Practical - 6

MULCHING IN FRUIT ORCHARDS (Plastic and biological)

Exercise

Mulching in fruit orchards (Plastic and Biological).

Objectives

- To learn about mulching in fruit orchards.
- To know different mulch materials used in fruit crops.

Delivery schedule: 01periods

Student expectations/learning objectives

- To know benefits and disadvantages associated with mulching.
- To know different mulch materials having commercial value in fruit production.

Handouts/material/equipment's & tools required: Practical note book, pen, and pencil to note down the important points on mulching etc.

Pre-learning required: Pre-requisite knowledge about cultivation of fruit trees and management of fruit orchards.

Introduction

Mulch term means 'covering of soil'. Mulches are insulating substances spread over the surface of the soil. Although one of their chief purposes is the regulation of soil temperature, they serve many other functions. Mulches conserve soil moisture because they reduce evaporation by lowering the soil temperature and by increasing the absorptive capacity of the upper layer of the soil. Erosion is reduced as a result of decreased surface runoff and the shielding effect of the mulch to driving rain. Mulches may control weeds and may be a source of organic matter and nutrients for the soil. While natural mulches such as leaf, straw, dead leaves and compost have been used for centuries. The advent of synthetic materials has altered the methods and benefits of mulching. The students studying the horticulture subject must have an idea about different types of mulches used in fruit cultivation.

Types of mulches

Materials used as mulches vary and depend on a number of factors such as availability, cost, appearance, the effect it has on the soil—including chemical reactions and pH, durability, combustibility, rate of decomposition. A variety of materials are used as mulch:

1. Organic mulch: Grass clippings, leaves, hay, straw, kitchen scraps, shredded bark, whole bark, sawdust, woodchips, cardboard, wool, animal manure etc. Many of these materials also act as a direct

composting system, such as the mulched clippings of a mulching lawn mower, or other organics applied as sheet composting.

2. Plastic mulch: Crops grow through slits or holes in thin plastic sheeting. This method is predominant in large-scale fruits and vegetable growing, with millions of acres cultivated under plastic mulch worldwide each year. However, disposal of plastic mulch is cited as an environmental problem, for which biodegradable plastic mulch material are now a days available.

For teachers…

- Ask students to practically examine different types of mulch materials.
- Practically show different types of mulch in fruit nurseries and orchards.
- If possible ask students to

Organic mulches

Organic mulches decay over time and are temporary. The way a particular organic mulch decomposes and reacts to wetting affects its usefulness. Some mulches such as straw, peat and sawdust may negatively affect plant growth because of their wide carbon to nitrogen ratio, because bacteria and fungi remove nitrogen from the surrounding soil for growth. However, whether this effect has any practical impact on gardens is disputed by researchers and the experience of gardeners. Organic mulches can mat down, forming a barrier that blocks water and air flow between the soil and the atmosphere.

Commonly available organic mulches

Leaves: Fallen leaves from trees tend to be dry and blow around in the wind, so are often chopped or shredded before application. As they decompose they adhere to each other but also allow water and moisture to seep down to the soil surface. Dry leaves are used as winter mulches to protect plants from freezing and thawing in areas with cold winters.

Fallen leaves serve as mulch

Grass clippings: Grass clippings, from mowed lawns are sometimes collected and used elsewhere as mulch. Grass clippings are dense and tend to mat down, so are mixed with tree leaves or rough compost to provide aeration and to facilitate their decomposition.

Peat moss: Peat moss, or sphagnum peat, is long lasting and packaged, making it convenient and popular as a mulch. When wetted and dried, it can form a dense crust that does not allow water to soak in. It is sometimes mixed with pine needles to produce a mulch that is friable. It can also lower the pH of the soil surface, making it useful as a mulch under acid loving plants.

Wood chips: Wood chips are a byproduct of the pruning of trees. They are used to dispose of bulky waste. Tree branches and large stems are rather coarse after chipping and tend to be used as a mulch at least three inches thick. Wood chips are most often used under trees and shrubs.

