

Drs. Larry Murphy and J. Larry Sanders

Crops Respond To Fluids In Combination With Carpramid Polymer

Researchers report favorable responses in corn, wheat, and cotton in extensive field trials across U.S.

Summary: University trials have demonstrated that fluid fertilizers in combination with a biodegradable polymer (carpramid) affect growth and production of corn, wheat, and cotton. Under controlled conditions, microscopic examination of enhanced root growth reveals greatly increased root branching and root hair development. Controlled condition studies indicate that the polymer labeled with C-14 is not taken up by the plant and acts externally on the root system. Plant analyses described in patents covering the product (carpramid, marketed as AmiSorb), as well as recent field data, show enhanced nutrient absorption. Not all soils and cropping conditions result in increased crop yield responses to the polymer. More remains to be learned as management of this production input is refined and specific conditions affecting responses are determined.

Extensive field trials in the United States have indicated excellent crop yield responses to fluid fertilizers in combination with carpramid, marketed as AmiSorb. Row crop studies have shown best overall responses when carpramid was banded at planting, followed by additional applications at sidedressing or through fertigation. Starter fertilizer and topdressed applications have been effective for winter wheat.

Winter 1998

Carpramid or AmiSorb used in these trials is a synthetic thermal protein produced from the amino acid aspartic acid. Characteristics of the anionic polymer include its high cation exchange capacity arising from the carboxyl groups of amino acid molecules, approximately 300 milliequivalents/100 grams of the 40 percent active ingredient liquid formulation. Molecular weight is approximately 5,000.

Crops responding to fluid fertilizers in combination with this carpramid are summarized below.

Corn

Illinois. In a 1997 Illinois study,

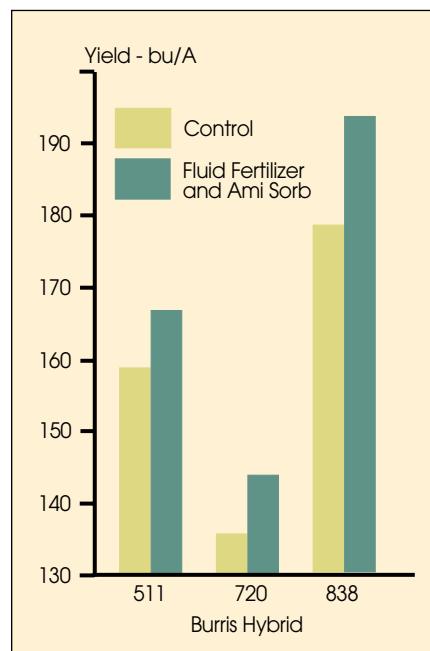


Figure 1. Corn hybrid responses to fluid starter in combination with 1 qt/A of carpramid, Illinois, Behymer Crop Consulting.

fluid starters in combination with carpramid showed yield increases as high as 14.2 bu/A (Figure 1). The study also included comparison of three hybrids. All plots received fluid starter at the per-acre rate of 20 N + 20 P₂O₅ + 7 K₂O + 1 qt chelated Zn. Rate of the carpramid was 1 qt/A with the starter.

Kansas. Fluid starter was used with carpramid in an irrigated, ridge-tilt study in Kansas. The carpramid was included at the rates of 1 and 2 qts/A in a fluid starter with a high N:P₂O₅ ratio. One quart of the carpramid in the starter, placed two inches to the side and two inches below the seed at planting, produced no yield increase.

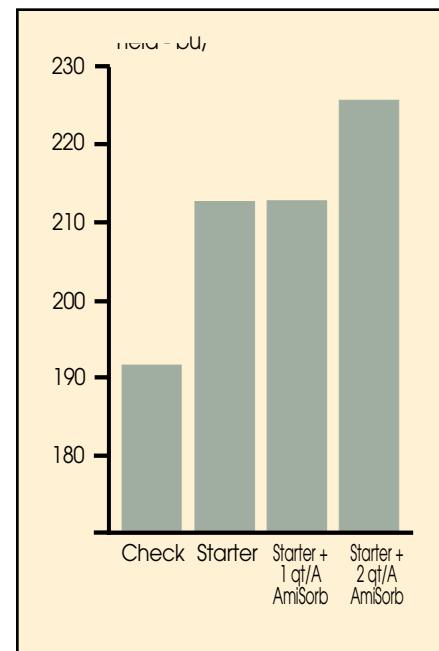


Figure 2. Corn yield responses to fluid starter in combination with carpramid, Gordon, Kansas State University.

