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# DAYNEUTRAL STRAWBERRY PRODUCTION GUIDE

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# WHAT IS A DAYNEUTRAL STRAWBERRY?

Dayneutral strawberries are uniquely different from Junebearing types and older everbearers such as Ozark Beauty, Gem, Superfection, Ft. Laramie, or Our Own. Dayneutrals flower and fruit continuously when temperatures are moderate because they are insensitive to daylength, which normally controls flower initiation. In northern climates, Junebearers form flower buds during the short days of autumn, and these buds complete development and open during early spring. Dayneutrals, on the other hand, form flower buds under any daylength and continue to grow so long as temperatures are suitable.

Dayneutrals and Junebearers are extremes along a continuum of photoperiodic types. The older everbearers, which fall in the middle, initiate flower buds under longer days than Junebearers. They produce a large spring crop and a smaller fall crop. True dayneutrals produce a fall crop the year of planting and, in subsequent years, cycle through production peaks every six weeks from June onwards (figs. 1 and 2). These cycles become less pronounced with cool summer temperatures. After the first year, the spring crop starts about four to seven days before the early season Junebearers (i.e. Earliglow).

Dayneutrals themselves fall along a continuum in their ability to flower during the summer, and they have been classified as either weak, intermediate, or strong. Tribute and Tristar are strong dayneutrals because they flower profusely and runner sparsely during the summer. Flowers also form on runners. Strong dayneutrals are small plants with a moderate number of crowns that produce small leaves. The proportion of total dry weight in the root system of dayneutrals is approximately one-third that of Junebearers, but the allocation of dry weight to fruit is considerably greater. Brighton, Hecker, and Fern are strong dayneutrals from California. Intermediate and weak dayneutrals, such as Selva, have more Junebearing characteristics, such as a stronger tendency to runner in summer.

An important way to increase sales of strawberries to consumers is to extend the marketing season. The dayneutral trait is advantageous to commercial strawberry growers because it allows fruit production from June through October in northern areas and from January through August in mild coastal climates. This difference in growing season between geographical locations exists because dayneutrals do not initiate flower buds above 85°F (30°C) or grow when temperatures fall below 35°F (2°C).

Royce Bringhurst of the University of California, Davis, recognized the potential of the dayneutral trait in wild strawberry plants collected from the Wasatch Mountains in Utah. He backcrossed these plants into breeding lines until a commercially acceptable dayneutral strawberry was produced. The first dayneutral types were released in 1980 and named Brighton, Hecker, and Aptos. These cultivars did well under moderate coastal California conditions but did not perform in warmer or colder climates.

Donald Scott of the U.S. Department of Agriculture in Beltsville, Maryland, realized that northern growers also could benefit from a dayneutral strawberry adapted to warmer summers and colder winters and resistant to soil diseases. He selected several progeny of crosses from eastern germplasm and the original wild dayneutrals. In 1981, Gene Galletta and Arlen Draper of the USDA and Harry Swartz of the University of Maryland introduced Tribute and Tristar to northern growers. These sister selections produce fruit of consistently high quality and are resistant to several races of red stele and verticillium wilt.

Modifications of cultural systems are necessary to produce high-quality, high-yielding dayneutral strawberries in northern climates. Some growers have had poor results with dayneutral cultivars because they have treated them as conventional Junebearers. During the last several years, researchers have shed new light on how to grow dayneutrals as a commercial crop. This guide is intended to provide growers with the latest information on dayneutral culture.

# EXPECTATIONS

Total yields of dayneutrals are quite high. With 20,000 plants per acre (50,000 per hectare), yields of more than 25,000 pounds per acre (28 tons per hectare) are attainable the year of planting, and even more in subsequent years. Heavy soils favor a large first-year crop; hot summers or cold winters reduce second-year yields.

