Elephant foot yam crop

Elephant foot yam corms

Advantages of drip fertigation

- Higher water and nutrient use efficiency
- Economy in water and nutrient use
- Lesser weed infestation
- Labour and energy saving

Challenges of drip fertigation

- Only water soluble (solid or liquid) fertilizers are suitable
- Periodical maintenance of the system is required
- Proper clean up is necessary against clogging
- High initial investments

Control of clogging in drip systems

Physical clogging: Mainly due to deposition of sand, silt or other suspended solids. An adequate filtration system can prevent physical clogging of drip irrigation system.

Chemical clogging: Mainly due to mineral precipitation of calcium, magnesium, iron or manganese. Acid injection, to lower irrigation water pH can reduce chemical clogging of drip emitters.

Biological clogging: Mainly due to bacteria, fungi or algae that can cause slime accumulation. Proper chlorination and disinfection procedures can control biological clogging of drip irrigation system.

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Drip feritgation in elephant foot yam

By
M. Nedunchezhiyan, K. Pati
V.B.S. Chauhan, K.H. Gowda
R. Arutselvan, K. Laxminarayana
S.K. Jata

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G. Byju
Director

भाकृअनुप-केन्द्रीय कंद फसल अनुसंधान संस्थान
(भारतीय कृषि अनुसंधान परिषद)
श्रीकार्यम, तिरुवनंतपुरम ६९५०१७, केरल, भारत
ICAR-Central Tuber Crops Research Institute
Sreekariyam, Thiruvananthapuram-695017, Kerala, India
Tel. No. : 91-(471)- 2598551 to 2598554; E-mail: director.ctcri@icar.gov.in, Website : https://www.ctcri.org

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DRIP FERTIGATION IN ELEPHANT FOOT YAM

