

Questions and answers about the N-min test to predict spring N rate for soft white winter wheat grown in western Oregon

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Results, Rotations, and N Rates

Q- Why are the same results returned every time I use the N-min test?

A- The nitrogen status or ability of your fields to supply N is the same. A similar result from the N-min test or spring N recommendation is common when the rotation or preceding crop is the same from year to year or field to field. A similar and low spring N recommendation is common when wheat is planted after grass grown for seed. More variability is likely to occur when the preceding crop is a legume.

Q- Will the N-min test provide adequate spring N recommendations for new varieties that produce yields over 150 bu/a?

A – Yes. During the test calibration process, many fields yielded 150 bu/a. Since then, the test has been validated on other fields across the valley that have yielded over 150 bu/a. Recently, the test worked in OSU variety plots where varieties were producing over 170 bu/a. The test should continue to be evaluated as higher yielding varieties are developed.

Q- I used the N-min soil test after clover. A neighbor did also. We have different spring N rates from the test. Shouldn't the N rate be the same?

A- Differing spring N rates from the N-min test after clover are not surprising. Look at figure 1 in *“Using the Nitrogen Mineralization Soil Test to Predict Spring Fertilizer N Rate”*. When clover was the crop preceding wheat, the N-min soil test varied more than for other crops. The value of the N-min test is that by measuring the N capacity of the soil, it reduces management “surprises” such as lodging from oversupply of N or reduced yield from under application of N. In addition, your management may differ from your neighbor's. Management and crops planted before the clover (or other legumes) influence the N available to the current crop.

Q- Does N-min work for wheat after wheat?

A- Yes. Although wheat after wheat was not a rotation in which the test was calibrated, we can think of no reason the test will not adequately measure N supply for successive wheat crops. Wheat following wheat is a rotation that was not used 10 years ago but is currently becoming common. The N-min test has been successfully used in a wheat/wheat rotation in recent years.

Q- I apply 130 lb N/a/year to my wheat crop and I am happy with the yield. Why should I use the N-min test?

A- Maximizing profitability is the reason. You may be applying more N than needed. If you plant wheat after a grass seed crop, you are likely to need only 80 lb N/a. Application of 130 lb/a is an unneeded expense of 50 lb N/a. Unexpected lodging can be avoided by using the N-min test. Conversely, in a few situations, you may be short of N for top yield. For example, if you plant wheat after oats, or in an unusual rotation such as after Christmas trees or caneberries, soil supplied N will be less. A rate higher than 130 lb N/a will likely be needed.

Q- The N-min test recommended only 80 lb N/a. I have never used this low of a rate. How do I know that I did not undersupply my crop?

A- Check grain protein. Growers routinely receive grain protein data when wheat is sold. Use this data as a “report card” to check adequacy of N fertilizer rate. When wheat yield is more than 80 bu/a, maximum economic yield is associated with grain protein concentration between 8.5 and 10.5 percent. Grain protein less than 8.0 percent suggests that N was inadequate. Grain protein greater than 10.5 percent suggests that N may have been excessive or that yield was limited by a factor other than N.

Q- Last year, I checked grain protein after harvest on several fields where the spring N rate was determined by using the N-min test. The grain protein was between 7.5 and 8.0 percent. Does the low protein mean that I undersupplied N and gave up yield?

A – Abnormally wet or dry grain fill periods can easily change grain protein by 0.5 -1.0 percent. In years where the grain fill period is extended due to late moisture into May or early June, grain protein will likely be lower than expected. Lower than expected protein does not necessarily mean that N was undersupplied or that yield was sacrificed. If the opposite occurred and moisture were limiting, grain protein would likely be high. When utilizing protein as a “report card” be aware of what the weather conditions were during grain fill and use that information to interpret the success of your N management program.

Q- I used the N-min test. In the field corners and some other places where the fertilizer was double applied, the wheat is much greener than the rest of the field. I think the N-min shorted the rate for the field. How can I tell if enough N was applied to the field?

A- Plant color does not always indicate if a crop was adequately supplied with N. As stated in the previous Q and A, check grain protein at harvest to determine if N was adequate for the wheat crop.

Q- The recommendation table in the N-min guide shows I should apply 180 lb N/a. I have never used this much. Do I need to use the amount that the table tells me to?