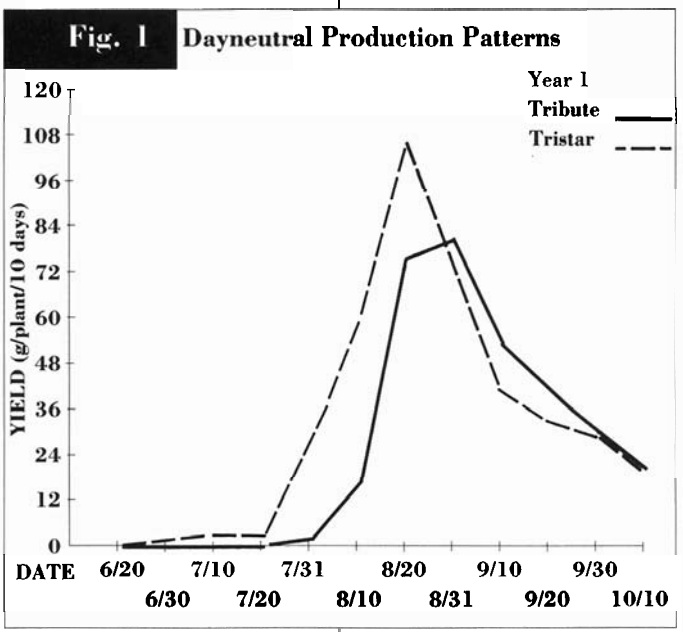
Although total yields are high, not all berries are marketable because some may be too small and others may be rotten or damaged by the tarnished plant bug. Observations over several years suggest that a reasonable marketable yield for a well-managed bed is 12,000 pounds per acre (13.5 tons per hectare) in the first fruiting year and 16,000 pounds per acre (18 tons per hectare) in the second fruiting year. In the second

year, however, at least half the fruit ripens with the June crop and the remaining fruit ripens throughout the later growing season (figs. 1 and 2).

A grower must decide whether to grow dayneutrals as an annual or perennial. Although annual culture is more expensive in terms of plant purchase and site preparation, weed control and pest problems are less, mulching for winter protection is not required, and production peaks can be staggered for more consistent production. Fruiting in the second year results in higher yields, but much of the production occurs in June when the price of strawberries is low. An economic comparison of the two systems is in the last section of this guide.

When plants are held into their third year, management becomes extremely difficult because crown numbers are very high, berries are small, and weed and pest problems are great. Fruiting for three consecutive years is not economical for most growers.

**Fig. 1** Distribution of yield during the planting year for Tribute and Tristar planted in early May, with flowers removed for 6 weeks after planting and all runners removed; spacing = 6 plants per meter.



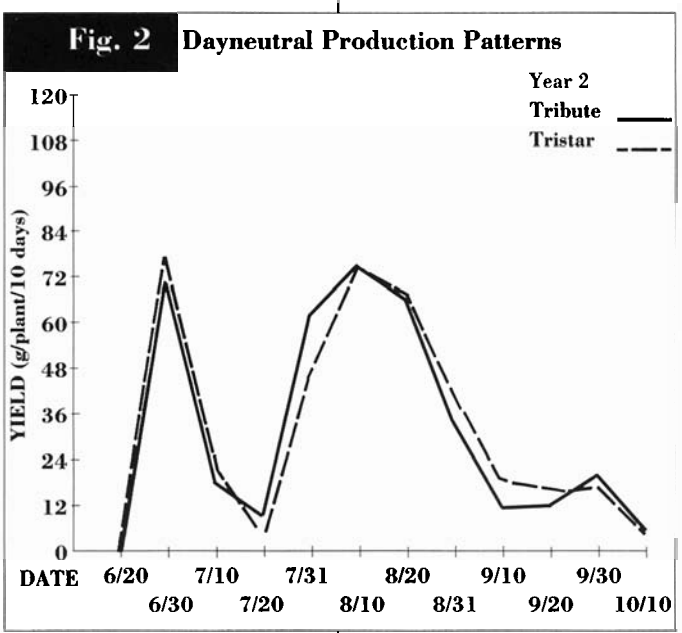




**Fig. 2** Distribution of yield for Tribute and Tristar during the second year after planting; spacing = 6 plants per meter.

## MARKETING

Experience has shown that growers must market dayneutrals as something special—not as typical strawberries shipped from another state. The intense flavor and color of dayneutral strawberries are well accepted by buyers. In the last several years, prices in late summer have been at least twice as high as those in June. Successful marketing outlets are restaurants, roadside stands, farmers' markets, and grocery chains.

Few growers succeed in selling dayneutrals through pick-your-own operations. Because consumers do not expect strawberries to be available later than July, growers inevitably pick and market the berries themselves. The most successful growers market their crops in large cities, often making biweekly trips to the city market. Berries that are too small for the fresh market can be cut and frozen or made into jam. Tribute and Tristar freeze well and make excellent jelly and jam.

