

Fertility Guidelines for Hops in the Northeast

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The increasing acreage of hops in the Northeast has prompted the need for fertility guidelines for this new and emerging crop. Unfortunately there has been no regional data generated to determine hop nutrient requirements for our soils and climate. Some basic fertility guidelines can be developed from research and information available from the Pacific Northwest (PNW). It is important to remember that these are just guidelines developed to help assist producers with maximizing hop yields until more local data can be generated for this crop.

Soil Testing

The first step to determine crop nutrient needs is to take a soil test. It is best to take annual soil tests in the fall after the crop has been harvested. Soil samples should be taken around the hill to a depth of 12 to 15 inches. A soil probe is the best tool for sampling and you may be able to borrow one from your local NRCS or Extension office. These offices will also have access to USDA soil maps that give the names and other pertinent information of the soils on your property. The name of your soil will help in the recommendations for soil amendments. The goal is take a representative sample from the hopyard. This may require pulling 10 to 20 samples for a one-acre yard. All soil cores should be put into a bucket and mixed thoroughly. Approximately a one-cup subsample should be taken and sent to a local soil-testing laboratory. It is important to always use the same soil lab so that you can monitor changes in soil nutrient levels. The test results will provide information about relative soil levels of phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and micronutrients such as boron (B), zinc (Zn), manganese (Mn), and sulfur (S). Generally the pH and organic matter levels of the soil are provided on a soil test. We will use these relative levels to provide some guidelines for fertilizing hops in the Northeast.

pH and Liming

Hop plants prefer to grow in a soil with a pH ranging from 6.0 to 6.5. In the Northeast, the lime requirement is based on a combination of the soil pH and reactive aluminum soil test. The acidic nature of many soils in the Northeast may require lime to raise the pH to the optimum range. Liming with standard agricultural lime, also known as calcium carbonate, will be adequate unless other nutrients such as Mg are required. Wood ash is another soil amendment available that can be used to raise the soil pH. On average, wood ash has half the liming value or Calcium Carbonate Equivalent of agricultural lime. That means if the soil needs one ton of lime, then 2 tons of wood ash would need to be applied to have the same affect. There are other benefits to wood ash, including the addition of K and micronutrients such as B. The availability

soil. In some cases the pH may be too high. A pH over 7.5 should be lowered, as certain nutrients are less available to plants above that range. Soil amendments such as sulfur fertilizers, pine needles and peat moss will lower the pH.

Keeping the soil pH between 6.0 and 6.5 will also aid in making other macronutrients and micronutrients available to the plant. Since it takes time for the soil pH to change, it is best to correct soil pH prior to planting and hopyard establishment.

Nitrogen

A hop crop will 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. Nitrogen application rates are often based on knowing your whole plant biomass yield. Higher yielding plants will obviously require more N per acre to promote plant growth and development. A whole plant biomass yield of 1000 lbs/acre will remove 80 to 90 lbs of N per acre from the soil. As the cone yield increases to 2000 lbs/acre the hop plant can remove 150 to 170 lbs/acre of N from the soil. Nitrogen rates should be based on yield but also soil organic matter level and/or soil type.

If you are dealing with low organic matter (OM) soils (1 to 2%) a rate of 150 to 200 lb /acre of N should be applied. If soil OM levels are between 2 and 5% then a rate of 100 to 150 lbs of N per acre should be applied. For organic matter levels over 5% then 80 to 100 lbs of N per acre should be applied to the crop. First year hops (establishment year) should only receive 75 lbs N per acre.

Nitrogen should be applied about 30 to 45 days 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.

It is difficult to predict N from a standard soil test. Therefore other tests such as leaf petiole testing can be used to determine N requirements of hops during the growing season.

Leaf Petiole Testing

Monitoring N needs of a crop can be difficult in perennial crops. Petiole testing can help producers identify N deficiencies throughout the critical growth stages. In the PNW, petiole testing begins when the hop plants are halfway to the top of the trellis. At the time of sampling, select 30 to 50 petioles from the yard (or whatever area you are sampling). Mature petioles should be selected from 5 to 6 feet above the ground. It is best to use the paper sample bags provided by the lab for transporting the leaf petioles. Regular lunch bags are often treated with Borax and can throw off the results if Boron is a critical element as with hops. Plastic bags hold too much moisture and can result in molding of the sample. The samples should be put into a cooler with ice and

Zinc deficiency can also be an issue in hop production. Similarly, Zn deficient corn has been observed in the Northeast. Soils that have an especially

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