

Hazelnut Irrigation 101

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11 March 2020

1. Advantages
2. Irrigation system selection
3. Drip irrigation emitter selection



Advantages

- Good establishment
- Helps bring trees to production faster

Increases:

- Vegetative growth
- Nut weights
- Nut yields
- Nut size





Advantages

- Good establishment
 - Helps bring trees to production faster
- Increases:
- Vegetative growth
 - Nut weights
 - Nut yields
 - Nut size
- Reduces number of blanks
 - Spring irrigation can positively affect nut production in the following year




This picture shows a filbert and pecan orchard in September 1990, the year of its planting.



Here is the same orchard 34 months later, having benefitted from a trickle irrigation system.





French Research 1980s


- Although its water requirement is not high, this species is very sensitive to drought stress (Mingeau et al 1994)
 - Ennis and Fertile de Coutard
 - $K_c=0.8$
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Nebraska study 2003

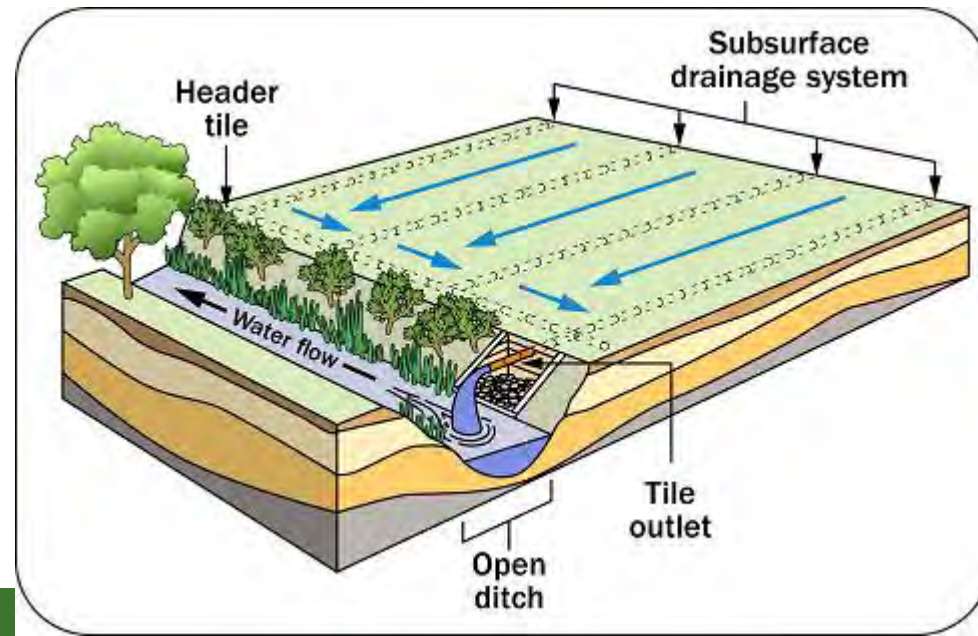
- Nut production was not affected by water treatment (Awada and Josiah 2004)
 - All trees watered in establishment year and as needed in year 2
 - Treatment started in year 3, no difference in soil moisture in May-June because of sufficient rainfall.
 - American Hybrids 88BS, G17, GEL502, BOX1. 176.8 g/plant to 30.3 g/plant (nut clean weight)
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- Some crops can survive with low water, but that doesn't mean they will be productive in dry conditions

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- Hazelnut trees are medium-rooted with the majority of the root system in 0.5 -1m of soil if the field has adequate drainage


Drainage

- Tile drainage should be installed between every row or every other row
- On some very deep sandy soils, tile drainage is not necessary
- Drain depths should be 750mm or deeper (max 1,200mm)






BMPs for Hazelnut Irrigation

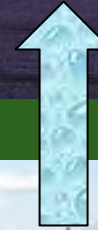
- Hazelnut trees should be irrigated every year during periods of low rainfall.
 - Irrigation is most important in establishment to promote adequate root development.
 - Sufficient water must be used to wet the entire rooting zone.
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Critical Hazelnut Irrigation Periods

