Practical-15

Identification of Different Types of Mulches and their Application in Vegetable Crops

EXERCISE

15.1 Identification of different kinds of mulches.

15.2 Method of application of mulches in vegetable crops.

Exercise 15.1: Identification of different kinds of mulches

OBJECTIVE:

- Identification of different mulches and their importance in vegetable production.

Delivery schedule: 01 period.

Student's expectations/learning objective:

- Importance of mulch application in vegetable crops.
- To demonstrate the identification of different types of mulches.

Pre-learning required: Introduction to mulching.

Handouts/material /equipment's and tools required: Paper sheet and pen to note down the instruction, organic mulch, plastic mulch *etc.*

Introduction:

Mulching is simply a practice to cover the soil around plants with a protective material which may be organic or inorganic *viz.*, straw, grasses, plastics, *etc.* Mulches help to reduce evaporation and moderate fluctuations in diurnal soil temperature, especially in the root zone environment. It is a practice in which the organic residues are not ploughed but are placed on the surface.

Importance of mulch application

The application of mulch can help cultivation of vegetable crops in many ways.

- Mulches reduce weed growth by making conditions unfavorable for germination of weed seeds by providing a physical barrier for emerging weeds. A good mulch layer can save many hours of laborious weeding. A thick layer of organic mulch material is effective in reducing the population of annual weeds in vegetable crops, since they have difficulty in penetrating through mulch. Some small perennial weeds may also be suppressed in this way but often dandelions or other tap rooted weeds eventually find their way through the mulch. They are easy to pull since the soil stays moist beneath the mulch. Therefore, mulch suppresses weed-flora and reduces weed competition with crop for water and nutrients by making them available in greater quantities for crop plants.
- Mulches are very useful for maintaining uniform moisture conditions in the vegetable gardens by reducing water loss through evaporation *i.e.* conserves soil moisture.
- Layer of mulches also reduce soil erosion by reducing the impact of heavy rainfall.
- Organic mulch allows a slow and steady infiltration of water rather than the puddling and subsequent crusting which often do occur with a heavy rain.
- Mulches help in the production of clean and quality produce *e.g.* mulch reduces splashing of soil on the fruit surface leaving them cleaner and help to prevent the spread of diseases.
- Mulch modifies soil temperature *e.g.* plastic mulch raises the soil temperature quickly in the spring season which enhances the plant growth and thus early harvest can be obtained. Organic mulch acts as an insulator which keeps soil temperature low and, therefore, should be applied later in the season. This helps in checking seedling mortality and improving crop stand.
- Mulches improve the soil fertility *e.g.* organic mulches after decomposition add nutrients and humus to the soil, thereby, improve physical properties of the soil.

Procedure to identify different mulches

Types of mulches:

1. **Organic mulches:** They include plant residues such as saw dust, straw, leaves, corncobs, peanut hulls and pine needles, animal manures, peat moss and wood products *etc.*
2. **Synthetic mulch:** It includes clear and black polythene sheet, metal foils.

Organic Mulches

Sawdust: Sawdust is best used around permanent plantings. It is readily available from sawmills and tends to be inexpensive. A layer of 5 cm of sawdust provides good weed control. A very thin layer of sawdust (0.5 cm)

Sawdust mulch
Source: greeningthelandscapebook.com

is useful after sowing of seeds as it conserves soil moisture. There is often a problem of crusting of fresh sawdust after rainfall due to impermeability. Aged partially rotten sawdust makes satisfactory mulch that lasts for a long time.

Hay or straw: Hay and straw are readily available in rural areas. Both are recommended for vegetable and fruit plantings. A layer of 15-20 cm of hay or straw provides good control of annual weeds. They decompose quickly and must be replenished to keep down weeds. It improves the soil fertility after their decay. Avoid hay that is full of weed seed and brambles. They are more frequently used in winter season. In vegetable gardens, it is suitable for larger transplants as it can smother the small seedlings.

Hay/straw mulch
Source: organicgardening-bio-garden.blogspot.com

Pine needles: They make excellent mulch around potato, onion, turmeric, ginger *etc.* A 5 cm layer of pine needles makes excellent mulch for acid loving plants. It allows water to penetrate easily and supply nutrients as they decompose.

