Field Handbook

Oil Palm Series

Volume 1

Nursery

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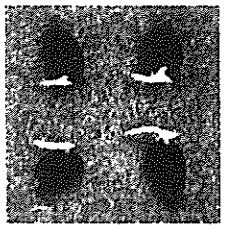
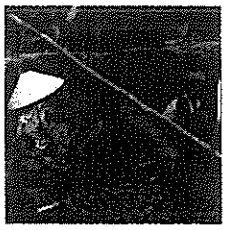
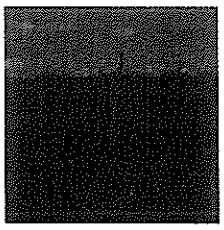
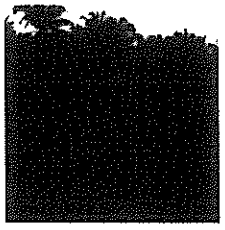
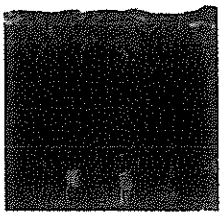
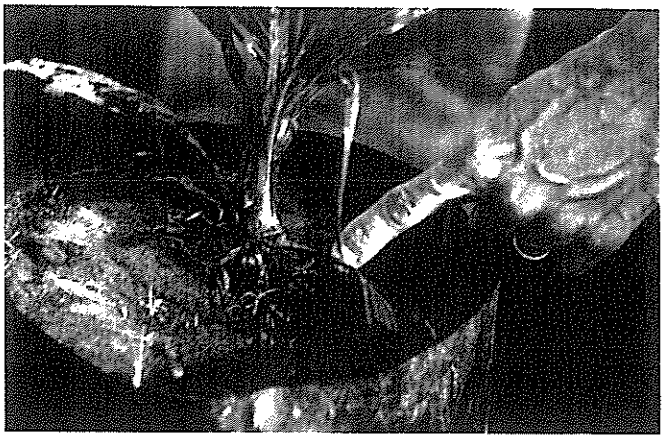




Ian Rankine and Thomas Fairhurst

OSS can be taken up or moved after nurseries have been emptied, or for maintenance and drainage operations. OSS are easy to maintain but require a substantial pump setup.



Overhead irrigation may cause polybag erosion, but correct pressures and mulch will minimise damage.

Advantages

a) An even distribution of water.
b) Little disruption to watering caused by growing seedlings.
c) Relatively trouble-free operations.

Disadvantages

a) More expensive to set up compared to layflat systems.
b) The large droplets may cause surface erosion in the polybags and in the nursery.

b) Lay-flat sprinkler tubes

This system is well suited to large *temporary* nurseries.

The most popular brand is Sumisansui which is manufactured by Sumitomo Chemical Co. in Japan.

The upper surface of the tubes has two rows of holes. When the tube is pressurized, a fine mist is sprayed to ~2 m height at opposite angles. The tubes deflate when not in operation.

Tubes are laid in alternate polybag interrows.

The nursery surface must be level.

Debris and other sharp objects that may puncture the tube must be removed.

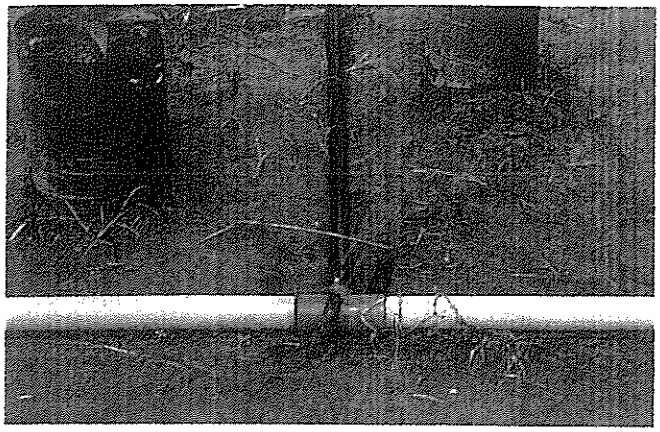
Filtration may be required to prevent dirty water and debris from blocking the small outlet holes.

