



Importance of Plastics in Horticulture

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Important role of plastic lies in solar solarisation, nursery management, plastic mulching, green house, shade net house, low tunnel, plant protection nets, etc.

Introduction

Application of plastics offer a multitude of benefits and are considered the most important indirect horticulture input which results in moisture conservation, water saving, reduction in fertilizer consumption, help in precise application of water and nutrients, weed management, off season farming through controlled environment, plant protection through use of nets and use of innovative packaging solutions help increasing shelf life and during collection, storage and transportation of fruits and vegetables. Following are some important role of plastics in horticulture.

Soil Solarization

Soil solarization is normally done during summer months with temperature (air) more than 35 °C for controlling soil born pathogens, pest and weed seed by covering the moist soil with a transparent polyethylene film (25 micron) exposed to sunlight. The effectiveness of soil solarisation enhances plant growth by improving soil structure, color, temperature, moisture etc. Soil solarisation improve germination and helps in the development of healthy seedlings, further it helps in reducing uses of herbicides. Soil under the plastic is than soaked with water via one or more hoses or pipe outlets inserted under one end of the tarp. The soil may be irrigated before you lay the plastic, but the plastic should be applied immediately after irrigation to avoid water loss. The plastic should be left in place for 4 to 6 weeks to allow the soil to heat to the greatest depth possible. The principle mode of action is direct thermal inactivation of soil borne pathogens and pests. (Schrader, 2000)

Nursery Management

Nurseries have been using plastic in the form of soil solarisation, plastic pots, nursery bags, portrays, plug trays, crates, hanging baskets, sprayers, mini and micro sprinklers, drip irrigation system with foggers and misters, low tunnel, shade net house, green house etc. The use of plastics in nursery offers round the year nursery of different crops and helps in raise early and healthy saplings for off season crops, further it improve germination of seed and reduce mortality of seedlings. Protrays facilitate raising seedlings of cucurbits also.

Plastic Mulching

Mulching is a predominant act in inter culture operation. Mulching, primarily, refers to that condition wherein the soil around the stem of a plant is covered from all sides in such a way that adequate moisture for growth is conserved, weed do not grow and even the requisite normal temperature is maintained around the plant. Natural mulching is not possible everywhere and every time on account of unavailability of suffice material, further natural mulching also gets destroyed/decomposed in a comparatively lesser time. Of late plastic films have come into use for the purpose of mulching due to its inherent advantage of efficient moisture conservation and weed control, soil temperature retention and maintenance of soil structure. Plastic mulch increase branching, extension and diameter of root, permit CO₂ enrichment of the plant, improve germination and quality of produce. Plastic film mulches are generally made from low density polythene (LDPE) or linear low density polythene (LLDP). In plastics mulching, the thickness of film should be according to the types and age of horticultural crops. The thickness of 25, 50 and 100 micron should be used in annual biennial and perennial crops respectively. Although a variety of vegetables can be grown successfully using plastic mulches, muskmelons, honeydews, watermelons, squash, cucumbers, tomatoes, peppers, eggplant, okra, sweet corn, and cole crops have shown significant increases in earliness, total yield, and quality. Research continues on field evaluation of new formulations of degradable, wavelength-selective, and colored plastic mulches and on cropping systems to use best these specific improvements. The use of plastic mulches for the production of vegetable crops continues to increase throughout the United States and the World. (Lament, 1993)

Protected Structure

Green house: Green house is a framed structure covered with glass or transparent plastic in which plants are grown under the partially or fully controlled environment. (Sanwal., *et al.*2004). The greenhouse technology has been considerable importance in better space utilization, growing crops in extreme climatic conditions and high rainfall areas. The plastic film used in greenhouse act as selective radiation filters. The solar radiation pass through it and trap the thermal energy inside the greenhouse, which is emitted by the objects that are kept inside, this phenomena is known as greenhouse effect.

Shade Net House: Shade net house is a framed structure made of material such as GI pipes, Iron angle, wood or bamboo. It is covered with plastics net (nets are made of 100 % polythene thread with specialized UV treatment) having different shade percentages. It provides partially controlled atmosphere and environment by reducing light intensity and effective heat during day time to crops grown under it. Hence provides round the year seasonal and off-season cultivation is possible.

Low Tunnel: These structures are laid out in open field to cover row of plant with transparent plastic (30-40 micron thickness) film stretched over steel hoops at about 50 cm height. Low tunnels are miniature structure producing green effect. These tunnels facilitate the entrapment of CO₂, there

by enhancing the photosynthetic activity of the plants and enhance the yield. Row covers used in vegetable production have different in temperate and tropical region. In cold condition, they are used to conserve warmth, stimulate and early growth, protect plant from frost injury and improve the quality of the crops. Other beneficial effects such as maintaining soil structure and protecting crops from high winds rain, snow, attack of birds and pests. The main advantage of these covers in northern India is to grow vegetable specially cucurbitaceous crop ahead of normal season in winter.

Plant Protection Nets

Nets are used for the protection of plants from excess sunlight, heavy rainfall, snow, hail, wind, insect etc. The selection of nets used varies as per the application with different mesh size or strength to withstand weather conditions.

Innovative Packaging Solution

Packaging is one of the most critical areas in the distribution and marketing of horticultural produce. Traditional packaging techniques such as wooden crates and gunny bags have many disadvantages. The properties in plastics such as flexibility, light weight, cost effective, hygienic, safe, and transparent provide invaluable contribution for the processing, storing, preserving, and transporting of produces. Innovative packaging products are used with many advantages.

References

- Lament WJ. 1993. Plastic mulches for the production of vegetable Crops. *Hort Technology*, **3(1)**. Pp. 35-39.
- Sanwal SK, Patel KK and Yadav DS. 2004. Vegetable production under protected conditions in NEH region: problems and prospects. *ENVIS Bulletin: Himalayan Ecology* **12(2)**.
- Schrader WL. 2000. Plasticulture in California vegetable production. *University of California*, Pp. 1-9.