Hop Fertigation and Nutrient Management

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Fertigation:
Fertilizing through the irrigation system

www.hops-super-styrian.eu

This does not constitute an endorsement. This is just a good site for information.
You will become a plumber!

http://www.trickl-eez.com/
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Typical Drip System Layout

Influence of Soil Type on Irrigation Strategy

Course Soil (sand): Rapid uptake, High permeability, Low retention
Therefore, Prone to leaching

Fine Soil (clay): Slow uptake, Low permeability, High retention
Therefore, Prone to run-off
Factors Influencing Water Application

Climate: Rainfall Wind Temperature Light Level

Soil Type: Sand – Loamy Sand – Sandy Loam - Loam Clay Silt Organic Matter

CEC: Cation Exchange Capacity (Indirect measurement of water holding capacity)

Plant Growth Stage: Vegetative – Flowering - Fruiting

Sand Kaolinite Clay

CEC is an Indirect Measurement of Soil Surface Area

CEC is a direct indication of:
- The soil’s ability to hold water
- Water infiltration rate
- The soil’s ability to retain nutrients
- The soil’s ability to change pH
- Herbicide activity in the soil

Element (Symbol) Form taken up by the plant Soil Mobility

| Nitrogen (N) | (NH₄)⁺ Ammonium form Somewhat imm. 
| Phosphorus (P) | (H₂PO₄⁻), (HPO₄²⁻), PO₃⁻ Immobile |
| Potassium (K) | K⁺ Somewhat mob. |
| Calcium (Ca) | Ca⁺ Somewhat mob. |
| Magnesium (Mg) | Mg²⁺ Somewhat mob. |
| Sulfur (S) | (SO₄⁻)²⁻ Mobile |
| Chlorine (Cl) | Cl⁻ Mobile |
| Iron (Fe) | Fe⁺² Immobile |
| Boron (B) | (BO₃⁻) Mobile |
| Manganese (Mn) | Mn⁺² Immobile |
| Zinc (Z) | Zn⁺² Immobile |
| Molybdenum (Mo) | (MoO₄⁻) Mobile |

Wherever Water Goes - So Do Nutrients

Nitrate (NO₃⁻) retention in soils

If nitrate is not taken up by plants it is very likely to be lost from the soil.

Irrigation Strategy???

Depends mainly on soil type.

More critical for young plants.

Sand: a little at a time, but often, fast application.

Silt/Clay: slow application, longer time period, less frequently.

When do I start and stop irrigating?

Resistance
Want to maintain soil moisture between 65% and 100% capacity

Below 65% you run the risk of economic loss

Above 100% you run the risk of leaching and runoff

Hops have a fairly extensive root system

Attaining a depth of 15-feet (most in the top 2 to 4-feet) and spreading

Don’t confuse rhizomes with roots

Need an understanding of the hop growth phases (See handout)

9 phases: 0 - 9

Fertilizer has its greatest affect during phases 1, 2 and 3 and should be complete by the time flowers become visible (stage 5)
Total N demand 100 - 150 lbs./A
Total P demand 20 – 100 lbs./A
Total K demand 80 - 150 lbs./A
Boron (B), Zinc (Zn), Sulfur (S)

Levels depend on age and expected yield.

Flowering in hops is dependent on day length and number of nodes and varies with cultivar.

The day length signal happens 7 – 14 days after June 21

Vegetative growth greatly slows and fertilizer will have minimal affect after July 1.

All P and K can be applied as a broadcast early

Split K applications on light soils

Highest N demand is from late April to late June
Early N applications can be applied as a broadcast – up to 25%

Prior to a rain event

150 lbs. N total
40 as a broadcast early
110 in 8 weeks = 13.75 lbs./week
1.7 lbs./day
Done by July 1 when flowers become evident

Determine how long it takes for water to move through your system
Charge the system
Inject the fertilizer
Flush the system and apply enough water to move it into the soil but not out of the root zone

QUESTIONS?