A- The first “rule” for using the N-min test is to retain your experience. If you have used a lower rate and not changed rotation, are satisfied with yield, and monitored grain protein, try a strip with the recommended rate. The high spring N rate has been needed when wheat follows oats, wheat, or other crops that provide little N. Sometimes when clover or another legume is grown before wheat, high spring N rates are needed. Check protein at harvest even if differential rates are not applied. See the answer above for more information about grain protein and spring N rate.

The N-min test’s strength is identification of N supply potential for wheat. A high N-min test indicates a high potential to supply N. Conversely, as in your situation, a low N-min test indicates little N will be supplied for the crop. The second part of any soil test is to make the test results into an application rate. In doing so, the results put many sites and situations in one table or graph. Crop growth doesn’t always follow our predictions. Use your experience while testing the N-min system. See the question about testing N-min for steps necessary to adequately evaluate the test with strips in a field.

Q –In one field, the soil is sandy. The PSNT for sweet corn is not advised for this soil. Should I use the N-min test for wheat in this field?

A- PSNT and N-min are quite different tests. N-min was tested on the Newburg series, a very sandy soil. It performed on this soil the same as it did for other soil types. You can use the N-min test for fields with sandy soil.

Q-I have a very gravelly field near Stayton. Can I use the N-min test there?

A-Gravelly soils present two problems. First, obtaining a representative sample is difficult due to the gravel. Second, some soil has sufficient gravel and cobbles to reduce the soil volume. Reduced soil volume means less soil from which N is supplied. Limited testing on gravelly soils provided mixed results. Proceed carefully when using the N-min soil test in fields with gravelly soil.

Q- I grow wheat after several vegetable crops. I use the N-min test and the test values are usually low. Why is N-min test low after vegetable crops?

A-Even though vegetable crops are grown on “good” or well drained soil, many of these crops have little residue for decomposition and supply of N for a subsequent wheat crop.

Q-How can I test N-min in my field?

A- If a trial to evaluate N-min is planned, use at least four treatments: (1) check or no spring N, (2) N-min rate, (3) N-min rate minus 40 to 50 lb N/a, and (4) N-min rate plus 40 to 50 lb N/a. Collect a soil sample from the treated area for N-min analysis rather than from the entire field. Sample collection from each area treated is ideal, but understandably not always practical. Place the treatment strips in a uniform area of the field, i.e. do not put one on a slope and another in a swale. Measure yield and collect a grain sample for protein determination. Replication is desirable but not always possible.

Sample collection, handling and laboratories

Q- What care should be given to soil samples after collection?

A- The most practical plan for most people is to refrigerate the samples and ship them to the laboratory as soon as possible. Refrigeration should begin in the field by placing samples in a cooled and insulated storage box (cooler) immediately after you are finished sampling. Before shipping samples, place “artificial ice” or another cooling material with the samples until reaching the laboratory. Wrapping the samples and cooling material with an insulating layer is recommended.

If the samples cannot be kept cool and shipped within 24 hours, freeze the samples as quickly as possible and deliver frozen to the laboratory.

Q- Why do directions in the OSU guide recommend drying as first choice for sample handling after collection?

A-Drying is the most reliable step to stop microbial changes.

Q- I sent my samples to several labs and do not have the same answer from any two labs. Which one should I use?

A- A laboratory using OSU methodology as described in the “*Using the Nitrogen Mineralization Soil Test to Predict Spring Fertilizer N Rate*” should be used. Find a laboratory using the method used by OSU to calibrate the test and send all samples to that laboratory. Sending samples to multiple laboratories is not recommended.

Q – Sampling – what happens if I cannot collect the sample in the last 2 weeks of January?

A- We recommend collecting N-min samples during the last 2 weeks of January for three reasons: (1) this is when the N-min test and N uptake are best correlated, (2) this time period is when there is the least amount of variability in the amount of mineralizable N that is measured and, (3) it can take up to 2 weeks for the lab analysis and spring N needs to be applied when the wheat plant reaches Feekes Growth Stage 5 which generally happens in late February.

If you cannot collect the sample during the last 2 week of January your N-min test values may not be accurate. Additionally, you may not receive the laboratory analysis in time to apply spring N at the recommended timing.

Q- This spring has been cold. How do I know the soil N measured by the test is available?

A- Wheat uses N when the soil temperature is cool, usually during March. The average daytime soil temperature at a depth of 4 inches in late February and March is above 50°F. Microbes readily “convert” N to a plant available form at this temperature. In addition, the nitrogen mineralization test is performed “inside” with a controlled temperature so the soil test value is independent of temperature in the field.