Corn and Velvetleaf (*Abutilon theophrasti*) Water Use Efficiency.

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Rationale and Objectives

Soil water availability is the most important factor limiting crop yield worldwide. While there is considerable research on the effects of water supply on crop growth and productivity, there is little published research on the response of weedy and invasive plants to limiting soil water supply relative to that of the crop.

The objective of this study was to determine the water use efficiency (WUE) of corn and velvetleaf under varying levels of constant water supply.

Materials and Methods

Plastic bags were placed inside 10 L pots and filled with 13.5 kg of a 8:1:1 mixture of soil:sand:perlite. Corn and velvetleaf plants were thinned to one plant per pot with bags sealed around the base of the plant stem so the only water loss was that due to transpiration. Sealed access tubes were inserted through the bags to allow daily water replacement with minimal disturbance of plants. Daily transpiration was measured by weighing the pots at the same time each day. Soil water content was maintained at low, medium or high levels (fraction of transpirable soil water at which 1/3, 2/3 and 1.0 full transpiration occurs). Plants were harvested periodically and above-ground dry biomass was regressed on cumulative water use with the slope providing an estimate of water use efficiency.

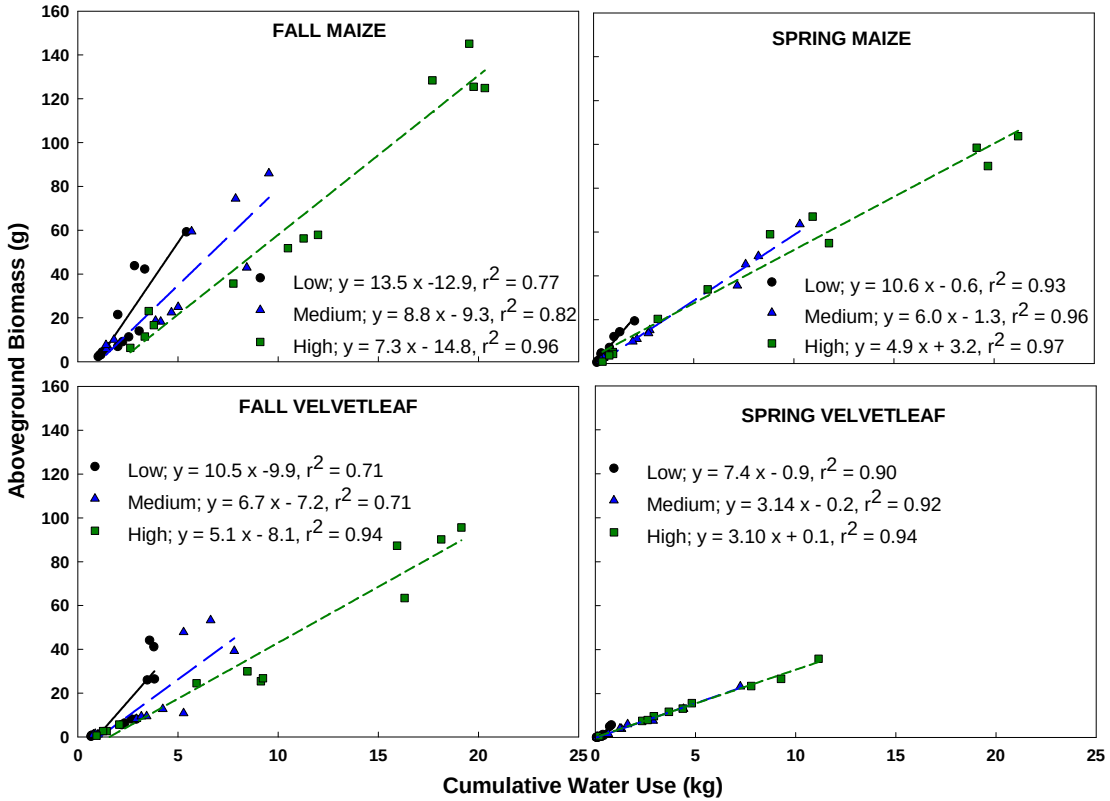

Figure 1. Corn and velvetleaf aboveground biomass (g) in response to cumulative water use (kg) . The slope of the linear regression represents the WUE.

Photo 1. Corn and velvetleaf near the end of the first trial.

Conclusions

- Corn and velvetleaf WUE was greatest in the low and smallest in the high water treatment.
- Corn WUE was 29-91% greater than that for velvetleaf, with greater differences at high levels of water supply.
- WUE was about 30% smaller overall in the spring trial, perhaps owing to lower temperature and VPD during that trial.
- Results from this study indicate that corn will best utilize available water relative to velvetleaf at adequate water supply levels.