Because dayneutral strawberries require so much attention, the number of other crops a grower can produce is restricted. Growers should not plant too many dayneutrals because the crop is expensive to grow and the market for them is limited.

# PREPLANT CONSIDERATIONS

## Site Selection and Preparation

In selecting a site for planting, several factors must be considered. These are soil, surface drainage, availability of water for irrigation, exposure, and previous crops. Dayneutrals do not require full sun for the entire day and perform well if they are shaded from the afternoon sun. A source of water is necessary to irrigate plants, to evaporatively cool them, and for frost control in both spring and fall. A location close to market is not critical, particularly since berries are not likely to be sold through a pick-your-own operation.

Dayneutrals grow best in sandy loam to clay loam soils high in organic matter. Their shallow root systems need soil with a good water-holding capacity. A preplant cover crop increases the organic matter content of the soil and improves its water-holding capacity. Because plants are small, they do not compete well with weeds. Eliminate perennial weeds from the planting site before setting the strawberry plants.

Nutrient levels should be adjusted prior to planting so adequate potassium, phosphorus, magnesium, and calcium are available for growth and production. A soil test from a local laboratory will indicate which nutrients need to be amended. Use limestone to raise the soil pH if it falls below pH 6.5. Dayneutrals perform well in soils amended for Junebearing strawberries.

## Fumigation

Consider soil fumigation when starting a new strawberry planting. Fumigation controls nematodes, soil insects, soil diseases, and weeds and should be done in the fall prior to the planting year. Spring fumigation is not recommended because an interval between fumigation and planting is required.

Soil preparation is necessary for fumigation to be effective. Since fumigants move through the soil air, the soil should be friable (loose) and free of clods. Weed and crop residues must be fully decomposed because fumigants loose effectiveness when absorbed by organic matter and nematodes can survive fumigation inside roots. The soil should be moist, but not wet (50 percent field capacity), and the temperature should range between 45° and 75°F (7° to 24°C) at a 6-inch (15-cm) depth.

When choosing a fumigant, consider the method of application, its effectiveness for specific problems, state regulations, and cost. Some fumigants are applied through an irrigation system and others are injected. Still others require injection followed by a plastic tarp covering for several weeks. The cost of fumigating ranges from $300 to $1,300 per acre ($750 to $3,250 per hectare).

Fumigants exhibit different degrees of control for weeds, diseases, and nematodes. Nematode populations are determined by specific soil tests, and disease pressure is estimated from an assessment of site history. Some fumigants are more effective on cold soils, and others are preferable for heavy soils. Consult your state recommendations for legal fumigants and their rates and relative effectiveness.

## Cultivar Selection

Tribute and Tristar are more productive in eastern North America than Fern or Selva. These latter two cultivars have firm fruit and good fall production, but fruit quality is not as high as that of the former two. The performance of Fern is better in the Midwest. Brighton, Aptos, and Hecker do not perform well in the East. Yolo, Mrak, and Muir have not been thoroughly tested.

*Tristar.* Plants have moderate vigor and are small to medium in size. Plants runner in the spring after chilling but form few runners in the summer and fall. Leaves and crowns are tolerant of powdery mildew and leaf scorch but susceptible to leaf spot. In the planting year, the production peak of Tristar occurs in late August. In subsequent years, plants produce two equal crops, one in June and the other through the summer. In northern growing areas, yields in the first year are usually less than those of Tribute, but second-year yields are equivalent. In southern growing areas, Tristar outperforms Tribute in both fruiting years.

Fruit flesh and skin are very firm, and berries are glossy red at harvest. Internal color is deep red throughout. Flavor is excellent and ranks with the best of the Junebearing types. Flavor development lags slightly behind color development, so berries should be fully colored before harvest. Berry size is related to temperature, with small size associated with warm temperatures and medium-sized fruit with cool temperatures. Many consider the berry's conical shape to be ideal. The fruit has some tolerance to gray mold.

*Tribute.* Plants have high vigor, resulting in medium-sized plants. Plants runner after winter chilling but form few runners after fruiting begins. Leaves are resistant to powdery mildew and tolerant to leaf scorch but susceptible to leaf spot. In the planting year, the production peak of Tribute occurs in September, after Tristar. In subsequent years, plants produce a large June and summer crop, coinciding with Tristar production.