Advantages

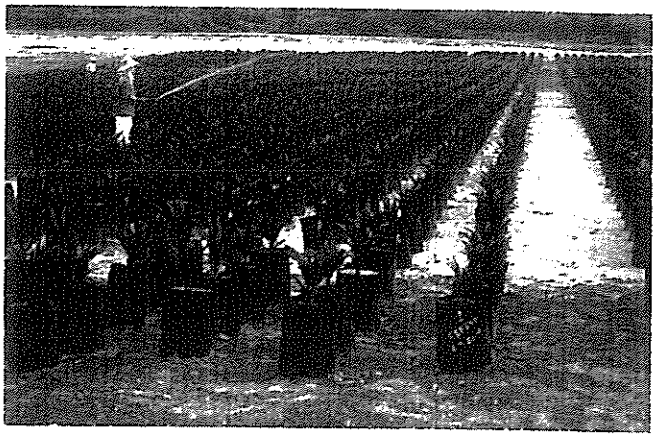
a) Lower initial setup costs.
b) No erosion in the polybags as a fine mist is produced.

Layflat tubes should be installed in alternate rows. As this nursery has tubes every 4 rows, half the seedlings may not receive sufficient irrigation water.

Layflat tubing produces an even, fine mist which does not cause polybag erosion.



Poor maintenance of layflat tubing will result in leaks and areas where watering is insufficient.



Hand watering gives uneven coverage in main nurseries and should only be used in pre-nurseries and in emergencies.

c) Quick installation as the tubing is very lightweight.

Disadvantages

a) The amount of water applied may be insufficient to fully wet the polybag soil.

b) Watering may not be efficient as seedlings >1 m high will prevent an even spray distribution. This is why installation in alternate rows rather than every fourth row is recommended.

c) Tube damage and outlet hole expansion results in leaks and lower line pressures.

c) Handwatering

Handwatering systems are labour-intensive and should only be used in small nurseries (<1 ha) or in small areas where there are problems with the main system.

The main disadvantage is that a lack of uniform watering may lead to uneven seedling growth (which makes culling more difficult).

Watering cans may be used (in very small nurseries), but usually the system consists of a reinforced hose-pipe (12-mm or 20-mm Ø) with a sprinkler rose attached. Pressure is regulated at the outlet.

d) Travelling irrigators

The irrigation water is supplied through a large flexible hose under pressure.

The forward movement is provided by the water pressure and the machine is normally guided by a wire rope anchored to a tractor or post. The irrigator tracks are designed to coincide with nursery access roads.

This irrigation method is not commonly used. A major disadvantage is that the variation in droplet sizes and the high water velocity can cause erosion in polybags and on the soil surface.

Initial setup costs are higher than the layflat sprinkler system.

MATERIALS

Water.

PROCEDURES

Prenursery

In small nurseries, seedlings may be handwatered using a 12-mm or 20-mm Ø hose-pipe fitted with a fine rose.