Bark chips: Bark chips, of various grades are produced from the outer corky bark layer of timber trees. Sizes vary from thin shredded strands to large coarse blocks. The finer types are very attractive but have a large exposed surface area that leads to quicker decay. Layers two or three inches deep are usually used.

Straw mulch: Straw mulch or field hay are light weight biodegradable and neutral in pH. They have good moisture retention and weed controlling properties but also are more likely to be contaminated with weed seeds. Straw mulch is also available in various colours.

Plastic mulch

Dr. Emery M. Emmert of the University of Kentucky was one of the first to recognize the benefits of using LDPE (low density polyethylene) and HDPE (high density polyethylene) film as mulch in horticultural production. Today, Dr. Emmert is considered the "father of plastic greenhouses". LDPE, HDPE and flexible PVC have all been used and although there were some technical performance differences. Owing to its greater permeability to long wave radiation which can increase the temperature around plants during the night times, polyethylene is preferred. Today the vast majority of plastic mulch is based on LLDPE because it is more economic in use.

Basic properties of mulch film

a. Air proof so as not to permit any moisture vapour to escape.

b. Thermal proof for preservation of temperature and prevention of evaporation.

c. Durable at least for one crop season.

Important parameters of the plastic film

Thickness: Normally the thickness of the film does not affect the mulching effect except when it is used for solorisation. Since it is sold by weight it is advantageous to use as thin a film as possible but at the same time due consideration should be given for the longevity of the film. The early mulch films used were of 60-75 micron (240-300 gauge) thickness, and today it is possible to have 15 micron thick film.

Perforated black polythene mulch

White polythene mulch

Width: This depends upon the inter row spacing. Normally a one to one and half meter width film can be easily adopted to different conditions.

Perforations: The perforations may be advantageous under some situations and disadvantageous for some other situation. The capillary movement of water and fertilizer distribution will be better and more uniform under unperforated condition. Prevention of water stagnation around the plants, perforation is better. But it has got the disadvantages of encouraging weed growth.

Mulch colour: The colour of the mulch affects soil temperature, temperature of air around the plants and soil salinity. In fruit production black, transparent and silver coloured plastic mulches are commonly used. Transparant film deposits more salt on soil surface however black film restricts water movement and upward movement of salt is reduced.

Selection of mulch

The selection of mulches depends upon the ecological situations and primary and secondary aspects of mulching

Rainy season	-	Perforated mulch
Orchard and plantation	-	Thicker mulch
Soil solarisation	-	Thin transparent film
Weed control through solarisation	-	Transparent film
Weed control in cropped land	-	Black film
Sandy soil	-	Black film
Saline water use	-	Black film

A view of black polythene mulch in strawberry

Methods of mulching in orchards/established trees

- Mulching area should preferably be equivalent to the canopy of the plant.
- Required size of mulch film is cut from the main roll.
- Clean the required area by removing the stones, pebbles, weeds etc.
- Till the soil well and apply a little quantity of water before mulching
- Small trench could be made around the periphery of the mulching area to facilitate anchoring of the mulch film.
- Cover the film to the entire area around the tree and the end should be buried in the ground.
- Semi circular holes could be made at four corners of the film in order to facilitate water movement.
- The position of the slit/opening should be parallel to the wind direction.
- Cover the corners of the film with 4-6 inches of soil on all sides to keep the film in position.
- In hard soil, make a trench of 1'x1'x2' depth on four corners of the mulching area and fill it up with gravel or stones, cover the trenches with the mulch film and allow the water to pass through the mulch to the trenches via semi circular holes on the film.
- Mulch should be laid on a non-windy condition.
- The mulch material should be held tight without any crease and laid on the bed.
- The borders (10 cm) should be anchored inside the soil in about 7-10 cm deep in small furrows at an angle of 45°.

Students Activities

1. Visit local fruit nurseries and orchards and note down the types of mulches used there.
2. Practically lay locally available organic mulch or plastic mulch in fruit orchards, if possible.
3. Examine different types of organic and plastic mulches and note down in the note book.

Study Material

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- Chadha, K. L. (2001). Handbook of Horticulture. ICAR, New Delhi.
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