2010 NUTRIENT WATCH LIST

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Introduction

Nitrogen is a very important nutrient for corn production and agronomists invest a lot of time in determining an appropriate application rate/time, assessing N credits from manure and legumes, and worrying about N losses. All aspects of N management impact profitability and environmental quality. Phosphorus is another agronomically important nutrient, which, in recent years, has become a driving force in nutrient management plans. So much focus is placed on N and P, that at times, other nutrients may not be given adequate attention. The goal of this paper is to highlight two nutrients, which will likely have increasing agronomic importance in Wisconsin cropping systems.

Potassium

It should come as no surprise that potassium is on the 2010 Watch List. While potash prices today are substantially less than a year ago, potash prices are still approximately four times greater than ten years ago. A direct result of high potash prices is reduced or eliminated application rates. In 2009, 40 and 41% of alfalfa samples submitted as abnormal and normal in appearance, respectively, for plant analysis at the UW Soil and Plant Analysis Lab (SPAL) were below optimum in K concentration. Low concentrations of alfalfa tissue K occurred in 17 and 14% of samples submitted as abnormal and normal, respectively, in 2008. Of all corn samples submitted for plant analysis 18 and 14% were low in K in 2009 and 2008, respectively. These data suggest that K is becoming a bigger problem in alfalfa and corn. In addition, there have been increasing observations of K deficiency in soybean throughout Wisconsin.

Potassium deficiency is characterized by yellowing of leaf margins on older leaves of corn and soybean, and yellow dots on alfalfa leaf margins. Photos 1, 2, and 3 depict K deficiency in alfalfa, corn, and soybean. Remind growers that K is an essential macro-nutrient and it should not be ignored to for many years. Potassium deficiency will result in yield loss, and for alfalfa reduces stand persistence. For growers in cash limited situations that have manure, work with them to determine how best to allocate the K in manure between fields.

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Photo 1. Potassium deficiency in alfalfa. Photo credits: E. Birschbach.

Photo 2. Potassium deficiency in corn. Photo credits: R. Wolkowski


Photo 3. Potassium deficiency in soybean. Photo credits: C.A.M. Laboski

Sulfur

The second nutrient on the 2010 Watch List is sulfur. Historically, Wisconsin has had a "free" source of S for crop production. That source was atmospheric deposition of sulfate, which was a result of industrial air pollution. Since the passage of the Clean Air Act in 1970, S emissions have been reduced. Figure 1 shows sulfate deposition in 1985 while Figure 2 shows sulfate deposition in 2008. There has been a substantial reduction in S deposition over Wisconsin in the past 20+ years and this may impact the need for S fertilization in the future. In fact, 85% of alfalfa tissues samples submitted to SPAL as abnormal in 2009 were low in S; while 44% of the normal samples were low in S. A similar trend occurred in 2008 where 67% of abnormal and 39% of normal alfalfa samples were low in S. Less than 10% of all corn samples were low in S over the same time period.

Sulfur deficiency in alfalfa appears as a yellowing of newer growth along with stunted growth (Photo 4). In corn S deficiency results in general yellowing of the foliage with newer leaves being lighter in color and perhaps also having interveinal chlorosis (Photo 5). Symptomology of S deficiency in soybean is similar to alfalfa (Photo 6). Sulfur deficiency is more likely to be observed on fields with low organic matter, several years since the last manure application, and soils with low subsoil sulfur. Past Wisconsin research found that when sulfur is deficient, application of 25 lb S/a could increase alfalfa yields 0.1 to 0.5 tons/a (Kelling et al., 2002), making application of S economically beneficial.

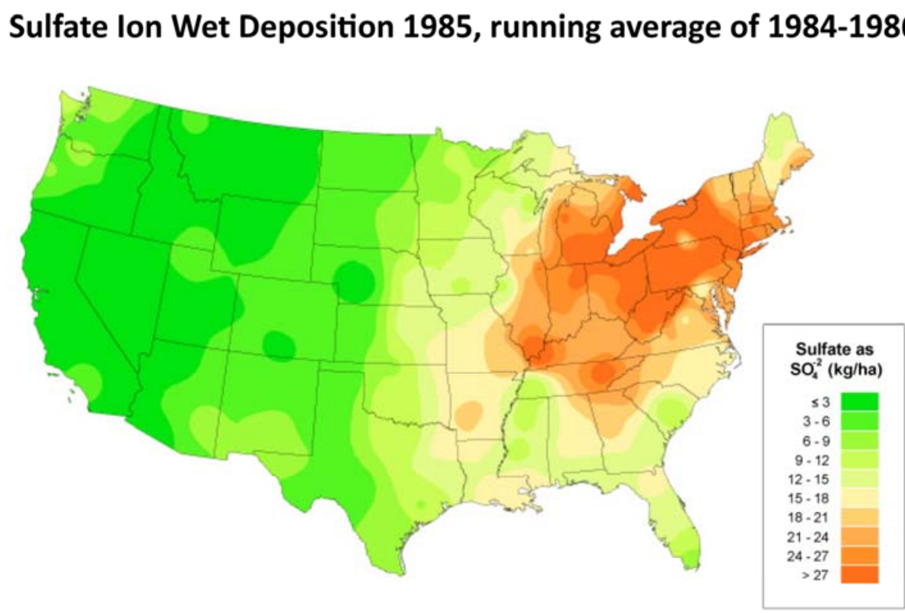

Figure 1. Sulfate ion wet deposition in 1985, presented as a running average of 1984-1986.