Fruit flesh and skin are very firm, but the color is not as intense as that of Tristar, and a white collar often forms below the calyx. Fruit is more rounded than Tristar and often wedge-shaped with pronounced shoulders. Flavor is not as strong, but size is larger. The fruit has some tolerance to gray mold.

## Plant Supply

Growers must use healthy plants to start a new planting, buying plants only from certified plant propagators. A list of certified growers can be obtained from local extension agents.

Strawberries supplied by certified plant propagators are derived from virus-tested mother plants, which are as free as possible from known strawberry viruses. Virus diseases reduce the vigor and yield of all strawberry cultivars.

Dayneutral plants will be in short supply for several years to come, so growers

should order their plants early. Dayneutral nursery stock is difficult to propagate because plants produce few runners and must be started from tissue culture to get the best multiplication rates. Also, the demand for dayneutral plants is greater than for conventional Junebearers because high plant densities are required and the life of the planting is short.

# CULTURAL PRACTICES

## Bed Preparation

Dayneutrals grow well in raised beds with black plastic and trickle irrigation, similar to the California system which uses clear plastic. The raised bed and black plastic allow the root system to warm in spring, and the trickle irrigation lines provide water and nutrients. Using black plastic increases yields in the first year by up to 50 percent compared with yields of unmulched plantings. It also reduces evaporation, thereby lessening the volume of water needed. Weed competition is almost eliminated.

Some studies suggest that black plastic causes excessive heat buildup in summer, resulting in reduced berry size. This can be prevented by using white on black plastic or covering the black plastic with straw when soil temperatures rise.

If black plastic with raised beds is not an option, then make flat beds after thoroughly working the soil. Heavily mulch the entire bed with weed-free straw immediately after plants are set. If plants are to be overwintered, flat bed culture may be better than raised beds because raised beds require significant amounts of straw for winter protection.

## Systems and Early Care

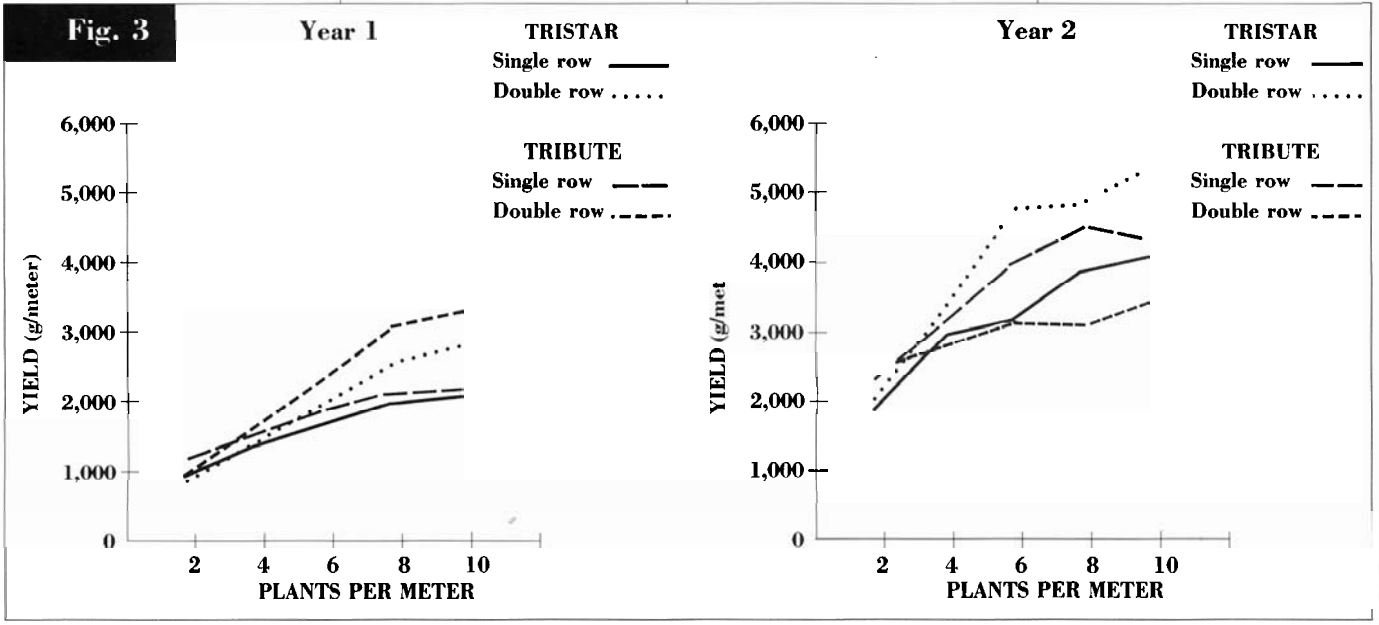
Dayneutrals perform best when planted in high densities and with runners removed. A very efficient planting design is a staggered double row with plants set 7 inches (18 cm) apart, offset 4 inches (10 cm) from center, with 4 feet (1.2 m) or less between row centers. At plant densities of 20,000 per acre (50,000 per hectare), double rows outyield single rows by 30 percent (fig. 3). Growers who plant dayneutrals as an annual crop can increase plant densities even further (to a 5-inch, or 12-cm, spacing) without sacrificing significant yield per plant.

