

Production Basics – Strawberry Plasticulture

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A lack of adequate weed control options for 1st year strawberry beds has stimulated interest in the annual hill system for strawberry production. This system as used in California and Florida is dependent on soil fumigation as a key element while in New England, growers use a combination of crop rotations, black plastic mulch (vs. the clear plastic used in CA and FL), and raised beds to help in management of weeds and soil diseases. In addition, trickle irrigation tape is placed under the black plastic.

There are two basic options for use of this system in New England: plant dormant crowns into black plastic covered raised beds in late spring/early summer or plant live plug plants into similarly prepared beds in late summer/early autumn. It is the fall planting option that has generated the most interest. For the fall plant option, the basic calendar looks like this:

- 1) Summer soil preparation. Usually, this consists of growing a vegetable crop like sweet corn, summer squash, beans, or some other crop that will be maintained relatively free of weeds and can be turned under by late August. Alternatively, a summer cover of Sudan grass or Japanese millet could be grown for mid-August soil incorporation. During this summer, soil drainage, pH and nutrient deficiency issues need to be addressed.
- 2) Prepare the beds. Usually a bed shaper/former that forms a 6 inch high, flat topped bed and lays both the trickle tape and black plastic mulch is used. It is critical that the soil be properly moistened before beds are formed. Dry soil covered with plastic mulch is difficult to wet and plant growth will be compromised, perhaps severely, if attention to this important detail is deficient. I typically use 4 foot wide plastic, 1.25 or 1.5 mil and hopefully manufactured with high levels of UV inhibitors (this is especially important when pulling mulch). 5 foot plastic is a bit easier to put down, but removal is more difficult. I space rows 5 feet on center, requiring about 17,000 plants per acre. Be sure the trickle tube is centered on the bed.
- 3) Late summer/early autumn – plant. Plug plants are set about September 1 in Durham although we have had good response planting as late as September 15. In colder areas of interior northern New England, planting a week or so earlier is desirable. A cautionary note is in order – plug plants sell out quickly so make the decision to plant and order early – you will not be able to get what you want at the last moment.
Planting is generally done by hand. Many growers use a water wheel or similar device to punch holes. We want to set plants in a double, staggered row with one row down each side of the plastic covered bed. Plants within each of the two rows are set 12 inches apart. Select a punch slightly smaller than the plugs you are setting to insure tight soil contact with plug when it is jammed into the planting hole.

- 4) Care during September and early October. If runners emerge in substantial numbers, run through the bed once in early October and remove them. An early October application of nitrogen at the rate of 5-7 lb/acre through the drip system can be made if growth is not adequate. In some 10 separate plantings, I have yet to determine that this nitrogen was necessary (because I took care of soil fertility pre-plant). One final touch I suggest – mulch the bare soil aisles with straw to help keep fruit clean in spring. Some fruiting clusters will contact soil.
- 5) Apply floating row cover in mid-October. Use a floating row cover of medium to heavy weight. It is worth the effort to purchase wide covers fitted to your field. This floating row cover will create a warm, lighted environment that will promote growth and development into December and more importantly in late winter as soon as snow cover is gone. No additional winter protection is needed; however, plants wintered under floating row cover will fruit at least 10 days to 14 days ahead of those covered with organic mulch such as straw. This means growers must be prepared to fight frost earlier and perhaps more often than with plants in the matted row system and must have access to early markets.
- 6) What about straw mulch? Some growers choose to use organic mulch for winter protection, primarily to delay harvest in the spring to more a “normal” harvest window. The floating row cover is still applied in mid-October. It is removed a few days ahead of mulching with straw in December. While this will delay harvest in the spring, it will also reduce yield potential as the largest impact of floating row cover is the result of light exposure and environmental modification in late winter/early spring.
- 7) Spring – harvest. Expect large crops of exceptional quality fruit, free of major insect and disease problems.
- 8) Post harvest – renovate. Rip off runners and mow foliage 2-3 inches above crowns. Plants will re-grow quickly – you will need to remove runners again in late September or early October. Apply floating row cover, again in mid-October. Fruit a second spring but with this harvest delayed a week or two due to the increased plant cover shading the black plastic mulch, reducing its effect on soil warming. Post harvest, plow it down.

