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The Utilization of Plastics in the Production of Horticulture

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INTRODUCTION

The utilization of plastics in horticulture has experienced significant progress over the remaining decade. We are aware that plastics have a significant impact on many fruit crops, from planting to post harvest handling and processing. Plastics are utilized at every stage of the horticultural life cycle, including seed packaging, planting, propagation, mulching, irrigation, harvesting, fruit packaging, and preservation. The utilization of plastics in the agricultural industry is commonly referred to as Plasticulture. Plasticulture represents one of the most valuable indirect agricultural/horticultural inputs that holds the potential to transform agriculture and facilitate the emergence of the "Second Green Revolution." Plastics are used in greenhouses to help plants grow and produce, as well as in containers for seedlings and soil solarization to reduce pest and disease. Plastics are very useful because they can be coloured, melted, shaped, squashed, cheap, light weight, impermeable to moisture, and grasses rolled into sheets or made into fibers. Plastics have numerous applications in both qualitative and quantitative horticultural production, including:

- **Propagation and nursery**
- **Mulching**
- **Protected Cultivation:**
- **Drip irrigation**
- **Soil solarisation**
- **Sleeving**
- **Packaging**

Propagation and nursery: Polythene is commonly employed in propagation processes such as layering, budding, and grafting. In grafting, polythene film is used to tie stock and scion so that the vascular cambium matches with each other. Rooting becomes easily occurring. Red, blue, and black polythene wrappers have higher success in rooting and survival by increasing physiological activities that are necessary for cell division and cell enlargement.

Mulching: Mulching refers to the practice of covering the soil around a plant with materials such as sawdust, compost, grass, hay, dry leaves, stones, or plastic sheet to mitigate evaporation, control soil temperature, prevent erosion control, eradicate weeds, enrich soil, and preserve fruit cleanliness. It reduces the soil temperature and microclimate in the plant root zone, which in turn increases yield and early-season crops. Generally, black plastic mulch film is utilized in fruit production. However, two-sided coloured plastic mulch film, such as yellow/black, white/black, red/black or silver/black, is also utilized in specific crops, which determine its energy radiating behavior and also have an impact on the macroclimate surrounding the plant.

White/Black: It contributes to soil cooling.

Silver/Black: It also aids in the cooling of the soil, however, there is limited availability of white and black plastic mulch.

Red/Black: It is translucent in nature, and is translucent in nature.

It helps to maintain a warm soil. Plastic mulch film has different thicknesses and can be used for different types of plants, such as medium-term crops, 25 to 50 microns, and long-term crops, 50 to 100 microns. Nowadays, LDPE (Low Density Polyethylene) and LLDPE (Linear Low Density Polyethylene) plastic covers are used in mulching. The thickness used for plastic mulch is 25 to 40 microns in fruit cultivation.

Protected Cultivation: A greenhouse is a framed structure that is covered with glass or plastic film, where plants are grown in a partially controlled environment. The greenhouse technology has been utilized to enhance space utilization during crop cultivation in areas with high elevations and high rainfall. The plastic films used in greenhouses are used as selective radiation filters. Greenhouse cultivation is very important because it can moderate temperature and humidity, increase yield quality, and reduce crop duration. It also conserves moisture, so it needs less irrigation. It also helps to grow crops in different climatic conditions.

Drip Irrigation: The precise and regulated software program application of irrigation water and plant nutritional at low stress and conventional intervals through drippers/emitters without lengthening into the root place of plant with the aid of close proximity of pipes is referred to as a drip irrigation system.

Advantage of Drip Irrigation:

- To improve quality, ensure early maturity of the crops, and achieve water savings of up to 40%
- The control of weed growth results in the reduction of fertilizer usage (30%) and labor expenses (10%).
- Fertilization and chemigation can be used to control diseases. The use of saline water is possible.
- The elimination of soil erosion is suitable for undulating land, resulting in a high water use efficiency and an increase in the production and productivity of fruit crops.
- The most important feature of plastics in drip irrigation systems is that they are corrosion resistant. This system is predominantly comprised of HDPE (High Density Polythen. The sub lines and lateral lines having wide range of wall thickness from 0.5 to 2 mm.

Soil Solarization: It is usually done during the summer months when the air temperature is above 35°C. It is accomplished by covering the moist soil with a transparent polythene film exposed to sunlight. Soil solarisation has

the potential to prevent the growth of weeds, the occurrence of bacteria, fungi, nematodes, and other soil-borne pathogens and pests, thereby reducing the utilization of weedicide/herbicide and pesticides. The impact of soil solarization enhances plant growth by enhancing soil colour, structure, temperature, moisture, among other factors.

Sleeving: The sleeving technique involves using a cylindrical plastic bag of 16-18 micron thickness with both ends open. It is used to protect the banana bunch from wind, rain, hail, dust, pest, etc. It protects the skin of fruits from leaf insect and bird damage as they mature. Due to the uniform sleeving, fruit size is uniform and larger throughout the bunch, and also fruit gets better colour.

Packaging: The area of packaging holds significant importance in the distribution and marketing of agricultural products. The product is visible from the outside and increases shelf-life of the produce because it is flexible, light weight, cost effective, and transparent.

CONCLUSION

For qualitative and quantitative horticultural production, plastics can be used for various purposes, such as mulching, cladding materials for protective structures, nets pressurized irrigation, soil solarization, and plastic trap propagation, sleeving and packaging. Plastic used in fruit crops increases production, but it also reduces pest, disease and weed populations. Furthermore, it extends the shelf life of fruit crops and saves fertilizers and water. This approach reduces the utilization of herbicides and pesticides in comparison to conventional methods.