Researchers have shown that dayneutrals have higher yields and larger berries when mulched. If plants are set through plastic, the mulch is already in place. When setting plants on a flat bed, place weed-free straw around them. This helps establish the plants, cools the soil, and retains moisture.

Remove runners from all plants throughout the season. Although this task is intensive early in the season, it becomes insignificant later because runnering decreases markedly after fruiting begins.

Remove flowers for 6 weeks after planting to allow the plants to achieve sufficient size for fruiting. Failure to remove flowers

**Fig. 3** Response of Tribute and Tristar to planting density and row configuration



results in smaller plants and lower yields. Extending the period of flower removal beyond 6 weeks results in less production the first year but in larger plants and yield the second year.

Staggered planting dates spread the harvest season in the first year and reduce weekly variation in yield. Plants set early in spring (late April or early May) reach peak production 12 to 14 weeks later (late August). Planting a portion of the field in early June results in high yields later in the season (fig. 4). Planting after mid-June results in substantially reduced first-year yields. Perhaps a better way to obtain late first-year crops is to remove flowers for a period longer than six weeks after planting. This alternative is more labor intensive but results in higher yields over the entire season (fig. 5).

## Nutrition

Dayneutrals benefit from a continuous supply of nitrogen and potassium. Additional phosphorus is not needed if an adequate supply is incorporated before planting.

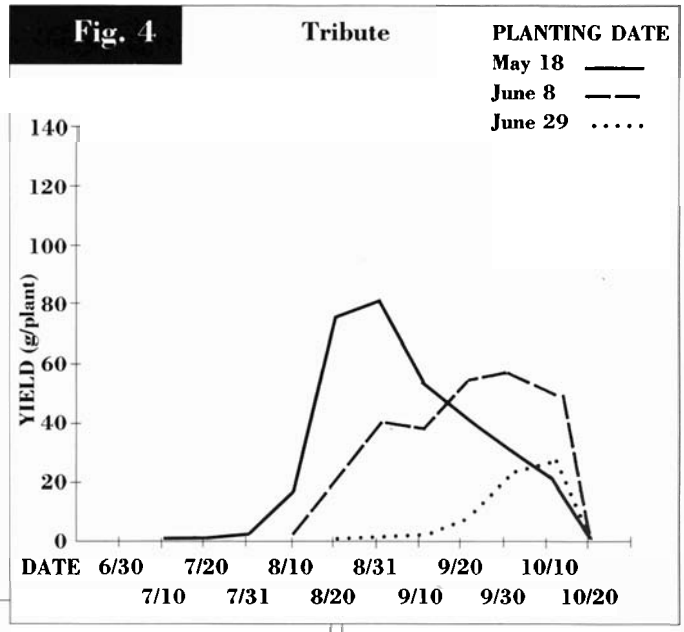
A large amount of fast-acting nitrogen fertilizer applied to dayneutrals at any one time softens fruit and causes excessive vegetative growth. There are three ways to avoid this yet supply adequate nitrogen during the season. The first is to apply 30 pounds per acre (34 kg per hectare) of nitrogen in monthly intervals throughout the growing season. Do not allow the fertilizer to accumulate on the leaves, especially if they are wet. The second way is to use a slow-release fertilizer at planting. Nitrogen release is a function of temperature, so check the soil at the end of the first season to determine if all the nitrogen was released under your climatic conditions. The third option is to apply 5 to 6 pounds per acre (6 kg per hectare) of nitrogen through the drip irrigation system every week. Calcium nitrate is the preferred source of nitrogen early in the season, but urea can be substituted when temperatures rise.

