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FERTIGATION IN OIL PALM

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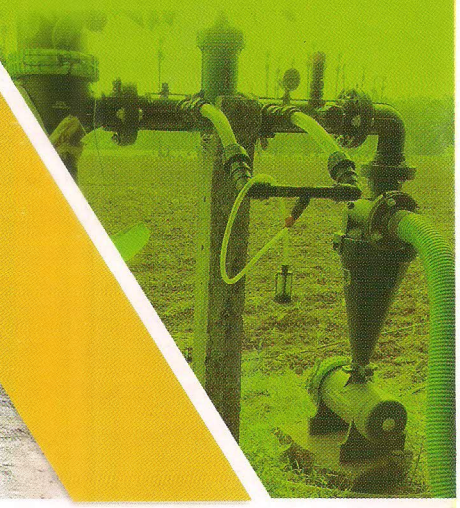

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FERTIGATION IN OIL PALM

Fertigation is a tool for efficient fertilizer application and water management in oil palm plantation. The practice of supplying fertilizers through irrigation water is called fertigation. Fertigation - a modern agro-technique provides an excellent opportunity to maximise yield and minimise environmental pollution by increasing the fertilizer use efficiency. Nitrogen and potassium are the two most needed nutrients by oil palms which are commonly met through fertilizers and these are mostly at risk to leaching because of the weak adsorption of ammonium and potassium ions and less adsorption of nitrate.

Fertigation requires a pressurized irrigation system with filter to prevent dripper clogging, non- return valve to prevent back-flow and pressure gauges to maintain required pressure. Three types of fertigation systems are available to create higher pressure for the fertilizer solution such as Venturi device, pressure tank and injection pumps.

Irrigation is scheduled in oil palm based on Potential Evapotranspiration (PET) for efficient utilization of water. Sprinkler & drip systems have substantially high irrigation efficiencies of 60-70% and 80-90% respectively than that of traditional surface flooding (50-60% efficiency). High irrigation water application efficiency associated with less deep percolation in drip irrigation systems makes it ideal for fertigation in oil palm. During flood irrigation or application of higher quantities of irrigation water through microjets or drippers, the applied water percolates through the palm root zone, resulting in losses of applied nutrients to leaching. Under such circumstances more nutrients may be needed than those irrigation methods with low volume systems which retain the applied water, and hence the nutrients, in the root zone.

Advantages of fertigation

1. Increases Fresh Fruit Bunches (FFB) yield by 25-30%
2. Saving in fertilizers costs by 30-50%
3. Precise application and uniform distribution of fertilizers
4. Minimises nutrient loses
5. Nutrients can be applied as per plant requirement
6. Saving in time, labour and energy
7. Magnesium and Boron can also be applied

Characteristics of fertilizers suitable for fertigation

1. High nutrient content in readily available form to palms
2. Fully water soluble at field temperature conditions

3. Fast dissolution in irrigation water
4. No clogging of filters and emitters
5. Low content of insolubles (<0.02%)
6. Compatible with other fertilizers-avoid SSP mixing with urea
7. No drastic change of water pH
8. Less corrosion of fertigation system

Suitability of fertilizers for fertigation

A wide range of fertilizers (both solid and liquid) are suitable for fertigation depending on the physic-chemical properties of fertilizer solution. For large scale field operations, solid fertilizer sources are less expensive than liquid formulations. However, the solubility of these fertilizers does vary greatly. The main factors to be considered in selecting fertilizers for fertigation are:

1. Soil condition
2. Water quality
3. Fertilizer availability and price

Soluble solid and liquid fertilizers are both suitable for fertigation depending on availability, profitability and convenience. High and complete solubility is a prerequisite for fertilizers used in fertigation. Fertilizer solubility generally increases with temperature, depending on the fertilizer.

Table 1: Commonly available fertilizers suitable for fertigation along with its solubility and quantity

S.No.	Fertilizer (per cent N-P-K)	Solubility (g/lit)	Quantity of fertilizer	
			kg/ha/month	kg/ha/year
1.	Urea (46-0-0)	1193	12.51	150.12
2.	Diammonium Phosphate (DAP) (18-46-0)	575	7.77	93.27
3.	Potassium Chloride (MOP) (0-0-60)	340	11.92	143.00
4.	Water soluble/liquid fertilizers	Recommended dose with different combinations could be used		

Preparation of fertilizer solution for fertigation

- Dissolve the recommended dose of fertilizers in 10-15 litres of water separately using plastic tubs by continuous stirring to avoid sedimentation
- Pour the fertilizer solution in an empty drum of 200 litres after filtration and then fill the entire drum with normal water to make up the total quantity to 200 litres.

Management of fertigation system

- Make sure that the pressure gauge reading should be between 1 - 2 kg/cm^2 by adjusting the pressure valve so as to maintain pressure for uniform discharge of fertilizer solutions to all palms.
- Insert drip venturi/injecting pump foot valve properly into the drum
- Apply normal water through drippers for half an hour before fertigation.
- Run the drip with normal water for half an hour after fertigation to avoid precipitation of fertilizers in the drip pipes

Precautions during fertigation

- Regular cleaning of drippers and filters before and after fertigation
- Proper placement of drippers in the palm basins
- Avoid using hard water which forms precipitation of fertilizer solutions

Recommendation of fertigation in oil palm

Research studies on fertigation at ICAR-Indian Institute of Oil Palm Research, Pedavegi over a period of seven years revealed that fertigation with NPK @ 600:300:600 g/palm/year at monthly intervals coupled with irrigation based on Potential Evapotranspiration (PET) is recommended for adult oil palm plantation which can reduce fertilizer costs from ₹ 9633 to ₹ 4664 per hectare.

Adoption of fertigation at monthly intervals also reduced application cost, minimum operational hazard, less soil compaction, reduced weeding cost and increased nutrient use efficiency to an amount of 75%.

Table 2: Economics of fertigation in oil palm

S.No.	Treatment	Total fertilizer Costs(₹/ha)	FFB yield (t/ha)	% saving of fertilizer costs
1.	Control*	9633	18.4	—
2.	Fertigation	4664	23.1	52

***Commonly Soil application of 1200:600:1200 g NPK/palm/year**

For furthur details

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