

Plastic Mulch and Drip Irrigation



Plastic Mulch and Drip Irrigation (or plasticulture) is a practice that can be applied on cropland fields that are used for fruits, vegetables, or stems flower production. This practice is applicable on gently sloping sites which allow for long rows (usually no more than 400 ft.) that can be divided into zones to facilitate water requirements and good drainage. To ensure proper drainage, a contour survey of the site is recommended to determine water flow between raised row beds. In order to ensure adequate drainage and minimize erosion, row gradients should be at least 0.5 percent, but no steeper than 1 percent. The end of the rows should be established to a dense stand of grass as a filter strip.

Preparation and Planning

A water supply of sufficient quantity and quality is the first thing that should be evaluated. A well is a good water source since it requires little filtration; however, water quality can become an issue in ground water and may cause emitters to clog. Ponds and streams require a filtration system which adds considerable cost to the irrigation system. Where available, a community water system may be the best alternative for small acreages. Pressure regulation should be a part of the system to insure

proper distribution of water. Also, backflow prevention equipment should be installed to prevent contamination of the water supply. Chemigation (injection of fertilizer, etc.) through the system is an important consideration when using plasticulture. Without chemigation equipment, proper delivery of fertilizer to the plant root zone is very difficult.

The maximum size of the cropland field used with this practice is two acres, if applied through the Alabama Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) for Limited Resource Farmers (LRF)-Limited Resource Small Scale Farmer Initiative (LRSSFI). Additional acreage can be applied at the discretion of the producer without cost-share assistance.

Three to four weeks prior to plastic installation, the field should be deep plowed and plant residue thoroughly incorporated to allow for decomposition and to avoid problems with plastic installation, seeding, and transplanting.

Plant Beds

The beds must be made correctly. There is no room for error. Row beds should be loose and friable, and free from stones, clods, and plant residue. If present, these factors can prevent

good contact between the soil surface and the plastic mulch limiting the maximum warming of the soil and early growth in spring plantings. Soil should be thoroughly tilled to achieve a well-pulverized soil that can be formed into a firm, smooth bed, free of clods and residue or debris.

Good soil moisture is essential to make firm beds. Recommended available water capacity (AWC) should range between 60 and 80 percent. AWC is estimated on site, based on appearance and feel of the soil in the plow zone. The NRCS document "Estimating Soil Moisture by Feel and Appearance" can be used to make AWC field estimates.

Mulch Machines

Mulch machines have a dispenser capable of holding at least one roll of plastic, furrow openers at the edge of the bed, press wheels to push the edges of the film into the open furrow, and discs to cover the edges of the plastic (tuck). Most machines will also have some means of controlling tension on the plastic as it is being laid. Drip applicators are normally attached to the front of the mulch layer. Fumigation equipment may also be attached to the mulch layer. If fumigant is applied in a separate operation, follow the instructions on the label.



Some fumigants should be covered with plastic film immediately after application.

To prevent wind from getting under the plastic (blowing and flapping problems) during installation, pull the plastic mulch tightly to the bed. Also, make certain that the edges of the plastic are tight along the side of the bed and held firmly in the soil.

Take time to adjust the plastic laying machine when needed. The press wheels should hold the plastic firmly against the bed and the discs should throw soil at least half-way up the side of the bed, but not on top of the bed. When starting the plastic application at the beginning of each bed, anchor the plastic by covering it with soil. At the end of each bed, cut the plastic off the roll and immediately cover the loose end with enough soil to firmly secure it.

Most plastic mulch machines can inject fumigant and install plastic and the drip tube in one operation. It is

very important for the grower to: (1) match the plastic system equipment with the needs of their operation, (2) purchase well-built, functional equipment, and (3) learn how to properly use the equipment before placing plastic in the field. For some growers, custom application by trained professionals is a more desirable alternative.

Proper placement of the drip tube is essential for effective irrigation and becomes even more critical if fertilizers are to be injected. Keep in mind, if it is not done correctly the first time, the plastic mulch will not allow a second chance.

Drip Irrigation (Tube)

There are two primary factors influencing the placement of the drip tube—the soil type and the number of rows per bed. Soil type significantly influences the movement of water. In lighter sandy soils, lateral movement of water near the soil surface is no more than 8 to 10 inches along each side of the tube. Lateral movement in moderate to heavy soils may extend 10 to 15 inches past each side of the tube.

Although the drip tube may be placed on top of the soil, surface placement makes it more accessible to rodents and insects. Also, temperature fluctuations at the soil surface can cause contraction and expansion of the tube and it may “snake” or wander from the

original location. This can result in too much or little water/fertilizer being applied in the root zone. Shallow subsurface placement (1 to 2 inches) of the drip tube is preferred.

Although upward and lateral movement of water in loose, sandy soils is limited, downward movement occurs readily. This can result in moisture deficiency near the soil surface and subsequent stress on recently seeded or transplanted crops. Therefore, in sandy soils, the drip tube should not be placed more than 1 inch deep.

Plans and Specifications

Specifications for applying plasticulture should be prepared for using existing micro-irrigation, mulching, nutrient and pest management standards, job sheets, narrative statements in the conservation plan, or other acceptable documentation offered through NRCS.

Plastic Disposal

The producer will be responsible for proper disposal of plastic at the end of the season in an environmentally safe manner.

Reference

The University of Georgia College of Agricultural and Environmental Sciences Cooperative Extension Service.



Preparing soil beds and placing plastic using mulch machine.

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