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Climate Smart Water Management in Horticultural Crops

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Introduction

The unpredictable changes happening so much around us have led to an altered life style as well as alterations in the farm practices of Indian Horticulture. Horticultural crops are exclusively meant for intensive care, which produce higher yield and optimal quality with increase in precised management strategies. During 1980s, there was an overall reduction in irrigated areas due to high cost of irrigation methods, soil salinization and problems of environmental protection. However, under changing global climate scenario, the focus has been driven to sustainable water management.

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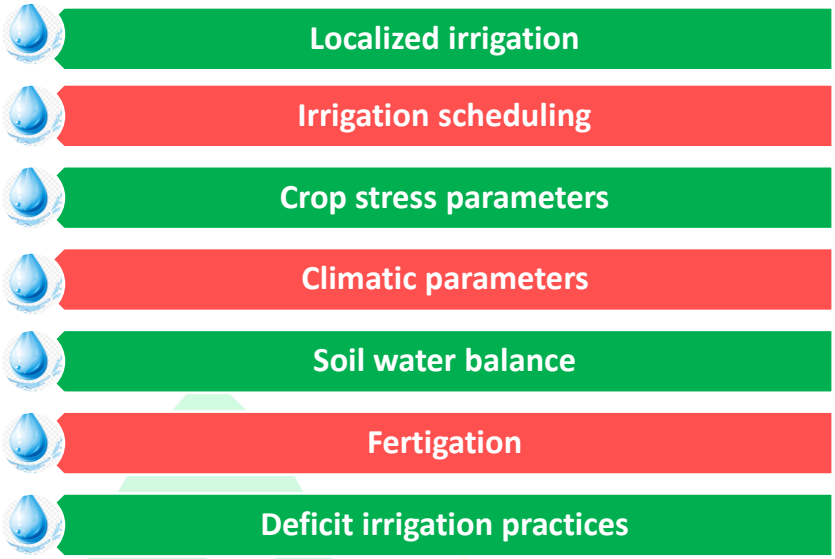

Fig. 1 Fertigation Unit

It mainly targets to higher water use efficiency by minimizing loss which occurs during application level. Climate smart water management aims to match water availability and water needs in quantity and quality, in space and time, at reasonable cost and with acceptable environmental impact. Instead of going for blanket recommendation method of irrigation in which wastage is huge, the approach should be demand driven. Irrigation scheduling (i.e. when to irrigate and how much to irrigate) should be our top priority instead of irrigation methods.

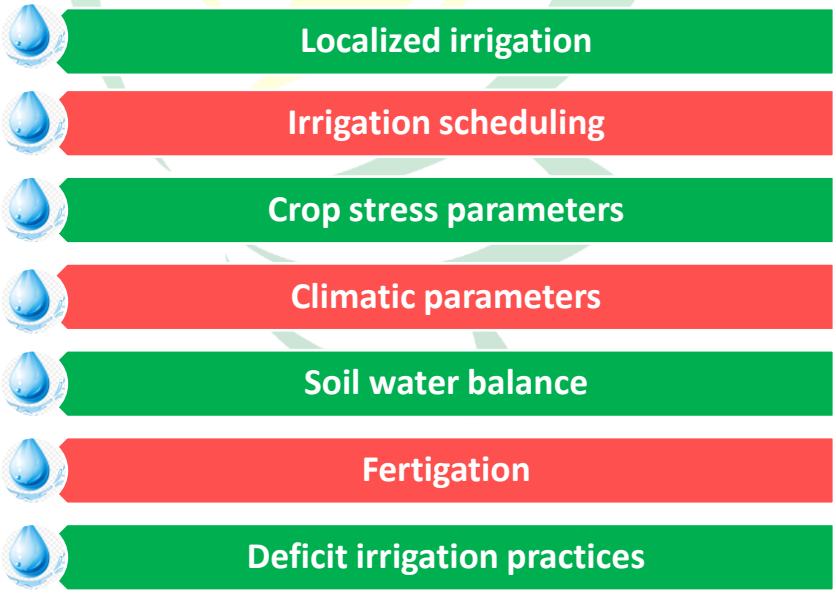

Fig 2. Key strategies for climate smart water management

Localized irrigation

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It referes to the application of water exactly to the root zone of the plant system. It is employed through drip system or micro-sprinkler system. With drip irrigation water is slowly applied through small emitter openings from plastic pipes with discharge rate ≤ 12 l/h. With micro-sprayer (micro-sprinkler) irrigation water is sprayed over the part of the soil surface occupied by the plant with a discharge rate of 12 to 200 l/h.

Irrigation scheduling

In most of the cases, the skill of the farmer is useful for irrigation scheduling of crops, but with advance of technology, various methods are also utilized to determine accurate irrigation scheduling. Soil water content measurement (TDR), measurement of soil water potential (tensiometer) and remotely sensed soil moisture meter are several other options one can go for in determining irrigation timings.

Crop stress parameters

Often the plant itself shows some signs to depict its requirement for water. Leaf water potential and leaf water content, changes in stem or fruit diameter, sap flow measurement, and canopy temperature etc. are some of the observations to represent the water requirements of the plants.

Climatic parameters

It is an indirect method for the calculation of crop water requirement. Weather data and empirical equations that, once they are locally calibrated, provide accurate estimates of reference evapotranspiration (ETo) for a given area are used. Then, crop evapotranspiration (ETc) is estimated using appropriate crop coefficients. These techniques include evaporation measurements for ETo calculation, assessment of crop evapotranspiration using climatic data (air temperature, RH, wind speed, sunshine hours) and remote sensed ET.

Soil water balance

The aim of soil water balance approach is to predict the water content in the rooted soil by means of a water conservation equation: Δ (AWC × Root depth) = Balance of entering + outgoing water fluxes, where AWC is the available water content. Soil water holding characteristics, crop and climate data are used by sophisticated models to produce typical irrigation calendars.

Fertigation

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Mostly water-soluble fertilizers are suitable for this kind of system. The installation of fertigation unit serves dual purpose in terms of supplying both water and nutrients to the plants. It is largely used in the protected cultivation of high value vegetable crops. Nutrient uptake has a direct correlation on the economic parameters of horticultural crops. Growth stage wise fertigation had direct impact on the nutrient uptake as compared to soil fertilization or fertigation with single water-soluble fertilizer. In his study, highest nutrient use efficiency was observed from the treatment T4 (when 100 % of nutrients given through fertigation).

Deficit irrigation practices

Our country has considerable proportion under marginal area, which is resource poor with different levels of difficulties. There are three different practices such as; deficit irrigation, partial root drying and subsurface irrigation, which can prove to be boon for arid and semi-arid horticultural ecosystem.

In several fruit crops, deficit irrigation has successfully applied and seen to have positive impacts in terms of yield and quality. But, we have to keep one thing in mind that, the deficit time should not coincide with critical stages, which is the most sensitive stage in horticultural crops. In different Prunus species, such as almond (*Prunus dulcis* (Mill.) D.A. Webb), flowering and rapid vegetative and fruit growth stages (stages II and III) and postharvest (stage V) have been reported as critical periods because water deficit affects yield.

Conclusion

The judicious utilization of our natural resources has become vital for survival of the current farming sector. Especially, in the era of scarcities, it is wise to learn water saving techniques and harvest maximum output per single drop of water. Hence, by wide scale adoption of sustainable water management approaches, the farmers can certainly reap a bumper lot. ‘More crop per drop’ should strike in everyone’s mind and our actions should be oriented towards minimization of water wastage at field level.

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