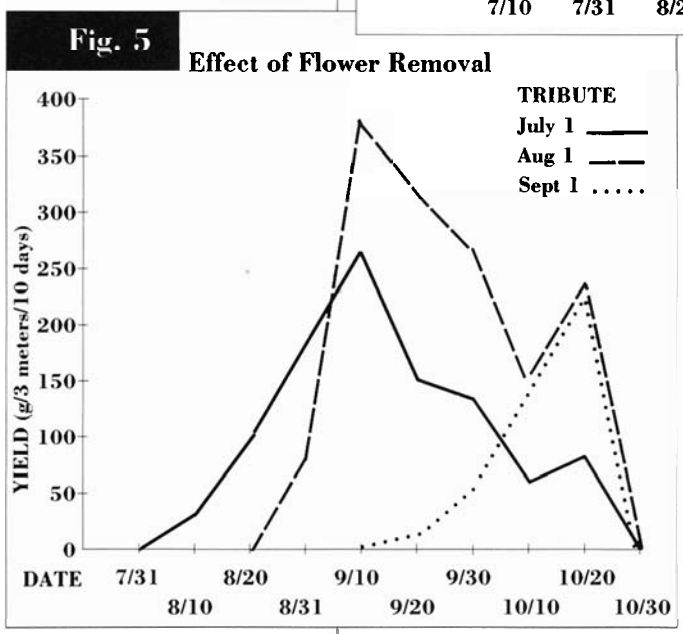
On soils low in potassium, such as sandy soils, supplement the preplant potassium with 10 pounds per acre (11 kg per hectare) of $K_2O$ at monthly intervals, or 2 pounds per acre through the drip irrigation system at weekly intervals during the growing season.

Dayneutrals are large consumers of boron because of their commitment to reproduction. Monitor leaves occasionally to ensure that boron levels do not fall below 30 ppm. If boron levels fall, apply 2 pounds per acre (2 kg per hectare) of solubor in midsummer. The zinc level should remain above 20 ppm. Because phosphorus antagonizes zinc uptake, balanced fertilizers containing phosphorus are not recommended if the soil was amended properly before planting.

**Fig. 4** Distribution of yield for Tribute following planting on different dates

**Fig. 5** Distribution of yield for Tribute following flower removal from planting in mid-May through the indicated dates; plant spacing is 0.5 meter.




## Second Fruiting Year

Some growers choose to retain their dayneutral plantings for a second year. This is advisable if a companion crop of Junebearers is short. To hold plants over for a second year, apply a herbicide in late November prior to mulching with weed-free straw. Remove the straw before the end of March and place it between the rows.

In the second year, dayneutrals produce a normal June crop before they continue flowering to produce the summer crop. This early crop starts 4 to 7 days before the early Junebearing cultivars but gives smaller berries than the Junebearers.

Because the berries are small, June prices are low, and labor is a problem, some growers choose to eliminate the June crop. To do this, mow the plants to within 2 inches of the crown at first petal fall. Timing is important. Studies show that mowing earlier or later than first petal fall reduces yield. Mowing eliminates the June crop and, compared with not mowing, results in a smaller August

crop but a larger late September crop. Overall, mowing reduces the size of the berries and decreases yield by about one-third.

Some runners develop in spring of the second year, but these can be tilled under if they reach into the aisle. Continuing selective runner or flower removal into the second year is not practical.

Nutrient requirements for the second year are similar to those of the first except that fertilizer applications should begin in April or early May rather than after planting.

Second-year plantings become noticeably less productive in September when first-year plantings are still vigorous.

## PESTS

Weeds are a major problem in dayneutral plantings because the small strawberry plants are not good competitors with weeds. Good preplant preparation is essential for good weed control. Black plastic mulch reduces weed growth except in the immediate area of the plant and the aisles. The weeds near the plant can be removed easily during harvest and the aisles kept clean with a herbicide.

When black plastic is not used, apply herbicides at or soon after planting. High rates of some preemergent herbicides reduce growth on some soils. Days-to-harvest restrictions require growers to apply herbicides soon after planting. For further information on weed control, contact your local extension agent.

