

of N increase yield and protein. Rates of N above those required to achieve maximum yield, while continuing to increase protein, may begin to decrease yield.

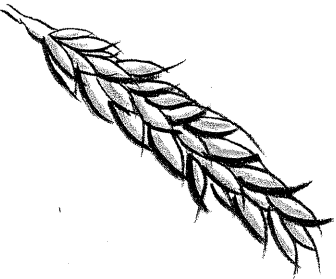
\* For hard red winter wheat, the amount of N necessary to achieve a protein goal of 11.5 percent is at or somewhat above that necessary to achieve maximum yield. This is why an accurate estimate of yield is critical to achieve a protein goal of 11.5 percent.

\* Most of the N required by wheat is taken up during vegetative growth (before flowering) and used to establish yield potential (the number of heads and kernels per head). Vegetative N is later transported to the kernels to form protein during grain filling. Early season N availability is critical for yield and a moderate level of grain protein.

\* Additional N taken up by wheat after flowering is used primarily to increase grain protein content. Ensuring that some N is available to wheat late in the season in active rooting regions of the soil profile is critical to reaching the final protein goal.

\* The availability of N at key times during the growing season is as important as the total amount of N available in reaching hard red winter wheat yield and protein goals. Inadequate N during vegetative growth can limit yield. In dryland situations, N stranded near the soil surface when soil dries will not be available for uptake by the plant and protein formation late in the growing season.

\* Sulfur (S) is also important to protein formation in hard wheat. The application of 1 lb S for each 5 lbs N up to 25 lb S/acre is a common practice for hard wheat.



## HARD RED WINTER WHEAT

# NITROGEN & PROTEIN

## MANAGEMENT GUIDE