Pine needles mulch
Source: www.gardensandcrafts.com

Grass clippings: It is very effective mulch. Sometime it may cause problem as excessive heat may be generated from a thick layer of green grass due to sub-oxidation conditions. The air is not able to penetrate to the bottom which leads to foul smell. Therefore, a thin layer of grass clippings as mulch should be used which decomposes rapidly and in addition provide nitrogen to the growing plants. Grass clippings may be used directly as mulch around vegetables or fruit plants, or they may be composted. It is used to cover the nursery beds after sowing of vegetable seeds till germination.

Grass clippings mulch
Source:inmykitchengarden.blogspot.com

Leaves and Leaf mould mulch: Leaves are easily available and they decompose faster than other organic mulches. They improve the soil by releasing nutrients upon decomposition. It is best to chop and compost the leaves and leaf moulds before spreading. A layer of leaves, 2 to 3 inches thick after compaction, provides good annual weed control. The dry leaves are blown away by the strong wind, therefore, partial decomposition of leaves is desirable.

Peat moss: This mulch is attractive and easy to handle but expensive. Dry peat moss requires considerable time and water to become moist, so it is applied only to 5-7.5 cm layer. Due to acidic pH of peat moss, it

should be preferably used in case of acid loving plants. It tends to be blown away if applied dry and probably more suitable for incorporation into the soil.

Compost: A 5-7.5 cm layer of compost is good. It contains weed seeds thus the problem of weeds is aggravated if used as mulch. It is better to use by incorporating it into the soil since it is an excellent source of soil amendment. A layer of compost may be used on overwintering beds of perennials, such as asparagus to provide nutrients and help in protecting crowns.

Hulls and ground corncobs: Ground corncobs are very good material for mulching purpose, some people find their light colour objectionable. A layer of 5-10 cm of ground corncobs provides mulch. They can be easily blown by the wind, so heavier mulch, such as partially rotted hay or straw, may be used on top to hold down the lighter materials.

Peat mulch: Peat being fine in texture has good moisture holding capacity and it is effective soil conditioner but it does not have good nutrient value.

Poultry Mulch: Poultry litter in many areas is available at poultry farms. The litter material may be straw, sawdust, crushed corncobs or woodchips.


Woodchip mulch
(www.123rf.com)

Woodchip mulch: It is a byproduct of reprocessed timber and can be effectively used as mulch in vegetable crops.

Inorganic mulches

Plastic mulch: Plastic mulches are commercially in use since early 1960's in the United States in vegetable crops. It is the most versatile among all mulches which are at present in use. It is manufactured in different film colours, thickness and widths. The plastic film mulches are generally made from low density polyethylene or linear low density polyethylene. The benefits associated with the use of plastic mulches include higher yield, early harvest, improved weed control and increased water and fertilizers use efficiency. Plastic mulches have also an effect on plant microclimate by modifying soil temperature and restricting the soil water evaporation. Different kinds of soil mulches are as under:


Black plastic mulch

1. **Black plastic:** Black is the most common colour for controlling soil environment. Black plastic mulch increases the soil temperature by about 8°F in the spring. In mid summer, the black mulch raises the

temperature beyond threshold tolerance range which causes root damage. This problem can be minimized by providing a good foliage cover or organic mulch which prevents direct absorption of sunlight. It is important to periodically monitor soil moisture beneath the plastic. Make slits on the sheet for percolation of water. Black plastic is easy to obtain, but is fairly expensive.

- New types of black plastic mulches are available in the market which has a white reflective side to prevent the overheating problems as experienced with solid black plastic and another plastic mulch sheet is porous which allows penetration of water and exchange of gases between the soil and air.

2. **Clear plastic:** Clear films are also used as mulch. It offers limited weed control unless herbicide is applied before mulching since light can easily pass through it. This material is most often used to warm the soil temperature early in the spring to prepare an area for planting. This mulch raises the soil temperature by 10°F or more. Clear plastic is readily available and somewhat less expensive than black plastic.

Clear plastic mulch

3. **Red plastic:** Red plastic mulch reflects onto plants higher amounts of certain growth-enhancing light waves from sunlight. It has been reported that red plastic mulch enhanced tomato yield in research plots up to 20 per cent, while conserving water and controlling weeds.

Red plastic mulch

4. **Aluminium-coated plastic and foil mulch:** Its use in vegetable crops is limited. These mulches reduce insect-pests, such as aphids and viral diseases transmitted by insects. These materials decompose very slowly but they are expensive and quite unattractive mulches.

