

Fall-planted annual strawberries

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The last several years we have planted strawberries on black plastic in the fall for harvest the following spring. This is the standard commercial technique in California and Florida. Recently this method has become popular in several other states. We will discuss how we have used this practice on our farm, a six-acre certified organic vegetable and fruit farm in northeast Oklahoma (zone 6).

Why Fall-Planted Strawberries?

Fall-planted, black plastic strawberries have several benefits over the traditional, spring-planted matted row system - higher fruit yields, bigger berry size, and less weed pressure. The latter is probably the biggest advantage to us as organic farmers. We are a two person farm (no interns or employees), and it is important we minimize labor requirements. Unlike the semi-perennial matted row system, we till in the fall-planted strawberries at the end of each June. The thought of weeding, watering, and maintaining yet another crop during the hot summer months is not appealing. With annual fall-planted strawberries, we get a fresh start each season. In addition, the black plastic greatly reduces hand weeding.

There are, however, some disadvantages associated with this system—namely, the higher annual cost of plant purchases, laying the black plastic, and labor-intensive transplanting every fall.

The Fall

We till the field several times to create a weed-free soil before we plant the strawberries. The strawberries follow our summer cover crop of millet and cow peas. We apply and incorporate six to eight tons per acre of chicken manure several weeks prior to planting.

We lay the plastic with a tractor-pulled mulch layer at the end of September. It is essential to apply the plastic securely to prevent air pockets from forming. The soil in the bed should be firm, the plastic tightly stretched and smooth. This will enable the ground to heat up faster and stay hotter longer in the cool fall weather. This facilitates foliar and root growth before the onset of winter. At the same time the plastic mulch layer shapes the bed and lays the plastic, it buries a line of drip tape. We place a heavy layer of straw mulch in between the beds in order to prevent weeds from growing and soil from splashing on the plants.

In our area of the country, we plant strawberry plugs at the beginning of October. This gives them two full months of growth before December, when we generally start experiencing consistently frosty or freezing overnight low temperatures. We plant plugs, or well-rooted tips, instead of bare root fresh-dug crowns for a number of reasons. Fresh-dug crowns are generally not available for planting until mid to late October. While

only a few weeks later, this time makes a crucial difference in the plant's establishment and success later in spring. Also, fresh-dug crowns need more babying to encourage vegetative development than do plugs.

We plant two rows of strawberries on beds that are twenty-four inches wide on the top. The plugs are planted sixteen inches apart within the row and are offset so that they are sixteen inches apart between the rows as well. We use a home-made planter constructed from 1 1/4" PVC that pokes a hole in the plastic. The planter is an upside-down "U" shape, with each leg sawn off at the bottom to create a sharpened tip. Each leg makes a hole in the plastic, and a wooden slat attached perpendicularly four inches above the bottom of the legs makes the hole only as deep as it we want it. Each leg is spaced sixteen inches apart. The wooden slat extends another sixteen inches and has a long screw drilled through the end. This makes a mark in the plastic where the next hole will be located. We then place the planter on the mark, push down with our feet on the wooden slat until it touches the plastic, remove, and begin again. The person not making the holes follows and transplants each plug by hand. The plug is dropped in the hole, and the soil is firmly patted down around the roots. It is important to plant at the correct depth so that the roots are well-buried but the crown remains above the soil.

We plant two thousand plugs per year, and on our two-hundred-foot-long beds that amounts to six beds of strawberries. We buy our plugs from G & W Nurseries in Arkansas (goodson01@windstream.net) which sells plants for around \$300/1,000 plants. There are several other places around the country that sell plug plants. Bare root fresh-dug crowns are half the price but come with the challenges mentioned above. It is also possible to grow your own plugs with tips. This is a labor-intensive process as the tips require a sophisticated misting system as they get established, and for a little more money we would rather pay someone else to manage that process.

Immediately after transplanting, the plugs are irrigated until the soil beneath plastic is well saturated. The plants are kept moist until the first hard freeze. Additionally, we foliar-feed with a fish/kelp mixture every other week until the first frost. Both these inputs—water and nutrients—encourage healthy plants capable of surviving winter weather.

Incidentally, we find Chandler to be the most productive variety with the best flavor. We have tried Camarosa, but the fruit must be incredibly ripe to achieve a decent flavor.