- 6 weeks post-bloom (can affect both current crop as well as flower set for following year)
 - Nut fill from mid July to mid Aug
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Irrigation System



Pumps and Motors





Sprinkler Irrigation





Traveling Gun Irrigation





Drip Irrigation

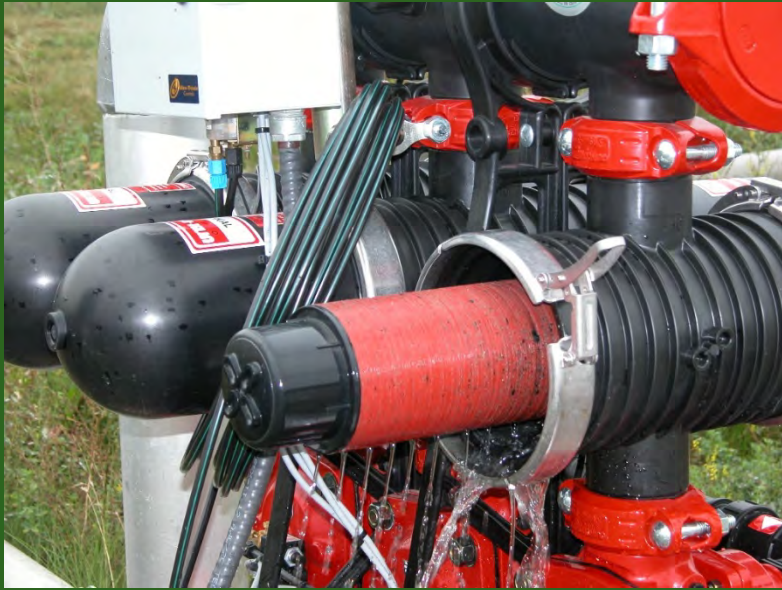








Filters for Drip Irrigation



Fertigation and backflow prevention



**Drip Irrigation:
Water Use
Reduction?
% of field covered by
canopy**



Irrigation Frequency in Ontario Implications for Efficiency



Irrigation Equipment Cost \$/acre

| Irrigation System | 15 acres | 50 acres | 100 acres |
|------------------------|----------|----------|-----------|
| Sprinklers (hand move) | 1540 | 980 | - |
| Travelling Gun | 1985 | 900 | 700 |
| Drip Tube | 3040 | 2550 | 2325 |

Power supply not included

Summary

- Consider operational preferences
- <http://www.omafra.gov.on.ca/english/engineer/irrigation.htm>
- Google “Irrigation OMAFRA”



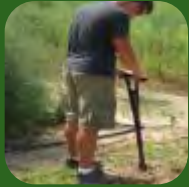


Appendix 1





Emitter Selection



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Emitter Selection

- X = Flow Exponent
- C_v = Manufacturer's coefficient of variation




Types of Emitters

- Laminar Flow Emitters
- Turbulent Flow Emitters
- Pressure Compensating Emitters



Flow Exponent X

| Flow Exponent (x) | Emitter Type |
|-------------------|-------------------------------|
| 0.0 | Pressure Compensating Emitter |
| 0.1 | |
| 0.2 | |
| 0.3 | |
| 0.4 | |
| 0.5 | Fully Turbulent Flow |
| 0.6 | |
| 0.7 | Mostly Turbulent Flow |
| 0.8 | |
| 0.9 | Mostly Laminar Flow |
| 1.0 | Fully Laminar Flow |



Manufacturer's Coefficient of Variation Cv

| Coefficient of Variation (Cv) | Classification |
|-------------------------------|----------------|
| <0.03 | Excellent |
| 0.03 - 0.07 | Average |
| 0.07 - 0.10 | Marginal |
| >0.10 | Poor |