A COMPREHENSIVE LOOK AT IRRIGATION TECHNOLOGIES FOR PROCESSING VEGETABLES

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Irrigation management is vital for the production of processing vegetable crops in Wisconsin. The use of water and improving the long-term sustainability of this absolutely critical resource has become a hot topic in the Wisconsin vegetable industry in recent years, because there has been increasing pressure to manage irrigation more efficiently and reduce unneeded agricultural water use.

Irrigation management includes adopting efficient irrigation systems such as sprinklers or drip irrigation, and scheduling irrigation to apply water at the right time with the right amount. Center pivot is the most common irrigation system for the Wisconsin processing vegetable growers. Based on previous studies conducted out west, dropping nozzles close to crop canopies can help increase irrigation efficiency from about 65% to above 90%. However, its application in Wisconsin is not thought to be as promising, due to the humid weather and warm groundwater temperature during the growing season. Drip irrigation has not been used for commercial processing vegetable production in Wisconsin because of its high cost and labor-intensive nature. A new technology called precision mobile drip irrigation (PMDI) combines sprinkler with drip irrigation, where drip tapes are attached to the center pivot and dragging on top of the soil surface. PMDI has the advantages of both center pivots and drip irrigation, but the lying tapes can be bitten by rodents, leading to maintenance challenges for the growers.

Common irrigation scheduling methods include hand feel, using crop evapotranspiration (ET), or using soil moisture probes. The hand feel method has been widely applied, but it requires years of experience for the growers to apply this method. Using crop ET requires data collection by weather stations. Thus if the weather stations are not installed on or near specific fields, estimating of crop ET might not be accurate, causing over- or under-irrigation. Soil moisture probes measures the indirect crop response to environmental water conditions, but they cannot indicate spatial variability within the fields. A recent irrigation scheduling technology mounts a sensor that measures canopy temperature onto the center pivot, which makes it possible to calculate in-time crop water use during growing

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season. Studies in Texas has shown that this technology can produce the same or higher crop yield compared with irrigation scheduling based on soil moisture probes. However, this new technology is cost-prohibitive and has not been routinely applied to commercial farms.

In summary, efficient irrigation management requires well-functioning irrigation systems and timely irrigation scheduling. Growers should make informed decisions based on their crop type, rotation history, soil condition, and financial budget to achieve sustainable irrigation water use.