

THE EFFECTS OF N-SOURCE ON YIELD IN FOUR WINTER WHEATS AND A TRITICALE

Gary Banowetz and Dale Coats

The form of nitrogen (N-source) applied to wheat can affect crop yield. Cultivar differences in the response to N-source have been documented in many crops. Certain cultivars seem more adapted to nitrate-N compared to ammonium-N, others provide higher yields in response to ammonium-N or to mixed N (fertilizers that contain both nitrate- and ammonium-N). Interest in the effects of N-source on yield in wheat stems from both economic and environmental factors. Ammonium-N is tightly bound by the top few inches of soil and may remain available to plant roots for an extended period of time. Nitrate-N is not tightly bound and consequently is subject to leaching through the soil. This leaching represents a loss of available nitrogen to the plants and a possible source of ground water contamination. The capacity of a specific cultivar to use either ammonium-N or nitrate-N is dependent upon nitrogen uptake and metabolic mechanisms.

Yield responses of four winter wheats (including one club wheat) and a triticale to N-source are being studied. The first year of the study (1991-1992), which used a single fall application of either urea, calcium nitrate, ammonium sulfate or ammonium nitrate, showed no significant differences in yield attributed to N-source. In the second year of the study (1992-1993), a second fertilizer application in the spring was added. Significant differences were noted in both Yamhill and Malcolm. Malcolm yields were highest in plots that received ammonium nitrate, a mixed N-source, while Yamhill yields were highest in plots that received calcium nitrate.

Yields were significantly higher during the second year of the trial, possibly in response to the split application of nitrogen. Soil analyses of plots of Stephens wheat (four replications per N-treatment) conducted just prior to the second fertilizer application indicated that soil nitrogen levels were highest in ammonium-fertilized plots and lowest in plots receiving only nitrate-N. Additionally, as expected, ammonium levels remained highest in the top 4 inches of soil. The trend of nitrate levels suggested higher levels at greater depths.

Protein and 1000-seed weight responses to N-form also are being monitored during the course of this study. No significant differences in either were noted in the first year of the study. This study is being conducted for a third year and again will use a split application of nitrogen. Soil nitrogen levels and specific yield components will be monitored during wheat development and after crop harvest.