

Surve of automation irrigation systems in Maharashtra

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Bombale, V.T., Popale, P.G., Magar, A.P. and Chavan, M.L. (2011). Surve of automation systems in Maharashtra. *Engg. & Tech. in India*, 2 (1&2): 58-60.

Key words : Automation irrigation systems

Water is prime source required for all biological activities of the plant and is most valuable input particularly in irrigated agriculture. Water saving and efficient irrigation methods have great scope in irrigated agriculture with help of automation. Comparative study between micro-irrigation and traditional irrigation methods had been conducted several times but once the 'automation irrigation system's is installed farmer seldom get chance in production. But he does not get any feedback regarding its operation and maintenance from the manufacturer. In order to asses the actual situation in regards with the 'automation irrigation system's and its adoption on the field of farmer and Govt. Hence it is necessary to survey of 'automation irrigation system's.

There are three basic automation systems namely time based system, volume based system and sensor based system.

Time based system :

In time based system, time is the basis of irrigation.

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Time of operation is calculated according to volume of water required and the average flow rate of water. The duration of individual valves has to be fed in the controller along with system start time; also the controller clock is to be set with the current day and time. As the clock of the controller knocks the start time of programmed, it starts sending signals to the first automatic valve in the programme sequence; the pump also starts up at the same time. As soon as duration of first valve is over the controller either stops or switches ON to next valve. When the operation of last valve is over, controller stops sending signals to valves and pump. The same process is repeated at next run time.

Volume based system :

In volume based system, the preset amount of water can be applied in the field segments by using automatic volume controlled metering valves. Automation using volume based systems are of two types. In first type of system, automatic metering valve with pulse output provides one pulse after completing one dial of the automatic metering valve. Thus, by counting the number of pulses received by the controller, it can count the volume of water passed through. After providing required volume of water through first valve, it closes down and controller switches on the next valve in the sequence. In second type of system, no controller is required. Automatic metering valves are positioned near each field segment. All automatic metering valves are interconnected in series with the help of control tube. For automatic closing and opening of the metering valves with the help of water pressure signal, components like t-connector, shuttle valve and a three way relay (called Shastomit) are also installed along the circuit. During sequential operation only one automatic metering valve remains open. The next valve

Table 1: Information regarding automation irrigation system survey of maharashtra

Specification	P ₁	P ₂	P ₃	P ₄	P ₅	P ₆	P ₇	P ₈	P ₉
Districts	Ahmednagar	Aurangabad	Kolhapur	Nashik	Nashik	Osambad	Osambad	Pune	Pune
Place	M.P.K.V. Rahuri	M.G.M College Padegoan	AG College	At/Post-VandderBhairo Tal-Chandvad	At/Post-Khedgoan Tal-Dindori	At/Post-Ieet Tal-Bhoom	At/Post-Ieet Tal-Bhoom	At/Post-Rajguru Nagar, Pune	At/Post-Manjri Farm (Solapur road) Pune.
Name of farmer and institute	ICAR Project	NBRI Project	ICAR Project	Mr.Rajandra D. Bhalerao.	Mr.Sharad P. Dhokare	Mr. Anil Deshmukh	Mr. Anand Deshmukh.	ICAR Project	ICAR Project
Total area	10 acres	25 acres	12 acres	65 acres	50 acres	25 acres	28 acres	44 acres	46.78 acres
Automation area	0.20 acre (Poly house 28m x 28m)	0.10 acre (Poly-house 6m x 6m – 10 plot)	0.576acre (Green-house – 10 plot)	6 acre	44 acre	8 acre	10 acre	40 acre	38 acre
Soil type	Heavy	Medium	Heavy	Medium	Medium/ Heavy	Medium	Medium	Light/ Medium	Light/ Medium
Water source	Canal	Open well	Open well	Open well	Storage tank	Farm pond	Farm pond	River	Farm pond
Pump (hp)	3	3	5	7.5	15	5	7.5	15	10
Type of system	Volume base	Time/ volume /sensor base	Volume base	Time base	Time/ volume base	Time base	Time base	Time base	Volume base
Controller used	Galstar	Galstar	Galileo WEXX	Galcon	Galstar	Galileo WEX	Galileo WEX	Galstar	Galstar
Valve used	Solenoid Valve	Solenoid valve	Solenoid valve	Solenoid valve	Solenoid valve	Solenoid valve	Solenoid valve	Solenoid Valve	Solenoid Valve
	Hydraulic valve		Hydraulic valve					Hydraulic valve	
Fertigation equipment	Dozzing pump	Fertijet machine	Fertijet machine	Fertilizer tank	Fertijet machine	Dozzing pump	Fertilizer tank	Fertilizer tank	Dozzing pump
Computer used	Yes	Yes	Yes	No	Yes	No	No	No	Yes
Filter system	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Field	Poly-house	Poly-house	Green-house	Open field	Open field	Open field	Open field	Open field	Open field
Crop	Chilly	Cotton	Cotton	Grapes	Grapes	Sugar cane	Sugar cane	Onion/ Garlic	Grapes
Cost of automation	Rs. 9 Lakh	Rs. 8 Lakh	Rs. 10 Lakh	Rs. 3.5 Lakh	Rs. 8 Lakh	Rs. 3.8 Lakh	Rs. 3.5 Lakh	Rs. 10 Lakh	Rs. 25 Lakh
Name of Company	Jain Irrigation system Ltd.	Jain Irrigation system Ltd.	Jain Irrigation system Ltd.	Jain Irrigation system Ltd.	Netafim Irrigation system Ltd.	Jain Irrigation system Ltd.	Jain Irrigation system Ltd.	Jain Irrigation system Ltd.	Jain Irrigation system Ltd.
Difficulties	1. Wiring damage 2.Valve brakeage 3. Skilled person required	1. Wiring damage 2.Sensor damaged 3. Skilled person required	1.Wiring damage 2.Valve brakeage 3.Skilled person required	1.Wiring damage 2.Voltage problem 3. Skilled person required	1.Voltage problem 2.Valve brakeage 3. Skilled person required	1. Wiring damage 2.Voltage problem. 3. Skilled person required	1.Wiring damage 2.Valve brakeage 3.Skilled person required	1.Wiring damage 2.Valve brakeage 3.Skilled person required	1. Wiring damage 2.Valve brakeage 3. Skilled person required

