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Chloride Fertilization Bumps Wheat Yields, Profits

Kansas researchers report yield increases as high as 23 bu/A in three-year trails and double-digit dollars returns over 16 varieties.

Summary: *In our studies, chloride (Cl) fertilization consistently increased wheat grain yields, most dramatically at sites having lowest soil Cl levels. Chloride fertilization also consistently and significantly increased plant Cl concentrations in a high percentage of the varieties used in this study. Chloride deficiency symptoms varied in intensity between varieties but were eliminated by Cl applications. Yield increases as great as 23 bu/A were observed. Return on investment at two locations in 1998 averaged $16/A. Responses to Cl fertilization appear to be most likely when soil Cl levels (0-24 inches) are less than 20 lbs/A and/or plant Cl concentrations are less than 0.10 percent.*

Chloride was determined to be an essential nutrient in 1954. Chloride is required for photosynthesis and is important in moisture retention. Research has shown that chloride has an important role in suppression of fungal leaf and root diseases.

Chloride deficiency symptoms for crops are not well described because few have been observed under field conditions. Plants suffering from severe deficiency of Cl show symptoms of chlorosis. Leaf tips wilt followed by bronze coloration followed by necrosis. On first examination this can appear to be some sort of leaf disease. Leaf spot has been noted where soils were <1 ppm Cl. Damage was minimal when whole plant Cl at heading was >0.10 percent.

To further evaluate Cl fertilization/ wheat variety interactions, field studies were initiated in central Kansas from 1996 through 1998. Sixteen commonly grown winter wheat cultivars were seeded in early October of each year. Seeding rate was 75 lbs/A for all cultivars. Nitrogen and other needed nutrients were applied at levels sufficient for optimum wheat production. In February, chloride was topdressed at rate of 20 to 40 lbs/A as potassium chloride. Chloride can be applied preplant or topdressed. For winter wheat, topdressed applications may be most effective, particularly when leaching might occur through the winter. Potassium chloride, magnesium chloride and ammonium chloride comparisons indicate equal effectiveness. Magnesium chloride (fluid) won't mix with 10-34-0 but is readily compatible with UAN.

Response sigificant

Yield. Figure 1 shows the magnitude of crop response in 1998 at our Saline County site. Chloride applications of 20 lbs/A increased wheat yields as much as 19 bu/A.

At all sites, a high percentage of varieties in our studies responded

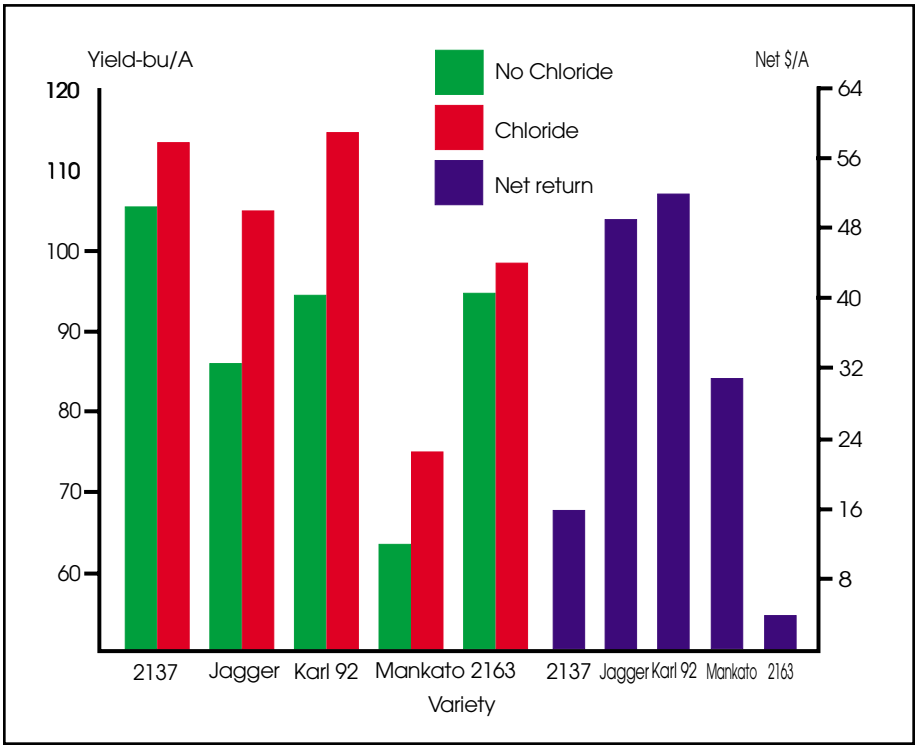

Figure 1. Wheat response to chloride applications and net return per acre in Saline County, showing selective varieties among 16, Lamond, et al., Kansas State University, 1998.

significantly to applied Cl. Varieties showing the greatest sensitivity to Cl deficiencies logically showed the greatest yield responses to applied Cl.

Yield responses did vary dramatically among varieties. Cimarron produced an additional 23 bu/A at a Marion County location in 1997, where soil Cl levels were very low at 7 lbs/A-2 ft. Leaf deficiency symptoms were pronounced. Twelve of 16 varieties responded significantly at that location that year. Conversely, where soil test Cl was higher at the Saline County location in 1997 (22 lbs/A-2ft), applied Cl had no effect on yield. Plant Cl concentrations were 0.29 percent.

The positive impact of Cl fertilization on wheat grain yield in these studies was apparently nutritional, since leaf disease pressure was low at every site.

Return per acre. Increased net return among the varieties in Figure 1 ranged from $4 to $52/A. Average of 16 varieties over both locations was $16/A, pricing Cl at $0.25/lb and wheat at $3/bu.

Chloride levels. Chloride fertilization significantly increased plant Cl concentrations each year for all varieties. Significant differences in plant Cl were noted between varieties both with and without Cl fertilization, suggesting varieties differ in Cl uptake. Lower soil Cl levels produced lowest plant Cl concentrations in all varieties, often less than 0.10 percent.

Catching on

Data continue to mount showing that Cl is a nutrient that can add wheat yield, cut production costs per bushel and increase profits where a good fertility program is already in place. Winter wheat, spring wheat and barley have responded to Cl fertilization from Texas to the Canadian Prairies and into the Pacific Northwest.

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