Foil mulch
(www.asianproducts.com)

Exercise:

1. Identify the following mulches

1. _____

2. _____

3. _____

Exercise 15.2: Method of application of mulches in vegetable crops

OBJECTIVE:

- Application of organic and synthetic mulches to conserve moisture, weed control and modifying soil temperature

Delivery schedule: 01 period

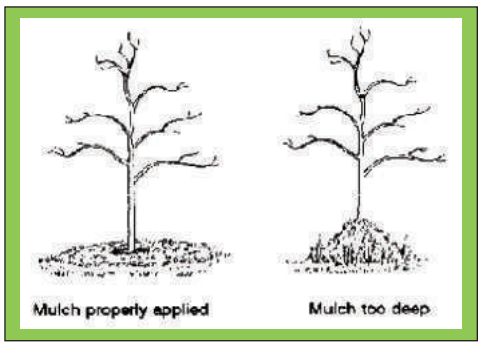
Student's expectations/learning objective:

- To demonstrate the method of application of different mulches

Handouts/material required/equipment's and tools: Paper sheet and pen to note down the instruction, organic mulch, plastic mulch *etc.*

When to apply mulch?

Time of application depends on the purpose of mulching. Mulch acts as insulating material which tends to warm up the soil in the spring and cool down in fall season.



Spring season: It is effective to apply the mulches in vegetable gardens after the soil has warmed up in spring. Cool and wet soils tend to slow down the seed germination and increase the decaying of seeds and seedlings.

Winter season: Mulches are used to raise soil temperature during winter season. Mulches can be applied late in the fall before the onset of harsh winters.

Fig. 1: (a) Hay mulch in broccoli, onion, (b) Straw mulch in capsicum
Source: www.extension.org

Procedure to apply mulch

1. Organic mulch

- Most of the organic mulches are usually applied when the vegetable crops have established well (10-15 cm tall) and the soil has warmed to near-optimum temperatures.
- It is advisable to make an area weed free before the application of mulch.
- Spread the mulch evenly over the soil surface just away from the plants.

- The amount of mulch to be applied depends on the texture and density of the mulch material.
- The thickness of wood and bark mulches should not be more than 5-7.5 cm and that of grass clippings or shredded leaves should never be more than 5 cm.
- Apply organic mulches when there is reasonably good soil moisture and before the weather turns hot.
- Organic mulches generally lower soil temperatures and conserve soil moisture by slowing evaporation while allowing rainfall to penetrate.
- Normally, organic mulch is left in the field after harvest. It helps to build soil organic matter after decomposition.
- Manual application of organic mulches is labour intensive, and is applicable for small gardens.

2. Synthetic mulch

- Plastic mulch is applied prior to planting.
- The type of mulch to be used depends upon the purpose, availability and cost of the mulch.
- Plastic sheet should be spread on land that has been completely prepared for planting and contain good soil moisture.
- Place the mulch over the row to be planted. Then bury the edges to prevent it from blowing away.
- Cut slits or make holes at the recommended spacing for transplanting or seeding a vegetable crop.

Figure 2. Tomato cultivation using black polyethylene film mulch

Source: www.extension.org

- A few additional slits can be made to allow water to infiltrate. The drip irrigation lines should be placed carefully in the rows under the mulch.
- These drip lines provide water and liquid fertilizers to the crop.
- The plastic sheets effectively control weed emergence, promote soil temperature and early crop growth.
- Weeds emerging through planting holes and path between mulched beds generally need weeding.
- Remove plastic mulches from the field at the end of the growing season.

Application of organic and synthetic mulches together

- Many vegetable farmers also apply straw or other organic mulches in alleys/paths between plastic-mulched beds, either at planting or after cultivation (Fig. 3).
- In addition to suppression of weeds on alleys, this system adds organic matter, conserves soil moisture, soil quality and prevents excessive soil heating during summer, thereby realizing many of the benefits of both organic and synthetic mulches.
- The organic mulch can also improve fruit quality in cucurbits by preventing fruit-soil contact in alleys.

Figure 3. Alleys between plastic mulched beds are covered with a thick layer of hay.
(Source: www.extension.org)

Exercise

1. Study the comparative performance of organic mulched and non-mulched tomato crop during the hot summer months.
2. Grow tomato crop in January using black plastic mulch and compare its yield performance and fruit quality with that of non-mulched tomato crop grown simultaneously.