The Winter

During winter the main activity is protecting the plants from very cold temperatures. If the temperature is forecast to drop below sixteen degrees, we cover the beds with Agribon 19. Metal hoops cut from ten gauge fencing wire are placed every five to six feet to keep the row cover from resting directly on the plants. The hoops create a mini-greenhouse along the top of the bed. We use sandbags half filled with gravel to hold down the row cover. The sandbags make it easy to cover and uncover the strawberries as needed. When uncovering the strawberries, we remove the sandbags completely from one side of the bed. On the other side, we tuck the row cover under every other sandbag. When it is time to cover the beds again, one of us lifts up the tucked in row cover while the other stretches it over the hoops and re-lays the sandbags. Row cover should only be left on when temperatures are below sixteen degrees. Any time the weather will be warmer, the row cover should be removed to prevent plants from coming out of dormancy in the artificially warm environment under the row cover. In practice, that can mean many days of covering and uncovering throughout the winter, but when done

right this effort will pay off handsomely in the spring. At some point in the winter (generally mid-January through mid-February), temperatures are consistently cold enough to leave the row cover on permanently.

It is important to allow the plants to experience several frosts and light freezes before covering them the first time. This promotes hardening-off of the crowns. However, if the weather has been unusually warm and then suddenly gets unseasonably cold, the crowns will be damaged. In that case, it is important to cover them. One year we lost almost all our plants because we received bad advice and didn't cover them when temperatures dipped into the single digits. This year they survived a record-breaking twenty-seven degrees below zero with the row cover and several inches of snow as protection.

The Spring

At the end of February, when temperatures begin to moderate, we remove the row cover. If we leave the cover on too long, the plants are more likely to flower prematurely. In Oklahoma blooming starts in the middle of March, so it is also important to allow the bees to pollinate the flowers to prevent cat-facing. We leave the row cover in the field next to each row in case of a freeze. Once the plants begin flowering, it is vital to protect the buds from frost damage. Our motto regarding spring row cover applications is: if in doubt, roll it out. If there is any chance in the forecast for a frost, it is prudent to cover the plants. Even a light frost can damage open flowers. Frost-damaged flowers will sometimes simply fall off, but not always! Some will continue to grow and create oddly-shaped fruit. Other fruits will appear perfect on the outside but will be rotten inside (a real challenge when harvesting). We cannot stress enough the importance of avoiding frost on flowers and buds. When planted, each crown contains all the flowers it will ever produce already stored inside, so any loss from frost or freeze cannot be "made up" later on with special care. Flowers killed by frost or freeze equal lost income.

Once the plants are six to eight inches in diameter in early spring, we foliar fertilize with the fish/kelp emulsion every week to ten days. We continue that schedule until the fruits are large and nearly ready for harvest. Although strawberries are heavy feeders, fish and kelp provide ample nutrients for strong fruit-set.

This year we started picking strawberries the third week in April and harvested until the second week in June, for a total of eight weeks. A general rule is to expect a pound of fruit per plant over the course of the season. The row cover can help accelerate fruit onset, which provides a longer harvest before the summer heat sets in.

Perhaps the greatest challenge to organic strawberry production is disease control. A heavy rain followed by cool temperatures is a sure bet for rotten fruit the subsequent week. Air flow is the best fungicide, which is why we will space our plants a little further apart this coming fall. We have not tried hoophouse strawberries yet but can imagine the potential for rainfall protection.

Why Black Plastic?

We tend to shy away from black plastic for philosophical reasons, but we have found there is no other viable means of growing fall-planted plugs. We experimented with winter cultivation and no mulch or plastic, but weeds were a constant battle and the fruit was filthy after a rain. We tried straw mulch both between the beds and within the rows, but without a miraculously seed-free straw source this method is tantamount to planting

weeds. More importantly, the straw keeps the soil cool and shaded, slowing down fall establishment and spring emergence dramatically.

Fall-planted strawberries on black plastic are successful because the plastic gives plants much-needed fall and spring heat, protects fruit from soil splashing and disease, and holds down weeds in an organic system. And though they are labor-intensive during growth and harvest, strawberries are a customer magnet and provide a profitable and delicious start to the growing season.