list of logistical advantages is the overall handling convenience associated with fluid fertilizers. In fact, handling convenience is one of the most often cited advantages of fluid fertilizers. This is evidenced by the fact that university researchers and farmers find it much easier, more accurate, and much more cost effective to adapt equipment for a wide variety of application methods by using fluid fertilizers as compared to dry. Simply put, it is much easier to pump fluid fertilizers to nursing and application equipment than it is to auger or belt transfer dry materials. It is also safer to transfer and apply fluids than it is anhydrous ammonia. It is also less expensive to maintain/replace necessary hoses, provide adequate safety equipment, and to provide for adequate insurance.

#4 ..... Right Rate

There are several aspects involved in applying the 'right' rate. Most commonly, the right rate refers to applying desired crop nutrient rates on a whole field (or portion of a field) basis. But average application rates within a field are only one aspect of the 'right' rate. Application uniformity across the application swath and across the field (or portion of field) is equally important.

Fluid fertilizers are homogeneous, with each drop having the same composition as the next drop. On the other hand, once blended, solid fertilizers immediately begin the process of unblending and becoming increasingly non-uniform during each step of the application process. Coning segregation occurs as blended materials are dropped from augers or belts - forming a conical pile in storage and nursing/application equipment. Segregation occurs as larger particles tend to roll to the outside edge of the pile while smaller particles and fines accumulate in the center. Physical differences among various products in the blend often result in wide differences in nutrient contents throughout the pile. Next, vibrational segregation occurs as the tendering equipment travels to the field, and additionally as the applicator travels across the field. Finally, ballistic segregation occurs during many applications since larger particles weigh more and travel farther than smaller particles. Doubling particle size increases weight by 8 times! As a result, dry fertilizers are much more subject to non-uniform application across the swath width and within a field or portion of the field than fluid fertilizers. Likewise, in comparison to most ammonia applications, fluid fertilizers are not subject

to flow variations as a result of temperature changes, hose configurations, hose barb condition, or orientation of application equipment.

Another often overlooked aspect in achieving the 'right' rate is the concept of achieving continuous crop nutrient bands in preplant and starter band applications. The probability of roots contacting a band and proliferating in the band will be higher if the fertilizer is deposited in a continuous, unbroken nutrient band as opposed to intermittent bands resulting from dry fertilizer granules. Again, while the overall rate per acre in a band might be correct, the distribution within the band is also important.

Calibration is also an important component in achieving the 'right' application rates. For fluids, calibration is a relatively simple process that involves orifice size, pressure, and density. Calibrating dry equipment is much more difficult since particle size and density vary. Identifying proper application overlap is often more difficult. Application equipment typically involves many parts that affect application uniformity and rate. Ammonia applicators are much more difficult to properly – and safely – calibrate.

Right Rate
"…. we suggest that plant roots may follow a continuous band with only one root contact. However, with discontinuous bands, where fertilizer is placed in droplets or as dry particles too far apart to interact with each other, a new root contact may be needed for each droplet or particle."

Drs. B. Eghball and D. H. Sander
Fluid Journal, Winter 2001

#3 ….. Flexibility

To many people, flexibility is the first thing that comes to mind when discussing the advantages of fluid fertilizers. Why? Because fluid fertilizers have unparalleled versatility and adaptability as compared to other fertilizers. Fluids are versatile and fit all crop nutrient placements, application methods, and nutrient timings – a characteristic not shared with any other class of fertilizer products:

- Preplant, planting time, and post-plant applications
- Broadcast applications – either incorporated or unincorporated
- Subsurface, surface, dribble, and starter bands
- Sidedress, topdress, and split applications
- Drip, sprinkler, and flood irrigation
- The only option for in-season foliar application.
- Sensor based and variable rate based applications.

Additionally, fluid fertilizers are adaptable to any and all crop production systems and are uniquely suited to refining planned crop nutrition programs in-season in order to respond to changing soil/environmental conditions. They also are adaptable to simultaneous product applications, tillage/nutrient application equipment, and precision operations and applications.

- Respond to in-season management in response to changing environment
- Easily adjust to changing crop conditions.
- Various tillage and planting equipment
- Irrigation/fertigation systems – drip, pivot, flood
- Simultaneous crop nutrients and micronutrients
- Tank mixes with many pesticides
- Adaptable to fertilizer additives
- Many other adaptations

Flexibility
"Foliar fertilization is a viable means of applying certain fertilizers that can supplement traditional soil methods. It can be used to improve the efficiency of a nutrient urgently required by the plant to produce maximum growth, yield, and fiber quality. In this way, foliar fertilization supplements soil applications for a more efficient supply of nutrients to the developing cotton plant for optimum yields and fiber quality. In general, foliar applications should be made early morning or late evening for maximum efficiency, and no foliar applications should be made to water–stressed plants."

Dr. Derrick Oosterhuis
Fluid Journal, Late Spring 2009

#2 ….. Agronomics

In recent years the '4R Nutrient Stewardship' concept has been increasingly adopted as a way of communicating Best Management Practices (BMP's) to the public, agribusiness, and farmers. Initially developed by the International Plant Nutrition Institute (IPNI) and the fertilizer industry, the 4R's refer to: 1) the right source, 2) at the right rate, 3) at the right time, and 4) in the right place. It is apparent that fluids are uniquely suited to being the "Right Source."

Fluid fertilizers, in conjunction with the previously discussed benefits associated them, have a long documented research history of providing high nutrient use efficiency (NUE), high yields, and improved environmental stewardship. Fertilizer placement, fertilizer application method, fertilizer application timing, and fertilizer rate all may have large effects on overall crop agronomics, NUE, and crop yields – and all are advantages associated with fluids.

Agronomics
"Using an intermediate degree of mixing, accomplished via strip treatments, has proven the more efficient placement. Fertilizer reaches a greater proportion of the root system and is not tied up as much by the soil as occurs with broadcast applications. The use of strip treatments, versus the extremes of banding and broadcasting, is definitely worth considering in the pursuit of getting greater yield responses from applied fluids."

Dr. Stan Barber
Fluid Journal, Winter 1997

#1 ….. Value

The number-one top benefit of fluid fertilizers is high value – the overall benefit relative to costs. And the totality of the benefits associated with fluid fertilizers far outstrips any difference in the purchase price of specific crop nutrients.

- Logistical advantages of fluid fertilizers provide for unequalled handling convenience/efficiency and timeliness of crop production practices
- Accurate, uniform, and precise applications provide for optimum crop nutrient distribution within a field, portion of a field, and fertilizer band
- Unparalleled flexibility, versatility, and adaptability allow fluids to fit all crop production systems, all application methods, and any application timing
- Unsurpassed agronomic efficiency provides for superior agronomics, environmental stewardship, and profitability.

High value provides for prosperity – low cost does not!

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