

Excessive Moisture, Climatic Stress, and Foliar Nutrition

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THE ENVIRONMENTAL FACTOR

Environmental factors play a dominant role in crop production throughout the world. This is why crops that thrive in certain areas cannot be grown successfully in other areas. Yet even within the preferred growing area for crops, seasonal weather patterns and extremes still have a profound impact on crop performance.

One plant growth factor affected by weather that we have an opportunity to manage is crop nutrition. Early season environmental conditions including low temperatures and excess moisture impose nutritional stresses on crops. These stresses are the result of several possible outcomes:

- Leaching losses of pre-plant nitrogen
- Denitrification of nitrate in the root zone to nitrogen gas that is then lost to the atmosphere
- Reduced soil phosphate availability due to cold soils
- Reduced root growth and activity from low temperatures and reduced soil oxygen levels meaning less soil explored by young plants and reduced nutrient uptake

Collectively, plants may suffer during critical early season growth periods from inadequate nutrition despite aggressive, well-planned soil fertility programs.

ROLE OF FOLIAR NUTRITION

Low rates of essential nutrients applied directly to plant foliage during critical growth periods may be beneficial. Foliar nutrient applications should always be based on sound agronomic principle and with a specific goal or objective in mind. As such, foliar nutrition can be a very useful tool for supplementing soil fertility programs especially when soil or weather conditions are hostile to nutrient availability/uptake.

NDEMAND® 30L INCREASES YIELD

For grain crops there is a distinct early season requirement for both nitrogen and phosphorus that contributes greatly to the crops' final yield potential. Environmentally induced nutrient stresses can lead to decreased yields. Foliar nutrition can compensate for some of this loss and actually elevate yields.

Before and after applications of 1 gallon NDemand 30L on stressed barley in Eastern Montana. ►



BEFORE



98 HOURS AFTER

NDemand 30L has an extremely low salt index and is immediately absorbed and converted into plant amines and proteins to head off yield-limiting nitrogen deficiencies.



NDSU SMALL GRAINS STUDY

The data in the table below is from research conducted in 2009 by NDSU near Minot, ND. Here two gallons per acre of NDemand 30L polymer nitrogen (30-0-0) was compared to the standard spring top-dress of 20 gpa soil applied UAN 28 and no spring top-dress. Soil conditions were very wet and likely accounted for a substantial loss of soil applied N.

Treatment	Yield (bu/ac)	Test Wt. (lb/bu)	Protein %
Control	60.2	62.5	11.7
NDemand 30L 2 gpa Early Joint	72.2	62.7	11.7
UAN 28% 20 gpa Early Joint	70.9	62.8	11.9

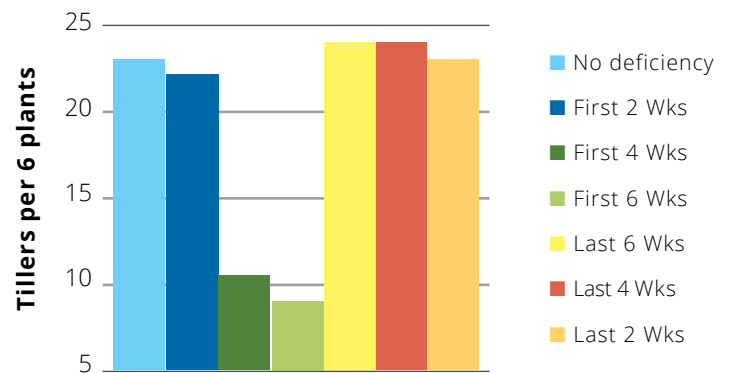
Under the conditions of this study, the two-gallon foliar NDemand 30L rate at early joint was as effective as the 20-gallon soil applied UAN 28 treatment. Both significantly outperformed the no top-dress treatment. Though this is an extreme response (6 lb foliar N = 60 lb soil N) and not what would typically result, this clearly illustrates the potential benefit of well-timed foliar NDemand 30L application during a wet spring. Wilbur-Ellis does not advocate replacing soil applied top-dress N with foliar NDemand 30L but rather use this valuable tool to enhance good soil fertility practices.

NDSU BARLEY STUDY

During the spring of 2008 another NDSU study near Valley City, ND, on malting barley was conducted comparing two gallons of NDemand 30L to no foliar treatment. Yield was increased by 8 bu/ac, test weight was elevated ¼ lb per bushel, and plump scores increased by nearly three points compared to the no foliar treatment.

ROLE OF EARLY SEASON PHOSPHORUS

Impact of length and timing of P removal in 10-week growth period on tiller production in wheat



Boatwright and Viets 1966

The chart above presents data illustrating the effect of limited P availability on tiller formation in wheat. As can clearly be seen, reduced P availability during the first 4-6 weeks of growth profoundly limits tiller formation and ultimately yield. Foliar phosphate applications present an avenue to help address this need and should be considered under cold spring conditions and on high pH soils.

PROPER PHOSPHATE NUTRITION



Proper phosphate nutrition (left) compared to untreated wheat (right)

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