

TECHNICAL NOTES

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NITROGEN FERTILIZATION OF WHEAT AND USE OF STARTER FERTILIZERS

On the next page is an article on "Crop Nutrient News" that appeared in the March 1985 issue of Agribusiness Fieldman. It was written by Robert C. Dixon, a certified professional agronomist from Stockton, California.

Some of the important statements are marked by // lines. The 3.5 pounds of N uptake per CWT of wheat yield can be used in conjunction with the estimated yield potential or yield goal for a field to determine the pounds of N to apply.

Note the N:P ratio and preference for using the ammonium form of N in combination with P used in starter fertilizers and why banding near the seed gives good results.

Prepared by Walt Bunter, State Agronomist, Plant Science Staff, Soil Conservation Service, Davis, California.

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(Editor's Note: As you can see by the photograph at the top of this page, there's a new author of CROP NUTRIENT NEWS, Robert C. Dixon, a certified professional agronomist who works out of Stockton, Calif. Bob has worked in Western agriculture for more than 26 years in sales, marketing and industrial agronomy. He is a graduate of University of California, Davis with a degree in agronomy with emphasis in soils and plant nutrition. He also is a licensed California Agricultural Pest Control Advisor.

Bob is an excellent writer and photographer and has authored or co-authored a number of trade journal articles and numerous fertilizer-use and plant nutrient management papers. If you have any questions or comments about Bob's articles, drop him a note either through the magazine or directly to him at 2719 Sheridan Way, Stockton, CA 95207.)

Consider Nitrogen

The nutrient most frequently lacking for high wheat yield and quality is nitrogen. Varieties grown in California take up to 3.5 pounds of N per 100 pounds of grain yield (including straw), depending on the availability of moisture late in the season. Dryland grain often has a higher protein content and may contain N close to 3.5 pounds. Nitrogen is vital for building plant protein.

Top Dressing A Must

According to the Potash and Phosphate Institute, wheat takes up 68 percent of its nitrogen by its boot stage. Greatest daily uptake—2.5 pounds N per acre per day—occurs between boot and milk stages when wheat takes up 32 percent of its N. This makes nitrogen top dressing a critical input. Maximum uptake of a three-ton per acre crop is on the order of 195 pounds of N per acre. However, requirements for nitrogen fertilization can vary greatly. It all depends on yield and quality goals, moisture supply and levels of residual nitrogen already in the soil. In fact, nutrient management with a sharp eye on nitrogen is one of the keys to success.

New Dimension in Testing

Taking cues from England, West Germany and New Zealand, re-

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By Robert C. Dixon
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searchers Stuart Pettygrove of University of California, Davis and John Hart, California State University, Chico, report a new dimension in diagnostic techniques for nitrogen management in wheat.

The technique uses a small square of paper fixed to a plastic strip. The paper is pre-treated with special dye and a compound which reduces plant sap nitrate to nitrite. Using the bottom two inches of stem at full tillering to first joint stage, a small amount of sap is squeezed on to the test paper. A red-violet color is produced in the presence of nitrite. The time to reach "full color" is measured in seconds and compared to a color standard to determine if a top dressing of nitrogen is needed. A time of 20 seconds or longer to reach "full color" is equivalent to 4,000 ppm or less of stem nitrate-N. At this level, a nitrogen top dressing is definitely needed. The top dress must be made before stem elongation.

Critical levels of nitrate-N have been determined for Anza and Yolo wheat varieties. The critical level for another popular California wheat, Yecora Rojo, is yet to be established.

In some situations, a more accurate and precise laboratory analysis may be needed. However, the rapid field test can provide immediate readings if rapidly changing weather is forcing a go or no-go decision to top dress the N. The strips cost about 35 cents each. Also, be aware that in addition to the inherent limitations found in all quick test methods, the strips have a limited shelf life if exposed to heat and/or moisture.

The strips are available from VWR Scientific in San Francisco. They're called EM Science Nitrate Strips.

Seedling Punch, Power

Early plantings of tomatoes and sugar beets often face low temperatures and high moisture levels in

seed beds. This is particularly true in the northern end of the state, both in the interior valleys and coastal areas.

Research and field experience continues to support the use of starter fertilizers containing both nitrogen and phosphorus. Early work at Purdue University proved conclusively three basic agronomic principles; 1. Nitrogen and phosphorus must be in close association with each other for maximum uptake of phosphorus and rapid root development; 2. A ratio of about one pound of N to each three to five pounds of phosphate seems ideal and 3. positive interaction between N and P is favored by the ammonium form of nitrogen.

Why Fertilizer Phosphorus?

—Cool and/or wet soils restrict the release of natural soil phosphates.

—By the time 20 percent of plant growth has occurred, 50 percent of the total plant phosphorus is taken up.

—Small rootlets often do not explore a sufficient volume of soil to satisfy the early phosphorous demand of seedling plants.

—Phosphorus encourages vigorous, early growth to quickly push roots through zones of soil applied herbicides while helping to minimize loss to seedling diseases. We've all seen this in the field.

It is frequently seen that a crop will have a dramatic growth response to added P early in the season, but at harvesttime there is no measurable yield increase. There is only speculation as to why this happens and more research is needed. Although Mother Nature may occasionally pitch an unexplained curve ball, the punch and power given to early plant growth is still undeniable. The use of N-P starter fertilizer still remains a widely practiced input to a profitable, higher yielding crop. □

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