Design of controlled drainage subirrigation systems in Southern Ontario currently must rely on results published for plots of limited field scale. Technology transfer and scale up to larger field sizes has not been formally documented.

Researchers have often reported using similar fertilizer applications in controlled as in conventionally drained plots. This is likely because of researcher propensity to reduce comparative plot variables by managing conventional and controlled drainage plots in a similar manner. However, year to year variations in precipitation (wet, average and dry) influence nutrient use and residuals especially for non-irrigated free draining unstable yield sites.

In Ohio research sites managed by farmers produced higher yields. Small research plots may have significant edge effects including increased lateral seepage losses compared to a farm scale implementation. Production variations over and between subsurface drains may not be apparent in small plots.

2.1 Climate and Water Deficit Trends

Water deficits and trends in Southern Ontario are described in this section.

2.1.1 Controlled Drainage-Subirrigation Influences on Tile Nitrate Losses and Corn Yields on Sandy Loam Soils (Ng et al, 2001)

Ng et al (2001) reported 35 year averages as follows:

For years 1960 to 1993 at the Eugene Whelan Experimental Farm at Woodslee, Ontario (Rochester Township, Essex County)

Table 2.1 Water Deficit 35 Year Averages

	May	**June**	**July**	**August**	**September**	**TOTAL**
Potential Evapotranspiration (mm)	96.4	113.2	126.6	121.0	70.7	527.9
Rainfall (mm)	72.7	97.4	88.6	82.1	80.7	421.5
Difference	23.7	15.8	38	38.9	(10.0)	104.4

The summer (June, July, August) water deficit 1960 to 1993 averaged 92.7 mm and summer potential evapotranspiration 360 mm. Growing season water deficit was 104.4 mm.