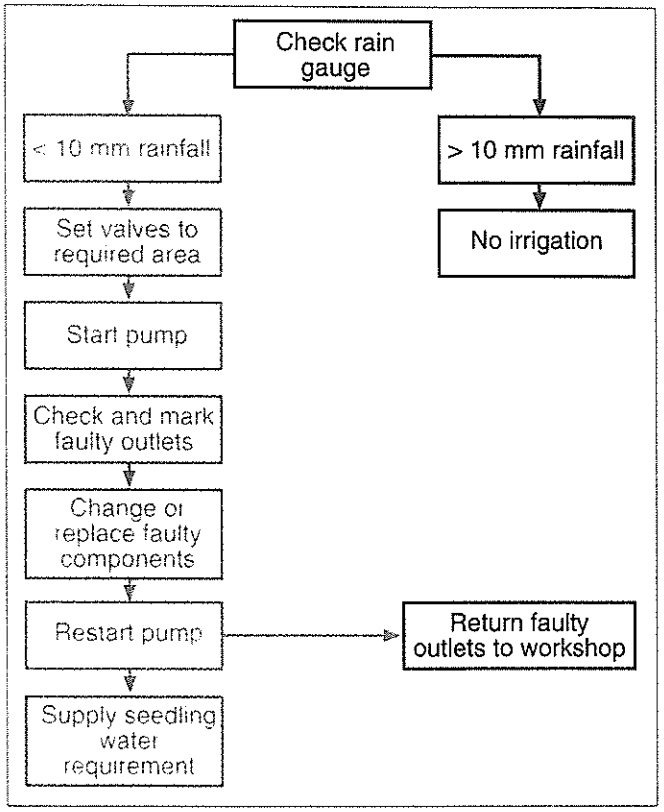
Main nursery

The general procedure for daily nursery irrigation is outlined in the diagram below.

As a guide, irrigation systems run for three hours per valve section during the wet season, and 4–5 hours per valve section during the dry season. This varies between locations but seedlings require approximately 6.5 mm water/day, equivalent to about 0.3 l water/polybag.

Layflat tubes that are damaged should be replaced as they are not costly. Attempts to repair tubes inevitably lead to more leaks and poorly watered seedlings. It is more important to prevent damage to tubes via proper installation and careful handling.

Mainline filters must be cleaned daily. Installation of filters that enable 'back washing' will minimize cleaning time.



Procedure for operation of nursery irrigation system

Do not change sprinklers, pipes or tubes or try to effect repairs while the irrigation pump is running. Sprinklers should never be repaired whilst they are attached to risers. Faulty sprinklers, rain-guns and fittings should be repaired at the nursery workshop.

The Nursery Supervisor should check that:

a) irrigation is not causing erosion in the polybag soil and exposing the seedling roots,
b) seedlings are not being 'overwatered',
c) all areas are being watered evenly, and
d) rain-gauges are checked, recorded and emptied once each day.

The irrigation operator is responsible for checking the following every day:

a) Irrigation of all planted sections in the nursery.
b) Pumps and filters.
c) Sprinkler operations.
d) Correct timing of application.
e) Soil moisture in polybags (check 20–30 bags per valve area).
f) Irrigation machinery and equipment maintenance.

FREQUENCY

Refer to the diagram under Procedures in this section.

TIMING

Irrigation events are timed so that a full nursery cycle can be completed in 24 hours or less.

TASK

Not applicable.

RECORDS

Irrigation times and quantities should be recorded daily in the Nursery Daily Diary.

Notes must be made of any checks made on distribution using rain gauges.

Data input	Frequency	Data	Calculation
Water use	Day	mm water	mm/day

TASK

seedlings/md	✗	✓	✓✓
Hand watering			
Prenursery	32,000	40,000	48,000
Main nursery	2,400	3,000	3,600

ENVIRONMENT

Do not over-irrigate as it may result in excessive runoff.

All waste fuel, oils and lubricants from pump stations must be disposed of properly.

SAFETY

Do not remove or repair any part of the irrigation system whilst it is pressurized. Stop the pump and disconnect the part before attempting repairs.

NOTES

- The Nursery Supervisor should note the usage of outlets and parts and advise management if the stock of spare parts are running low.
- Fuel and lubricant stocks for all engines and pumps must be checked daily.
- Irrigation must be designed with adequate capacity to apply at least 6.5 mm water/day to each seedling (approximately 78,000 l/ha).
- Generally, the slower the rate of application, the better the soil absorption.
- Apply 3–10 mm/hour, depending on environmental conditions.

- Check all installations for an even application pattern by placing calibrated containers at various points in the nursery to measure the output (mm/hr).
- Always test and run the irrigation system prior to the intake of a 'batch' of seedlings.
- Pressure gauges (or couplings to accept gauges) should be installed at various points in the nursery (particularly the sections farthest from the pump). Line and outlet pressures should be monitored on a weekly basis and recorded in the Nursery Daily Diary.

A main nursery using an OSS immediately after irrigation. Not that all excess water has drained away.

- The Nursery Manager should check irrigation efficiency – select 10 polybags at random from each 'batch' to determine whether the irrigation is uniformly wetting all the soil in the polybag. He should probe the soil at different levels with his finger, through the holes in the polybag. He should also check for waterlogging, the presence of pests and diseases, and poor work practices in the nursery.