WATER MANAGEMENT FOR GRAPEVINES

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Factors influencing plant water needs and irrigation decision making.

- Soil characteristics
  - depth
  - internal drainage
  - texture
  - structure
  - slope
- Climate
  - annual precipitation
  - rainfall distribution in the growing season
  - heat unit accumulation during the growing season
- Weather
  - temperature
  - sunlight
  - humidity
  - wind
- Plant characteristics
  - young vs. mature
  - canopy size and shape
  - root depth and distribution
- Stage of growth
  - Budbreak to flowering
  - berry sizing (flowering to veraison)
  - veraison to harvest
  - post-harvest to leaf fall
- Plant competition
  - weeds
  - cover crop
  - adjacent vines (population)
- Water Supply
  - amount available
  - flow rate
  - quality
- Economics - will improved yield or quality offset the cost?
  - $1.50 to 2.00 per vine for a standard drip system
  - Will additional equipment, piping, etc. be necessary?

Daily vine water use can vary from 1 to 15 gallons; in MO estimated use is 50-55 gallons per vine per week (Lakso & Pool). Vineyard water need varies greatly from 16 to 54 acre inches per year (Striegler & Allen).

SOME WATER-RELATED DEFINITIONS

Photosynthesis is the process of capturing the energy of light and converting water and carbon dioxide into chemical energy (simple sugars, or "food"); this process takes place in the chloroplasts, structures of the leaf that contain chlorophyll.

Respiration is the process by which the energy stored in food is released, resulting in the cell giving off carbon dioxide and water. All living cells respire, but only cells containing chlorophyll can conduct photosynthesis.

Translocation is the movement of water, mineral nutrients, food and other substances through the vascular system. Water and nutrients move upward from the roots through the *xylem*; food and other metabolites move throughout the plant through the *phloem*.

Transpiration is the loss of water in vapor form through the stomata of the leaves. It is estimated that 99% of water taken up by the vine is used for transpiration.

Evapotranspiration (ET) is the soil water loss from evaporation plus the water lost by transpiration of the crop. This daily ET is often provided by weather stations based upon data from a grass reference crop.

Field Capacity is a measure of soil water content and is the point at which further movement of water through the soil becomes negligible.

Permanent wilting percentage (PWP) is the point at which the soil moisture content is so low that it causes wilting and the plant cannot recover unless water is added to the soil.

Water stress is a physiological reaction of a plant that occurs when water loss from leaves exceeds the amount supplied by the soil.

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