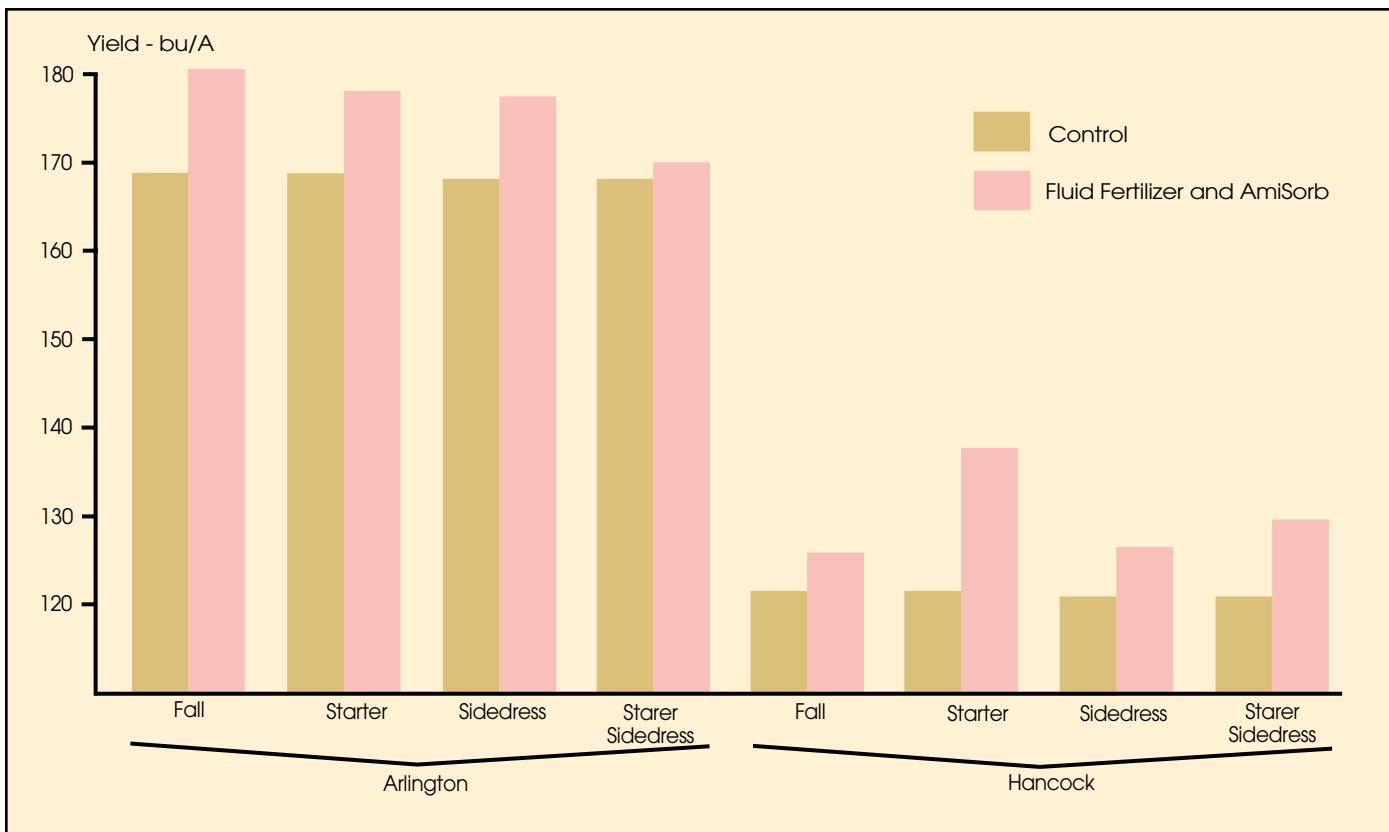


Figure 3. Corn yield responses to varying seasonal applications of fluids in combination with carpramid, Oplinger, University of Wisconsin.

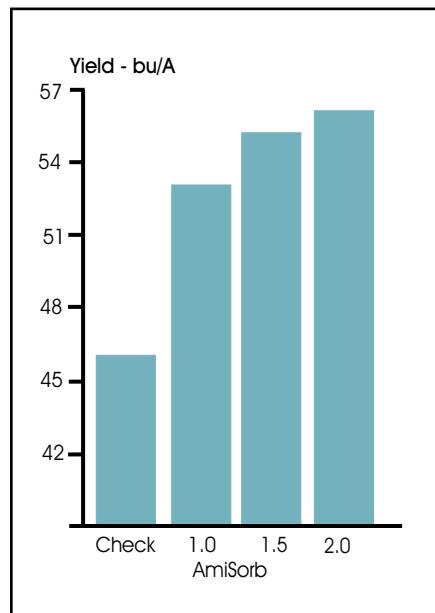


Figure 4. Hard red winter wheat response to nitrogen solution in combination with carpramid, Thompson, Kansas State University.

