Texas Research

Chloride Promotes Wheat Health and Increases Yields

By Travis Miller

Chloride (Cl) is a sometimes misunderstood and controversial element in plant nutrition. In the past, only the potassium (K) in potash (KCl) received attention as an essential nutrient. As a result, in the Great Plains, Canadian Prairies and Southwest U.S. where K soil tests were high, it was felt that KCl was not needed. After years of removal by small grains and other crops, and no Cl fertilization, Cl deficiency is becoming a greater hindrance to wheat yields, as shown in this study.

A POSITIVE RESPONSE of wheat to Cl-bearing fertilizers has been documented in numerous locations in the U.S. and Canada. This response includes a classic nutrient response with a corresponding improvement in leaf color as well as a suppression of fungal diseases.

Improvements in grain yield are attributed to both a classical nutrient response and reduced injury from fungal diseases. In Texas, suppression of leaf rust and septoria leaf blotch have been observed. In other locations, Cl fertility has suppressed crop injury from take-all, tan spot, common root rot, fusarium root rot and stripe rust. The level of suppression of fungal disease and the degree of nutrient response vary with wheat variety, Cl levels in soils and irrigation water, severity of disease infestation and weather conditions.

Chloride Availability

Chloride deficiency is complicated by the mobility of the Cl ion, which is similar to the nitrate ion in solubility and mobility in soils. The lack of Cl-bearing minerals for replenishing this nutrient adds to the problem. Data from Kansas and other central Great Plains states indicate that in most years, fall preplant and/or spring topdress Cl applications are equally effective in suppressing diseases and increasing yields. In years with high winter rainfall, however, spring applied Cl applications are more effective because Cl can be leached out of the rooting zone with high precipitation.

Texas Studies

Due to heavy winter precipitation in the Blacklands and east Texas wheat growing areas, spring application of Cl appears to be more effective than preplant applications in terms of disease suppression and yield improvement. Data in **Table 1** show the effects of spring applied magnesium chloride ($MgCl_2$), ammonium chloride (NH_4Cl), and KCl with varying rates and application methods on wheat yields. Overall, the 40 lb/A Cl rate (either foliar or soil applied) produced an increase of about 8 to 12 bu/A. The 20 lb/A foliar rate of Cl as NH_4Cl also produced an 8 bu/A response.

Increasing rates of Cl from all sources suppressed septoria leaf spot infection. Photographs of the third leaf below the flag leaf were collected on April 13, 1993, at a location in Bosque County, TX. Note **Figures 1, 2 and 3** indicate increasing rates of Cl were effective in lowering the incidence of septoria and that the various

Table 1. Effect of spring applications of Cl sources on wheat yields.

Fertilizer sources	Cl rates, lb/A	Method of application	Grain yield, bu/A
Check	0	—	36
$MgCl_2$	10	Foliar	38
$MgCl_2$	20	Foliar	40
$MgCl_2$	40	Foliar	44
NH_4Cl	20	Foliar	44
NH_4Cl	40	Foliar	45
KCl	40	Soil	45
NH_4Cl	40	Soil	48

Data from Bosque County, TX.

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Cl sources were essentially equal in correcting Cl deficiency.

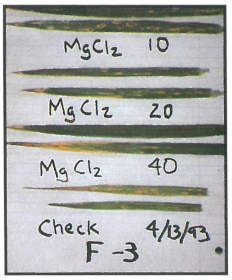


Figure 1. Effects of foliar $MgCl_2$ on septoria leaf spot with 10, 20 and 40 lb/A Cl rates compared to the check.

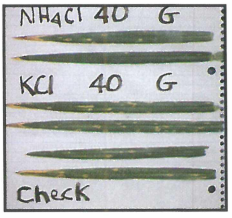


Figure 2. Effects of soil applied NH_4Cl and KCl at 40 lb/A Cl rates compared to the check.

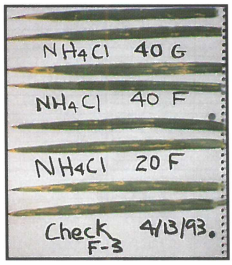
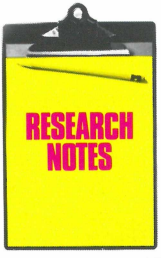


Figure 3. Effects of foliar and soil (G) applied NH_4Cl at 20 and 40 lb/A Cl rates compared to the check.

Conclusions

Texas studies continue to indicate that Cl fertilization on low Cl soils can have significant suppressive effects on fungal leaf diseases of wheat (leaf rust and septoria). Responses vary somewhat with variety, management and growing conditions. Grain yields have been significantly increased as a result of Cl application. Late winter or spring Cl applications appear to be more effective, probably due to leaching of Cl by winter precipitation. ■

Texas



Stand Dynamics and Yield Components of Alfalfa as Affected by Phosphorus Fertility

SCIENTISTS at Texas A&M, Beaumont, measured the effects of phosphorus (P) fertilization on alfalfa yield and stand components. The test soil, a Windthorst fine sandy loam, was low in P. Three preplant incorporated rates of P_2O_5 (0, 60 and 120 lb/A) and five annual surface broadcast rates (0, 15, 30, 60 and 120 lb/A) were applied to two field experiments.

Preplant incorporated P increased dry matter yields more efficiently than did broadcast P. Neither plant nor shoot densities were different among treatments. Researchers concluded that yield differences were a function of yield per shoot. Where no P was applied, root mass was concentrated in the upper 8 inches of soil. Where adequate P was available, root mass was distributed throughout the upper 16 to 20 inches. ■

Source: Sanderson, M.A. and R.M. Jones. 1993. Agron. J. 85:241-246.

New Color Slide Program Features Identification of Nutrient Disorders in Sugarcane

THE Potash & Phosphate Institute (PPI) has prepared a color slide set as a companion to the book *Sugarcane Nutrition*, published jointly by PPI, the Potash & Phosphate Institute of Canada (PPIC), and the Foundation for Agronomic Research (FAR) in 1991. The slide set consists of 69 color 35mm slides, with printed script.

The slide set serves as a visual guide to identification of plant nutrient disorders in sugarcane.

The color slide set with script is available at a cost of $40.00 plus shipping. Discounts are available for quantity purchases and for members of PPI, contributors to FAR, and to university and government agencies.

For additional information or to place an order, contact: Circulation Department, PPI, 655 Engineering Drive, Suite 110, Norcross, GA 30092; phone (404) 447-0335, fax (404) 448-0439. ■