

NEWS & VIEWS

A regional newsletter published by the
Potash & Phosphate Institute (PPI) and the
Potash & Phosphate Institute of Canada (PPIC)

California and Arizona
Dr. A.E. (Al) Ludwick,
Western Director
April 1998

Fertilizing after El Niño

WINTER RAINS will pass and we will bid a not-so-fond farewell to El Niño. So as spring approaches we can return to business as usual...or maybe not. Record rainfall will have an impact into the coming season and beyond. The immediate damage to trees, vines and winter vegetables is obvious as is field damage caused by erosion. But there are also negative effects of wet soils and flooding that are not so visible.

How were soils impacted and what does this mean to future crops? Growers, crop consultants, and fertilizer dealers need to understand how flooding affects their fertilizer management decisions for 1998.

Nitrogen

Do not expect much nitrate (NO_3^-) to be left in the soil profile. Whatever was present in the fall most assuredly has been leached from the crop's rooting zone or denitrified (lost to the air as a gas). Either way more nitrogen (N) fertilizer will be required than normal to obtain expected yield levels.

The ammonium form of N (NH_4^+) is not denitrified, nor is it lost by leaching in all but very sandy ground. So some fall applied fertilizer N may have survived the heavy rains. The question is, had the applied NH_4^+ (anhydrous ammonia, aqua ammonia, urea, urea-ammonium nitrate solution, etc.) had sufficient time for significant quantities to be converted to nitrate before the soils became saturated? Time and temperature are important to this answer ... more time and higher temperature mean more of the NH_4^+ had been converted to NO_3^- . Since soil temperatures were warmer in October and November than in December, more N may have been lost by denitrification with earlier applications. If 3 or 4 weeks elapsed from the time of fertilizer application

to waterlogged conditions with soil temperatures mostly above 50° F., probably 50 percent to all of it was lost.

Another source of N comes for crop residues and soil organic matter. Nitrogen is released as these materials decompose. The prolonged wet conditions will slow the decomposition process, so this source too will provide less than usual amounts of N for crop use.

Testing for residual nitrate in the profile is an especially good idea this year. Consult your soil testing laboratory for sampling details. Sample the whole rooting zone to obtain the complete picture.

Phosphorus

Phosphorus (P) does not leach from soil as does NO_3^- , but is lost through erosion of fertile top soil. Also, reduced microbial activity and chemical transformations in saturated soils reduce P availability.

Most crops have a beneficial fungus...called *mycorrhizae* ...colonizing their root system. This fungus enhances P absorption by crop roots. Mycorrhizae are often depressed after flooding, resulting in severe P deficiency in following crops. Mycorrhizae also influence plants' abilities to take up zinc (Zn).

Prolonged water logging of soils causes several physical, chemical and biological changes, some of which are not necessarily reversible. Phosphorus availability to plants is affected by reactions with iron (Fe) and manganese (Mn), both of which are made more reactive by water-logging. As soils dry out, the forms of Fe and Mn phosphates change, but the P availability remains low.

Slower organic matter decomposition, as mentioned for N, will also supply less P than usual. And finally, eroded



Agronomic market development information provided by:

**Dr. A.E. (Al) Ludwick, Western Director,
Potash & Phosphate Institute (PPI)
P.O. Box 970, Bodega Bay, CA 94923
Phone: (707) 875-2163
E-mail: aludwick@ppi-far.com**



soils offer additional problems in that the organic matter content will be lower, accentuating potential for P deficiency.

Soil testing for available P is a generally reliable guide, at least with the Olsen bicarbonate test commonly used in the west. However, P deficiency may be more severe or more difficult to correct than in drier years. Higher rates of P fertilizer and additional starter P are suggested to help overcome these conditions. Banding P to maximize its concentration in the root zone could be especially effective this year.

Potassium

Soils over the winter will not directly affect potassium (K) availability. The exceptions are some K was undoubtedly lost through leaching of sandy soils and some was lost from erosion of top soil.

There is a problem yet waiting to happen. Reduced K availability will result when anxious growers return to their fields and attempt to work them while too wet...causing compaction. Compaction reduces availability of K (and other nutrients) to plants. This is compounded by cool, wet conditions contributing to poor root development.

Besides the obvious nutritional benefit of supplying K in adequate amounts, K also enhances the crop's ability to resist disease. It could be especially important to build up soil K for perennials weakened by prolonged saturated

conditions and especially prone to development of disease problems.

Soil testing will indicate a potential problem of K in soils that have been waterlogged for long periods and eroded. Besides rebuilding soil test levels on leached soils, starter K is particularly beneficial when soils are compacted, wet and/or cold.

Summary

There is no doubt that the 1998 season will offer many challenges for nutrient management on soils damaged by prolonged water logging, flooding and erosion. It may be a cliché, but it is so true: *A fertile soil is not always a productive soil, but a productive soil is always a fertile soil.* Right now a lot of fields are going into the 1998 cropping season with less fertility than they have experienced in many years. So don't get caught short. Past experience tells us that a program of balanced fertilizer inputs will likely give excellent returns. Don't forget to consider secondary and micronutrient needs as determined by soil testing. Nutrient management will need special consideration as we recover from the winter of 1997-1998. ■

Author's note: *Some of you may recognize similarities of this to a News & Views topic that was printed entitled **Fertilizing After the Floods**. Times may change, but scientific principles do not. The information was accurate then and it is accurate now. Best wishes for a successful new season.*

RN 98068

NEWS & VIEWS

Western Region
April 1998



Potash & Phosphate Institute (PPI)
655 Engineering Drive, Suite 110
Norcross, GA 30092-2837

BULK RATE
U.S. POSTAGE
PAID
Atlanta, GA 30329
Permit No. 1355