Nitrogen Requirements
Is all that you’ve been putting on necessary?
by F. Todd Tremblay

Onions do not require very large amounts of nitrogen fertilizer to produce a good crop. Analyses of mature onion bulbs and tops grown in Western Idaho and Eastern Oregon under varying soil conditions indicate that 800 cwt. of onions actually remove about 130 lbs. actual N.

Farmers in this same area are applying considerably more nitrogen to produce a crop of onions. While there are several reasons for applying more than the 130 lbs. N required to grow a good crop, we need to understand the factors that affect the efficiency of this nitrogen uptake.

Healthy onion roots are fairly efficient in removing nitrogen from the top 12" of soil. Over the years, by using a soil probe, we have found roots down to 18-20" in a good soil, but the roots are not very numerous and do not utilize the nitrogen very efficiently below the 12" depth. Carry-over nitrogen from previous crops and fall applied nitrogen, which has been leached beyond the 12" depth during the winter, will not be efficiently utilized by the onion roots; consequently, only minimum applications of N should be made in the fall before bedding out.

Heavy irrigations during the growing season also leach nitrogen out of the root zone. Care in irrigation can reduce this loss.

Certain onion varieties (Peckham) have a larger root system and appear to be more efficient in feeding for nitrogen.

Onion diseases, particularly pink root, cause inefficiencies in nitrogen utilization. More nitrogen will be required under these situations. Root lesion nematodes may also be a problem in this regard.

Table 1 shows the amount of residual (carry-over) NO₃-N we have found in onion fields over the years.

These figures indicate that we need to analyze our methods of application of nitrogen on onions and do a more efficient job on timing and placement of the fertilizer. The concern over nitrate contamination of drinking water sources would certainly indicate that we will need to get better control over the nitrogen losses from the root zone of the onion crop.

Onion growers should attempt to hold residual NO₃-N levels to below 120 lbs. per acre in the soil profile in a number of fields over the years. Grain and beet crops are efficient users of this excess nitrogen carry-over, but in many cases the N is leached out of the root zone of these crops during the winter months.

To determine N needs of onions we multiply the cwt. desired, or attainable by a factor of 0.3. Thus 600 cwt. X 0.3 = 180 lbs. N required. Subtract the amount of NO₃-N found in the 0-12" soil depth plus 50% found in the subsoil from this figure. Consequently, if 50 lbs. of NO₃-N was found in the 0-12" and 30 lbs. NO₃-N in the 12-24" depth we would subtract 65 lbs. N from the 180 lb. N requirement, or 115 lb. N.

Onions need only small amounts of Nitrogen to get to the 3 leaf stage (10-12 p.p.m. NO₃-N in the 0-12" depth). A good time to take the spring soil sample is just after the crop is planted. The correct amount of nitrogen can be applied sidedress. Either 32-0-0 solution or 20-0-0 (aqua Ammonia) give good results in the sidedressing operation. If dry materials are sidedressed, 21-0-0-24 may be preferable on alkaline soils with pH over 7.5, particularly because of the high sulfur requirements of the onion crop. Figure 1.

If crop monitoring indicates that the onions need to be touched up with N during the growing season, aerial application of dry urea is fairly efficient if applied just after irrigation (on furrow irrigated fields). 32-0-0 is an excellent material to use in the water sets or apply through the sprinkler systems when supplemental N is needed.

Yields and quality of onions will not suffer if the onion plants take on a yellowish hue due to a temporary N shortage in the early growth stages, as long as prompt action is taken to correct the situation.

We have long felt (without adequate proof) that onions grown with adequate, but not excessive nitrogen, have better keeping quality as far as neck rot and other diseases in storage are concerned.

Onions are a high dollar per acre crop and money will be well spent on monitoring the crop during the growing season to determine the nutrient status. The roots are a very reliable plant part to determine, not only the N status of the plant, but also the P, K and S requirements. Over the last 18 years we have established reliable critical levels for these nutrients.

Figure 2 illustrates the use that can be made of this procedure. Onion plants on this field showed a visual deficiency of N on certain rows in early May where the first sidedressing (120 lbs. N) was missed. A second application of 120 lbs. N was made to the whole field and comparisons were made of the 120 lbs. N application versus the 240 lbs. N application. The
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Figure 1.
Chart showing variation in NO₃-N content of onion roots with two different sidedress nitrogen rates.

Figure 2.
Effect of sidedress N on the size of the onion bulb and root mass early in the season.

Here’s a tip...
a tax tip.

Be careful when selecting a tax preparer.
- stay away from someone who claims to have an “in” with the IRS,
- don’t accept promises of a refund
- Get the preparer to sign the return,
- NEVER agree to sign a blank return.

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chart indicates the sensitivity of the monitoring procedure for this crop.
Residual N levels on the 0 - 24” depths for the 120 N rows and 240 N rows were 46 and 125 lbs. NO₃-N respectively, at the end of the growing season. The amount of residual N on the 120 N plot is about as low as you can get and the onion roots had depleted the soil supply.
Yields in both areas were fairly similar at about 1000 cwt. per acre.
Nitrogen is an important nutrient in onion production. However, we have found that just as much attention should be given to the need for other nutrients, particularly phosphorus, zinc, sulfur and potassium in the Pacific Northwest onion growing area.
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