However, a yield increase of 13 bu/A was produced over the starter alone at the 2-quart rate (Figure 2). Nitrogen and P uptake by the plant at the 2-qt/A rate at the 6-leaf stage both increased

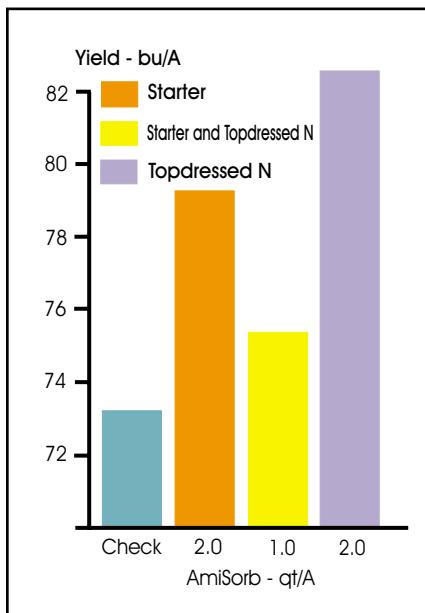


Figure 5. Soft red winter wheat response to fluid fertilizers in combination with carpramid, Mulford, University of Maryland.

significantly. Starter applied was a mixture of UAN and 10-34-0 (30 lbs N, 30 lbs P₂O₅/A). Soil was a Crete silty clay loam and was high in P.

Maryland. A fluid starter

containing N, P, and K placed 2 by 2 at planting included a mixture of carpramid (1 qt/A) in a corn experiment conducted in Maryland. The combination produced a yield increase of just over 12 bu/A. A second study evaluated 2 qts/A of the product in a sidedress application of UAN broadcast at the rate of 120 lbs/A of N when corn was at the 4- to 6-leaf stage. The combination produced a yield increase of approximately 5 bu/A.

Wisconsin. Carpramid was used in combination with fluids in fall, starter, sidedress, and split starter/sidedress applications in trials conducted at two locations in Wisconsin. As can be seen in Figure 3, the starter-alone application at the Hancock site produced the highest yield increase of 17.6 bu/A. Soils were a Piano silt loam at Arlington and a Plainfield sand at Hancock.

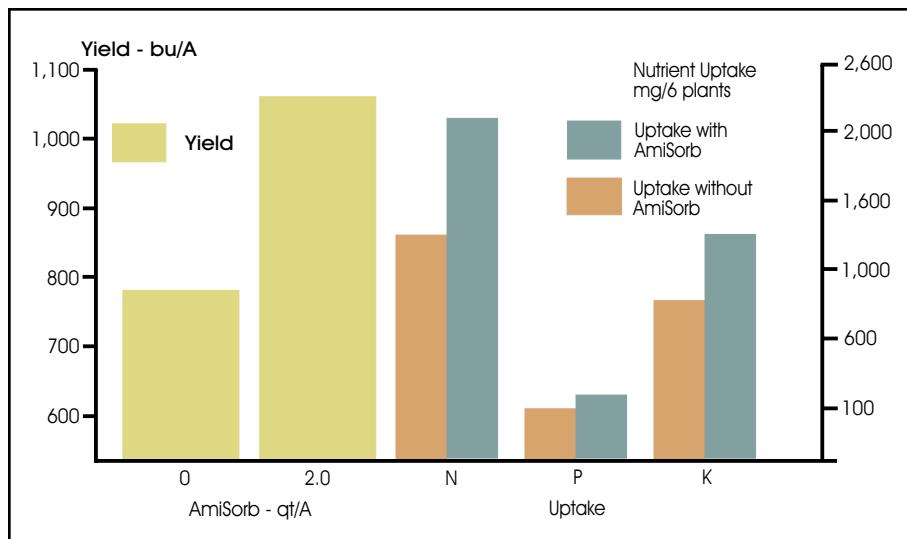


Figure 6. Cotton yield and plant nutrient uptake response to fluid starter in combination with 2 qts/A of carpramid.

Wheat

Kansas. Fluids in combination with carpramid have shown more consistent yield responses with winter wheat in Kansas. Applications with both fluid starters and with topdressed UAN have been effective. Studies across seven locations in central Kansas produced hard red winter wheat yield increases ranging from no significant responses to 19 bu/A, with most consistent responses occurring when the carpramid was applied with topdressed UAN. Average yields over the seven sites using different rates are shown in Figure 4. UAN was applied at 20 lbs/A of N. Soils at the sites were generally calcareous silt loams with organic matter content ranging from 1.1 to 1.3 percent. However, at some other locations responses were not significant.

Maryland. Soft red winter wheat responses in 1997 studies were also good (Figure 5), although all studies did not report significant yield increases using the carpramid at varying rates with an NPKS liquid starter or topdressed UAN. Note the better response was the 2-qt/A rate in

combination with topdressed UAN. Advancement in maturity by 3 to 4 days also has been observed—important where double-cropped soybeans are to follow wheat. The UAN was banded on 10-inch centers.

Cotton

Louisiana. Fluid starter banded in combination with 2 qts/A of carpramid had a positive effect on uptake of N, P, and K, increasing lint yield significantly (Figure 6).

Mississippi. A 4-qt/A rate in combination with a fluid fertilizer produced a 226-lb/A jump in lint yield at the Westfield Plantation near Lexington. In addition, approximately 15 percent more boils were open on September 9, emphasizing the effect of carpramid on advancing crop maturity.

Dr. Larry Murphy is vice president of research and D. Sanders is vice president of corporate development for Donlar Agricultural Products.