The second major option is to plant dormant crowns into black plastic covered, raised beds mid to late June. The same basic system is used. Raised beds, complete with trickle tape are formed and covered with black plastic. Planting again is done in double, staggered rows with plants 12 inches apart within each row. Planting is a bit more labor intensive as dormant crowns are simply more difficult to set in the punched planting holes. I trim roots of dormant crowns to a uniform 4 inches or so in length to facilitate planting. How does the time table flow for this method of planting?

- 1) Soil preparation is again critical – I like to select a site where a good cover crop or sweet corn or pumpkins were grown the previous summer.
- 2) You will be planting dormant crowns into black plastic during the hot part of the summer – set up the solid set (overhead) irrigation system for plant cooling, especially the first 3 weeks from planting.
- 3) While runner development will be less than for plants set in May, there will be some and they should be removed.

- 4) Cover with floating row cover (early harvest) October 1 or with straw in late November/early December (late harvest).
- 5) Fruit in spring, then plow planting down.

What About Varieties?

Without a doubt, Chandler has been the most productive variety in our fall plug plantings. Typical yields in Durham, NH are 11,000 lb/A in the first spring after planting and 12,000 lb/A in the second. Other varieties have done well. Cavendish has been almost as productive and Northeaster, Jewell, Seneca and Allstar have produced well, but none of these has yielded as well as Chandler in this system. In addition, Chandler fruits have been flavorful and very uniform in shape and size. Cavendish will produce some extremely large fruits, but its lack of uniform ripening of individual fruits is still an issue. And Allstar color is definitely a weakness in this system. The following table shows yield data collected in 1999-2000 – it is representative of the yield response we see with use of the annual hill system using fall planted plugs. These are 2 year yields.

| VARIETY | Lb/A |
|-------------|--------|
| Avalon | 12,279 |
| Northeaster | 17634 |
| Chandler | 23185 |
| Seneca | 13630 |
| Jewell | 14126 |

For early summer plantings using dormant crowns, Cavendish was extremely productive among the many varieties we have looked at, producing over 17,000 Lb/A in the first year and an additional 6,000 plus pounds in year 2 for a total of over 23,000 Lb/A over the life of the planting. Interestingly, fall planted Cavendish plugs in the same trial yielded almost 23,000 Lb/A as well, 11,000 in the 1st year and 12,000 in the 2nd. Seneca in the same trial performed better when planted as a fall plug – almost 18,000 Lb/A vs. 12,000 for dormant crowns planted a full growing season earlier.

Why are yields for these early summer dormant crowns significantly lower in their second harvest when compared to fall planted plug plants? Simply put, the plant develops a complex of many branch crowns but due to the plastic mulch system, has no way for new plant/soil contact needed for new root development to occur. A second interesting piece of information relates to the level of pest injury in unsprayed plots. Tarnished plant bug injury represented the bulk of injury seen. That level was about 15% for fall planted plug plots but exceeded 40% for early summer dormant crown plots. Why? Plant debris was distinctly more dense around these latter plants and offered excellent hiding places. Additionally, the fall planted plug plants began fruiting a full 8 days ahead of the early summer dormant crown plants, offering both early harvest and the potential of being developmentally ahead of the insect pests.

There are several variations to these systems in trial in grower plantings around New England. Several growers are established living mulches in aisles to reduce weed management inputs and provide a clean harvest environment. In colder areas, the system is being used

without the use of 6 inch raised beds to reduce risk of cold temperature injury to the plants. But all have the use of black plastic, trickle irrigation, and establishment of the final field plant population at harvest as common characteristics. Given the current and likely future herbicide outlook, this trend is likely to continue. And the use of fall planted plugs offers growers several distinct advantages:

- The field is available for other cash crop production the season before planting; if dormant crowns are used, actual yields per year are much lower due to a “down” grow year
- Pest pressure is reduced, offering organic and reduced pesticide growers a viable production option
- Growers can select a winter protection system, organic mulch or floating row cover, to affect harvest date
- Growers can quickly respond to changes in market demand or poor plant performance in other strawberry plantings
- Labor on most veg/berry farms is more available for fall planting than for late spring/early summer plantings

The use of intensive management systems for strawberry is constantly evolving. More changes are likely, and the best ideas for manipulating strawberry plasticulture for maximum benefit will likely come from you, the grower.