The tarnished plant bug causes the biggest insect problem for dayneutral growers. Populations of this insect increase during the summer, and the strawberry flower is a preferred food. Failure to control this pest results in nubby berries in 20 to 30 days. The greenish nymphs actually do the most damage to flower parts. These can be monitored by shaking flower clusters over a white saucer and counting nymphs. Control measures are warranted if more than two nymphs are observed per foot of row. Insecticides, if used, should have negligible toxicity to bees, and they should be applied regularly every ten days in the evening after bees return to their nests. Days-to-harvest restrictions present scheduling problems for picking. The grower can accommodate these intervals by treating only a portion of a field each day. For further information on control of the tarnished plant bug, contact your local extension agent.

Gray mold is the biggest disease problem of dayneutral strawberries. Because berries are continuously present, mold inoculum increases during the season. Remove moldy berries from the planting, and protect flowers every 10 days to 2 weeks with a fungicide, especially after rainy periods. Some growers reduce fungicide sprays during the warm periods of July and August, particularly on crops where black plastic is used.

Tribute and Tristar are susceptible to leaf spot and partially resistant to leaf scorch and mildew, but these diseases do not present a major problem in annual plantings.

## IRRIGATION SYSTEMS

Ideally, both overhead and trickle irrigation should be available. Use the trickle system to apply water and nutrients and cool the soil. Use the overhead irrigation system to apply pesticides, cool the plants, and protect the plants from frost in spring and fall.

are excellent monitors of soil moisture. Readings should be maintained at less than 50 centibars in loamy soils and at less than 20 centibars in sandy soils. If water is provided by overhead irrigation only, apply 2 inches (5 cm) per week during the summer months. With trickle irrigation, daily applications of water best maintain the correct soil moisture, particularly under black plastic. On sandy soils, rates of up to 0.1 gallon per square foot per day are required under black plastic. Without mulch, rates of up to 0.75 gallon per square foot per day are required to maintain yields.

Some growers report that cooling plants when temperatures are greater than 85°F (30°C) significantly improves berry size and quality. Start overhead irrigation when the temperature rises above 82°F (28°C) and cease irrigating in late afternoon so plants can dry before evening, thereby reducing disease pressure. Overhead irrigation is better for delivering pesticides than PTO sprayers, which compact the soil. Most pesticides can be injected into the irrigation lines to provide complete coverage using a large volume of water.

# HARVESTING

Dayneutrals should be harvested only after they are fully ripe to allow maximum flavor to develop. During the spring and summer, pick berries twice a week. Later in the season the rate of ripening slows, and a one-week harvest interval is sufficient.

Pick dayneutrals into pint containers to avoid compressing the berries on the bottom. Also, dayneutral strawberries in pint containers look proportionately like Junebearers in quart containers. Separately pick the rotting and small berries and remove them from the field to avoid contaminating the healthy fruit.

Refrigerate the berries immediately after harvest if they are to be held overnight. Temperatures near 32°F (0°C) are optimal. After the berries have lost their field heat, wrap the flats in plastic. When marketing the berries, remove the plastic only after the berries inside the flats have warmed to the temperature of the display. This practice minimizes condensation on the fruit and prolongs shelf life.

# ECONOMICS

## Production Costs

The first task of a grower considering commercial production is to develop an enterprise budget. The following budgets were developed in 1988 to compare annual with perennial dayneutral strawberry culture on a per acre basis. They are based on the following scenario.

A grower finds good land, which costs $200 per year to either own or rent, and reliable persons to work for $5 per hour. The grower has access to a tractor, plow, fertilizer spreader, disk, harrow, rototiller, fumigator, weed sprayer, and bed shaper. A nearby source of water provides water for trickle and overhead irrigation. The cost of a pump, a filter, an injector, and overhead irrigation components is $250 per year for the life of the system.

The perennial and annual systems require the same preplant preparation, which consists of performing soil tests, applying a systemic herbicide, plowing, applying nutrients, liming, disking, harrowing, fumigating, and cover cropping. Preplant preparation is required once every 2 years for the perennial plantings and each year for the annual plantings.

Both systems use black plastic raised beds with trickle and overhead irrigation. The grower has access to a device that shapes the bed and lays the trickle line and black plastic in one operation. The cost of materials for this operation is $0.06 per foot, with 10,850 feet of row per acre.

Plants are set by hand in a staggered double row at a density of 20,000 per acre (6.5 inches apart) and a cost of $0.10 per plant. Planters can set three plants per minute.

