DEVELOPMENT OF AN AUTOMATED IRRIGATION SYSTEM FOR HORTICULTURAL NURSERIES

Abdul Aziz Zakaria

Department of Biological and Agricultural Engineering Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

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Introduction

Horticulture is widely practised as an industry and as a hobby. The horticulture industry is responsible for the production of fruits, vegetables, and ornamentals for local and export market. Horticulturist in the floral, landscaping and nurseries produce ornamental plants for use in creating attractive surroundings outside or inside the buildings. The horticulture industry is becoming an important sector. The demand for fruits, vegetables, cut flowers and other ornamentals are increasing every year. The estimated market value in this sector can be worth a few billion ringgit. Due to increasing demand for planting materials, horticultural nurseries are mushrooming in every part of the country. From small roadside nursery to large-scale business by the corporate sector, the horticultural industry is expanding fast. If not for the present economic slow-down our horticultural nursery should have developed much faster. Interest in agro-tourism and agro-hobby are steadily increasing. So, the demand for fruits and other horticultural plants is expected to increase.

Materials and Methods

Automated irrigation system is being developed at UPM using imported components. A 6-station controller with solenoid valve was evaluated for irrigation of fruit seedlings grown in ceramic pots. Micro-sprayers, perforated hose, and mini sprinklers were evaluated for their performances. Battery –operated valves were also being evaluated for application in areas with sufficient pressure from the main line. Information on irrigation water requirements for nursery is important in the design and selection of sprinkler or emitter spacing and discharge. Different size plants will require different volume of water to meet the evapotranspiration. For irrigating plants grown in containers, point source emitters, microsprayers, or perforated hose can be used. Battery operated valves were installed to irrigate fruit seedlings grown in polybags. A 6-station controller was set up to irrigate fruit seedlings grown in ceramic pots. only three lateral lines were set-up to irrigate pulasan, water-apple, and longan seedling. Battery operated valves were also used where the mainline water pressure is high.

Results and Discussion

Results from the water balance study showed that the average evapotranspiration rate for the fruit seedlings is about 4.0mm per day. The system was operating successfully, provided there is no power failure. The only problem is that sometimes the solenoid valve do not closed fully when actuated to do so. This result in over-irrigation for that lateral line. Based on the moisture characteristic of the soil used, the system was program to operate once a day every for the peak water demand period of June through August. The battery-operated valves were installed at a commercial nursery. The programmable valves have been working successfully for the past two years. The only precaution that has to be taken is to protect the battery-operated valve from rainfall. The other problem that can happen is clogging of the valve due to lack of good filtration system.

Conclusions

A 6-station programmable controller with solenoid valves was set up at UPM for automated irrigation of fruit seedlings grown in ceramic pots. The system was set up to irrigate only a small number of plants but can be expanded to operate more stations From initial water balance study, the average evapotranspiration for the fruit seedlings grown in large ceramic pots is about 4.0mm per day. This system can be used for irrigation of larger nurseries. For smaller nurseries with available water supply from the main, battery-operated programmable valves are recommended.

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