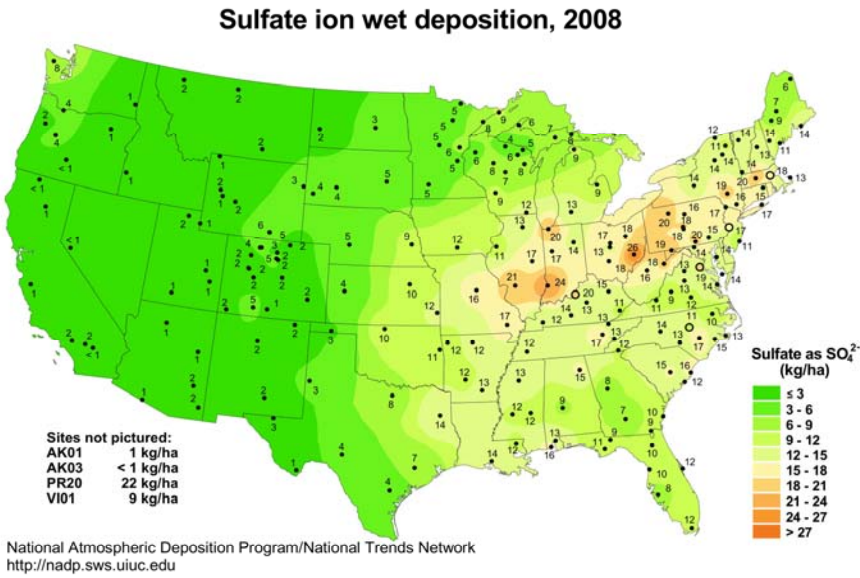

Figure 2. Sulfate ion wet deposition in 2008.

Photo 4. Sulfur deficiency in alfalfa (left). Photo credits: Montana State Univ.

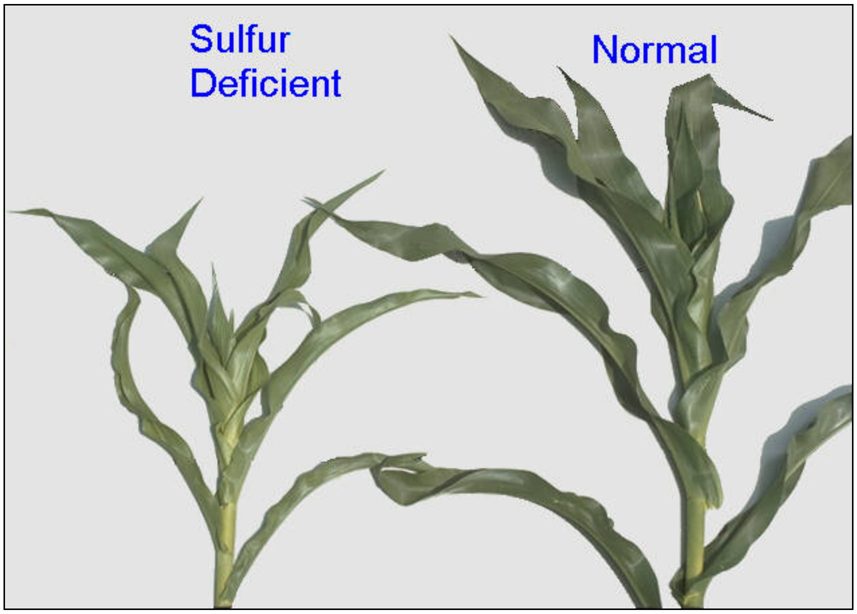

Photo 5. Sulfur deficiency in corn. Photo credits: R. Hoeft

Photo 6. Sulfur deficiency in soybean. Photo credits: Better Crops 1997. Vol. 81 (3):8-13.

Summary

Sound nutrient management planning requires that all nutrients, not just nitrogen and phosphorus, are managed to ensure long term farm profitability. Potassium and sulfur are two nutrients that may be limiting crop yield now and in the future. Use soil and tissue analysis to determine fields that may benefit from application of these two nutrients.

References

Kelling, K.A., P.E. SPeth, and S. van Wychen. 2002. Sulfur responses and the Wisconsin alfalfa sulfur survey. Proc. of the North Central Extension-Industry Soil Fertility Conf., Des Moines, IA. 18:53-59.