in the series opens after the first valve closes. Shut down of the irrigation pump can be made automatic after closure of the last valve in series by connecting the spare end of the last valve T-connector to a micro-switch with the help of control tube. Micro-switch is connected to the pump motor starter's magnetic coil. After the last automatic metering valve closes, it transmits pressure signal to the micro-switch with the help of pressure which in turn activates a pressure switch and terminates the motor starter circuit resulting in automatic shutdown of irrigation pump.

Sensors based system :

Sensors based system is the application of irrigation based on actual dynamic demand of the plant itself, plant root zone effectively reflecting all environmental factors acting upon the plant. Operating within controlled parameters, the plant itself determines the degree of irrigation required. Various sensors *viz.*, tensiometers, relative humidity sensors, rain sensors, temperature sensors etc. control the irrigation scheduling. These sensors provide feedback to the controller to control its operation. A research study was conducted at Maharashtra state of nine places in the selected six districts namely Ahmednagar (P₁), Aurangabad (P₂), Kolhapur (P₃), Nashik (P₄ and P₅), Osmanabad (P₆ and P₇) and Pune (P₈ and P₉). From each place all the necessary data were collected according to the questionnaire form (prepared before) and are tabulated in Table 1.

Based on the collected information the data were analyzed for area under automation, water source, pump Hp, type of system, controller, valve, type fertigation equipment, crop cultivated, automation company, automation cost, difficulties/ problem arised.

The automation area ranged from 0.10 acres to 44 acres in minimum area required for poly house and green house and the area of open field was comparatively large.

Farm pond and open well was used for irrigation. Farm pond is cheaper water source compared to other source.

The pump Hp also ranged from 3 to 15 Hp. In poly house minimum Hp of pump was required as compared to open field.

Time based system was comparatively cheaper and hence gaining more popularity than the volume based system. Most places 'time based system' was used. Sensor based (real time) system was cheaper than time base system. But due to environmental condition sensor was damaged and system was broken and this reason farmer not used sensor base system.

Most of automation system galstar controller was used. All automation systems were found to be operated on solenoid type valve.

Fertijet machine or fertilizer tanks were found to be used for most of the automation systems.

As per the crop under cultivation, sugarcane and grapes were usually crops that were irrigated by using automation irrigation system. In green house vegetables was the main crop.

Most of the installations were of Jain Irrigation Privet Ltd. and rarely of Netafim Irrigation Ltd.

Costs of automation ranged form Rs. 3.5 to 25 Lakhs. Wiring damage, voltage problem, valve brakeage, lack of skilled operator were the few of the problems faced by the farmers while irrigating by the automation system.

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