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Mulching in Vegetable Crops

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SUMMARY

Many specific benefits are associated with mulching in vegetable cultivation. The specific impact of mulching on vegetable crops is contingent on various factors, such as the type of mulch, crop species, local climate, and soil conditions. The overall result is improved such as crop quality, characterized by enhanced size, colour, and taste. In essence, mulching emerges as a crucial practice in vegetable production, addressing challenges related to water management, weed control, temperature regulation, and soil health, thereby significantly benefiting vegetable crops.

INTRODUCTION

Mulch means covering of soil and mulching is the process of covering soil around the plants with an organic or synthetic material to create congenial condition for the plant growth, development and efficient production. The term mulch was first coined by Waggoner in 1960. The word mulch was probably derived from the German word "molsch" which means soft to decay. It has been referred to the gardener's use of straw and leaves, as a soil cover. It is also known as sheet composting.

Types of Mulches:

The material used for mulching is known as mulching material. It may be organic or synthetic.

Organic mulches degrade easily and they are locally available usually and are on-farm produced. There is no issue of post utilization handling.

For example: - Leaves, straw, grass etc.

Synthetic mulches are synthesized ones and they need prior work before using them in the field. They are easily available, easy to handle, transport & lay.

For example: - Plastic films.

Grass Clipping: These are one of the most abundantly and easily available mulch materials across the country. It provides nitrogen to the soil, if incorporated fresh. However, application of green grass in rainy season may result into the development of its own root system which will be detrimental to plant growth. Therefore, use of dry grass as mulch material is suggested.

Straw: Paddy and wheat straw are commonest mulching materials used for fruit and vegetable production. Though straw is poor in nutrient value but after decomposition, it makes soil more fertile. Among organic mulching materials, straw has a long life in comparison to other mulches (grasses, leaves and leaf mould).

Compost: The compost is one of the best mulch materials. It increases microbial population, improves the soil structure and provides nutrients. It is the excellent material for improving the health of soil.

Dry leaves: Leaves, an easily available material, are good for mulching. Though leaves are good for protecting dormant plants during winter by keeping them warm and dry but due to lightweight they may be blown away even by light wind. To counter this problem, it requires anchoring which can be done with stones, chipped bark and covering with net or some form of sheet.

Sawdust: Sawdust, obtained during finishing operation of wood, is very poor in nutritive value as it contains only half the nutrients of straw. It decomposes slowly. Being acidic in nature, it should not be used in acidic soils.

Newspaper: Newspaper mulching helps to control weeds. One to two cm thick sheet of newspaper can be used and edges should be fastened with materials like pebbles, gravels, etc. The application of newspaper mulch should be avoided on a windy day.

Bark clippings: These are good mulch materials as they are long lasting and allow proper aeration to the soil underneath. Hardwood bark clippings contain more nutrients than softwood but bark clippings are not easily and abundantly available, and some bark products may cause phytotoxicity.

Inorganic Mulch

Gravel, Pebbles and Crushed stones: Soil is covered with pebbles to prevent transfer of heat from atmosphere. These materials are used for perennial crops. Small rock Layer of 3-4 cm provides good weed control. But they reflect solar radiation and can create a very hot soil environment during summer.

Plastic Mulch: Both, black and transparent films are generally used for mulching. Advancement in plastic chemistry has resulted in development of films with optical properties that are ideal for a specific crop in a given location. These are two types.

Photo-degradable plastic mulch: This type of plastic mulch film gets destroyed by sun light in a shorter period.

Bio-degradable plastic mulch: This type of plastic mulch film is easily degraded in the soil over a period of time. Generally, the following types of plastic mulch films are used in horticultural crops.

Type of Mulch	Purpose
Perforated mulch	Rainy season
Thicker mulch	Orchard and plantation Crops
Thin transparent film	Soil Solarization
Transparent film	Weed control through solarization
Black film	Weed control in cropped land Sandy soil & Saline water use
White film	Summer cropped land
Silver coat film	Insect repellent
Thinner film	Early germination

White plastic film: It reflects more light to the plant as compared to black mulch. It is good under hot summer conditions. It has little effect on soil temperature. It keeps soil temperature down. It repels some insects.

Black plastic film: It helps in conserving moisture, controlling weed and reducing outgoing radiation.

Reflective silver film: It generally maintains the root-zone temperature cooler.

Transparent film: It increases the soil temperature and preferably used for solarization.

Selection of organic mulches

Undecomposed or partially decomposed mulch material should not have a nitrogenase activity after the application of mulch. It should not have any antagonistic effect on the crop. It should be free from the attack of insects/pests particularly termites and diseases. Determination of mulch depth and identification of plant for moisture and oxygen tolerance are the two important steps in organic mulching.

Selection of plastic mulch

Selection of film depends upon the specific purpose to be achieved such as weed control, raising of soil temperature or cooling it down, disease control or enhanced plant growth etc. Depends upon the ecological situations, Primary and secondary aspects of mulch.

Thickness of mulch: It depends on the type and age of the crop.

Crop duration	Thickness of mulch
Annual crops	25 microns
Biennial crops	50 microns
Perennial crops	100 microns

Advantages of Mulching

Moisture Conservation: Forms a protective layer over the soil, reducing evaporation and conserving moisture for optimal hydration of plants.

Soil Structure Enhancement: Alleviates soil compaction issues, enhancing soil structure and promoting better root development in cultivated crops.

Insect Management: Acts as a barrier, implementing effective insect management strategies by reducing the risk of pests reaching the plants.

Weed Suppression: Minimizes weed growth, reducing competition for nutrients and sunlight and supporting the overall health of cultivated crops.

Fumigation Aid: Contributes to fumigation processes, creating a healthier soil environment for plant growth.
Promotion of Plant Growth: Associated with an increase in plant growth, providing favorable conditions for robust and vigorous development.
Elimination of Root Pruning: Eliminates root pruning, allowing plants to establish healthier root systems.
Soil Temperature Increase: Contributes to an increase in soil temperature, particularly beneficial for heat-loving crops.
Reduced Fertilizer Leaching: Reduces fertilizer leaching, helping retain essential nutrients in the root zone for efficient nutrient uptake by plants.
Cleaner Vegetable Produce: Prevents soil splashing onto plants, resulting in cleaner vegetable produce.
Earlier Harvest: Enables an earlier harvest, extending the growing season for crops.
Frost Protection: Provides frost protection by insulating the soil and shielding sensitive plants during cold periods.
Overall Agricultural Sustainability: The multifaceted advantages of mulching contribute to improved crop quality, increased yields, and sustainable agricultural practices.

Disadvantages of Mulching

- Large scale mulching is cost intensive.
- Availability of mulching materials.
- Use of high C: N mulching materials viz., saw dust, straw results in temporary immobilization or starvation for nutrients in crops.
- Change in the soil reaction due to continuous use of same mulching material.
- Application of top-dressed fertilizers is difficult.
- Biodegradability of plastic materials
- Organic mulches may harbor termites needs frequent irrigation and spray of termiticides.
- Some of the organic mulches have allelopathic effects on crops

CONCLUSION

It is essential to find ways to increase the yield and lessen the cost of production. Thus, mulching, is one of the most important cultural practices which increase growth, yield and quality of fruits and vegetables crops. Due to multiple beneficial effects by all types of mulches including organic and synthetic, mulching becomes an inevitable in agriculture production.

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