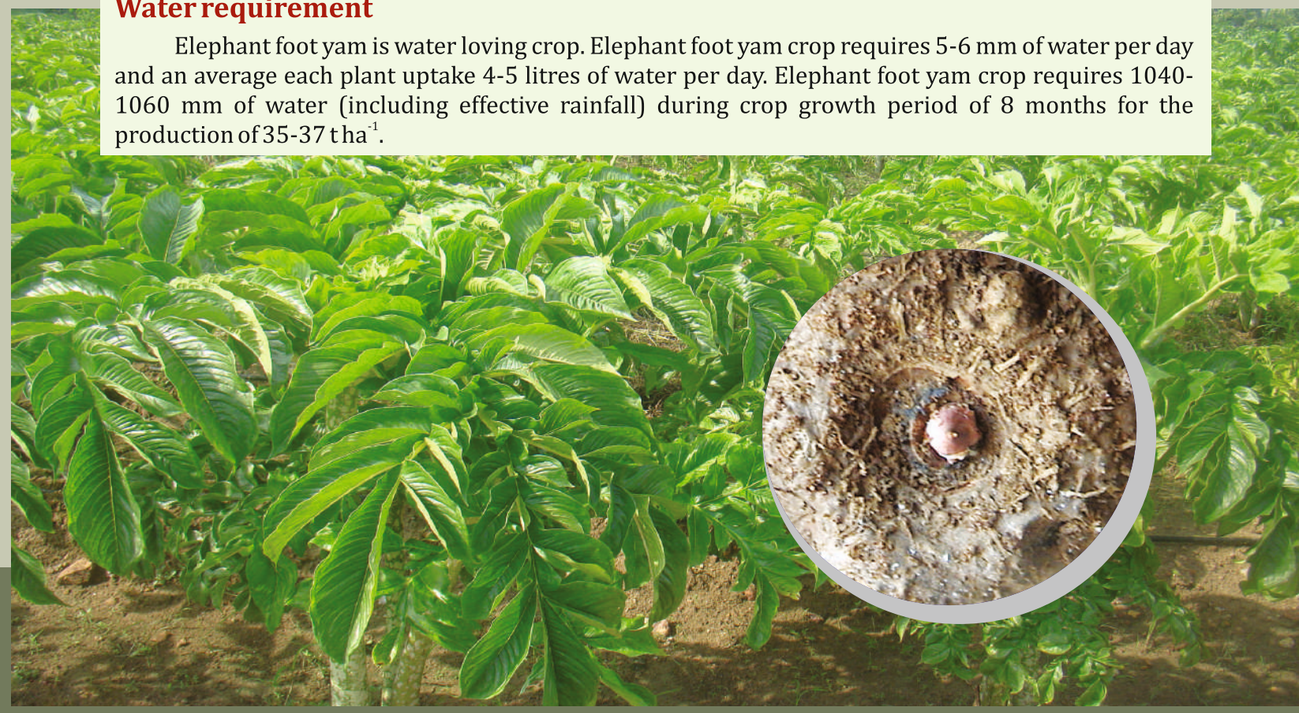
Introduction

Elephant foot yam (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is grown for its starchy corms. It is considered as famine food in the Pacific Islands. This tuberous vegetable crop cultivated through-out India, particularly in Andhra Pradesh, West Bengal, Bihar, Uttar Pradesh, Tamil Nadu, Kerala, Maharastra, Odisha and Karnataka. In India, elephant foot yam is commercially cultivated due to its unprecedented productivity and popularity as a vegetable in various cuisines. It has great scope for exploitation as a medicinal crop in pharmacological industry. The corms are used in the traditional ayurvedic preparation for treatment of inflammation, piles and digestive disorders. The leaves are used as a vegetable by local tribes in India as they contain high amount concentration of vitamin A.

The crop is planted with wide spacing due to its peculiar leaf orientation in spite of single pseudostem. Commercially the crop is grown under protective irrigation. Furrow irrigation is the most common method followed by farmers' field. Elephant foot yam takes 20-25 days to emerge and grows slowly during early stage. The crop is planted at wider spacing of 90 x 90 cm. It takes 75 to 90 days to cover the ground fully. Thus, during early-stage furrow irrigation causes heavy weed infestations apart from un-utilization of most of the applied water by the crop.

Water requirement

Elephant foot yam is water loving crop. Elephant foot yam crop requires 5-6 mm of water per day and an average each plant uptake 4-5 litres of water per day. Elephant foot yam crop requires 1040-1060 mm of water (including effective rainfall) during crop growth period of 8 months for the production of 35-37 t ha^{-1}.



Drip irrigation

Water is a scarce resource which needs to be conserved and the ultimate goal should be to ensure more crop per drop. Irrigation through drip saves lot of water. Drip irrigation is an efficient method of providing water directly in to the root zone of plants. It checks unwanted weed growth and reduces water requirements. Irrigation efficiency in drip irrigation is as high as 90% compared to 30-50% in surface irrigation besides substantial saving of water to the extent of 40-80%. Pan evaporation is most widely used method to schedule the irrigation because of its easy and inexpensive use.

Elephant foot yam under drip fertigation

Application of 260-275 mm of water during dry period through drip irrigation at 100% of cumulative pan evaporation (CPE) is found optimum for higher yield and water use efficiency in elephant foot yam. Drip irrigation frequency can be fixed based on soil type. In sandy loam soil, drip irrigation at 2-3 days interval is found optimum whereas in clay loam soil 4-5 days interval. Elephant foot yam requires 286-297 litre of water through drip irrigation for production of one kg of corm yield. The water use efficiency (WUE) of drip irrigation of elephant foot yam is 33.7-34.9 kg ha-mm^{-1} of water used.

Nutrient requirement

Elephant foot yam is a nutrient exhaustive crop. It is a shallow rooted crop; their feeding roots are in the top only hence it exhausts nutrients in the topsoil. An elephant foot yam crop yielding 33 tonnes of corm removes 128.8 kg N, 23.6 kg P and 239.6 kg K per ha. Hence, adequate supply of NPK is required for elephant foot yam. In elephant foot yam, fertigation of water-soluble fertilizers N- P_2O_5-K_2O @ 120-60-120 kg ha^{-1} is recommended for higher corm yield.

Laterals and drippers layout along with mulching

Elephant foot yam under drip fertigation

Drip fertigation

The method of nutrient application is important in improving the use efficiency of nutrients. Fertigation is a method of application of fertilizer through irrigation. Fertigation enables adequate supply of nutrients with precise timing and uniform distribution to meet the crop requirement to get maximum yield. There is 25-50% reduction in total fertilizer requirement under drip fertigation compared to surface broadcasting with no yield reduction.

Elephant foot yam harvesting

In a 8 months duration elephant foot yam crop, fertigation of water-soluble fertilizers N-P_2O_5-K_2O @ 120-60-120 kg ha^{-1} in 40 split doses at 4 days interval (N-P_2O_5-K_2O @ 3-1.5-3 kg ha^{-1}dose^{-1}) or 50 split doses at 3 days interval (N-P_2O_5-K_2O @ 2.4-1.2-2.4 kg ha^{-1}dose^{-1}) with first split/dose 10 days after planting is recommended for greater productivity, corm quality and nutrient uptake and use efficiency.

Venturi fertilizer injector system

Fertilizer mixing tank

Water filter unit

Sensor panel for drip fertigation