

Nitrogen Management in Hops

Dr. Heather Darby, University of Vermont Extension Agronomist

A hop crop can require a substantial amount of nitrogen (N) to meet growth requirements. A high yielding hopyard can remove between 100 to 150 lbs of N per acre from the soil. Higher yielding plants will obviously require more N per acre to promote plant growth and development. The whole plant biomass of a hop crop contains approximately 3% nitrogen. Hence the whole crop biomass weight multiplied by 3% will indicate how much N the hop plant is removing from the soil. A whole plant biomass yield of 2000 lbs/acre will remove 60 lbs of N per acre from the soil ($2000 \text{ lb/acre} \times 0.03$). Most growers will not know whole plant biomass but most should know cone yields per acre. The cone yield is approximately one third of the whole plant biomass. If the cone yield is 1000 lbs per acre then the whole plant biomass would be approximately 3000 lbs per acre. You need to fertilize to meet the N needs of the whole plant biomass of 3000 lbs not just the cone biomass. Therefore the crop will require 90 lbs of N per acre. In most first year hops the N requirement will be low and range from 30 to 75 lbs of N per acre. Folks have asked how to calculate requirements on a per plant basis. In order to calculate take the cone yield per plant and multiply by 0.03 (3%).

Nitrogen should be applied about 30 to 45 day after emergence or mid May to mid June. The primary N uptake period for hops occurs during the vegetative stage (May through early to mid July). It is important to not apply N after flowering as this can lead to unwanted vegetative growth. Split applications of N are recommended on lighter textured (i.e. sandy) soils where leaching is an issue.

Once you determine the N needs of the crop, it is time to decide what type of fertilizers or nutrient sources will be used to supply the hops with their required nutrients. Commercial synthetic fertilizers are generally considered 100% available to the plants. These fertilizers can be blended to include a variety of nutrients or just one nutrient. For example, a fertilizer analysis may read 10-10-10. This analysis indicates that 10% of the fertilizer contents is N, 10% P, and 10% K. So if you are applying 100 lbs per acre of the fertilizer blend you will be adding 10 lbs each of N, P, and K. Given the perennial nature of this crop, it may be best to apply N sources that are slow to volatilize from the soil's surface. This would include products such as ammonium sulfate.

Many farmers may choose to apply compost or other organic amendments to the hops to meet the nutrient demands of the hops. Remember that these materials should be tested to determine their nutrient value. Composts will contain many nutrients including N, P, and K. In addition, cover crops or other plowed down amendments will provide nutrients such as N to the following hops crop. If a clover field is plowed and a hopyard planted in its spot, the N from the terminated clover will become available to the hops. Cover crop and rotational crop N credits can be found in various University Extension publications. A good stand of clover can provide 70 or more lbs of N per acre to the following crop. If you are adding compost or manure, it is important to remember that not all the N will be available to the crop during the first growing season. Depending on the scenario,

compost can have between 1% and 15% of its N available in the first year. If 4000 lbs of compost were applied and it had 2% N, there would be 80 lbs of N in the compost. At 15% N availability, the crop would only receive 12 lbs of N per acre. The more **you** know about the compost product, the better you are able to predict nutrient mineralization rates.

If you are a certified organic producer, you will need to apply only fertilizer materials that are approved for organic use. You will need to check with your organic certifier to verify what sources are available in your area. Generally organic certified sources of nutrients are slowly available.

Remember it is important to keep good crop production records to develop more reliable recommendations for your farm. Good record keeping will be a must to track nutrient dynamics on the farm. If you need further assistance with fertility recommendations please feel free to contact Dr. Heather Darby, University of Vermont Extension at 802-524-6501 or heather.darby@uvm.edu.

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