Prior to shaping the bed, the grower incorporates nitrogen fertilizer into the bed at a cost of $175 for materials. Preemergent herbicide is also applied after planting to prevent weed establishment in the planting hole and between the rows. In each subsequent month of the growing season, the grower spends $100 on fertilizers. While the plants are flowering or fruiting, the grower sprays fungicides and insecticides every 10 days.

Deblossoming and derunnering are required once in May, twice in June, and again the first of July. Workers can manipulate five plants per minute. The planting is hand weeded for 10 hours every month of the growing season. In the perennial system, an additional 30 hours are needed in May to clean up the planting before fruiting begins.

Straw is applied between the rows of both systems after planting, and the perennial system is mulched

**Preplant Preparation**

| Operation | Month | Labor or Service ($/acre) | Materials ($/acre) | Total Cost ($/acre) |
|---|---|---|---|---|
| Soil sampling | May | 5.00 | 25.00 | 30.00 |
| Apply herbicide | May | 10.00 | 45.00 | 55.00 |
| Plow field | July | 35.00 | | 35.00 |
| Apply nutrients | July | 10.00 | 250.00 | 260.00 |
| Disk field | August | 25.00 | | 25.00 |
| Harrow field | August | 15.00 | | 15.00 |
| Fumigate field | September | 30.00 | 525.00 | 555.00 |
| Seed cover crop | September | 10.00 | 25.00 | 35.00 |
| Land cost and overhead | | | 200.00 | 200.00 |
| Real estate taxes | | 15.00 | | 15.00 |
| Miscellaneous expenses | | 50.00 | | 50.00 |
| Total | | 205.00 | 1,070.00 | 1,275.00 |

heavily with straw at the end of the first fruiting year.

The grower pays $0.67 per pound ($0.50 per pint, $6.00 per flat) to the picker, which includes sorting out the small, moldy, or damaged berries and carrying them from the field. Picking costs are higher for dayneutrals than for June-bearers because dayneutrals are smaller and not as concentrated in the row and sorting must be done in the field. The grower uses pint containers ($0.04 each) and 12-pint flats ($0.52 each). A 12-pint flat holds 9 pounds of fruit (3/4 pound per pint).

Marketable yield is 12,000 pounds per acre in the first year—5,000 pounds each in August and September and 2,000 pounds in October. In the second fruiting year of the perennial system, yields are 6,000 pounds per acre in June, 2,000 in July, 4,500 in August, 2,500 in September, and 1,000 in October, for a total of 16,000 pounds.

The grower finds a market for all the berries and receives $1.75 per pint in August, September, and October and $0.75 per pint in June and July.

The cost of marketing and advertising the berries is assumed to be $0.10 per pound, but it can vary greatly.

The cost summary for the annual system includes production costs plus the cost of preplant preparation. The preplant cost for the perennial system is included every other year.

## Implications

For the scenario described, the relative costs and revenues of the annual and perennial systems do not differ significantly. The annual preplant and planting costs of the annual system are offset by the overwintering expenses and greater costs for pest control of the perennial system. Given the similarity between the net return of both systems, the choice of planting system depends on how well the assumptions hold for a particular situation. The most important assumption for the perennial system is that the entire June and July crop will be sold at $1.50 per quart. Therefore, choose the perennial system only if June-

**Annual System**

| Operation | Month | Labor or Service ($/acre) | Materials ($/acre) | Total Cost ($/acre) |
|---|---|---|---|---|
| Fertilize | April | 10.00 | 175.00 | 185.00 |
| Rototill | April | 75.00 | | 75.00 |
| Bed shaper, plastic mulch, trickle irrigation line | April | 50.00 | 650.00 | 700.00 |
| Set plants | May | 600.00 | 2,000.00 | 2,600.00 |
| Herbicide | May | 10.00 | 55.00 | 65.00 |
| Overhead irrigation | May | 40.00 | 250.00 | 290.00 |
| Remove flowers and runners, once | May | 335.00 | | 335.00 |
| Remove flowers and runners, twice | June | 670.00 | | 670.00 |
| Fertilize | June | 10.00 | 100.00 | 110.00 |
| Remove flowers and runners, once | July | 335.00 | | 335.00 |
| Fertilize | July | 10.00 | 100.00 | 110.00 |
| Hand weed | July | 50.00 | | 50.00 |
| Pesticide sprays | July | 15.00 | 140.00 | 155.00 |
| Fertilize | August | 10.00 | 100.00 | 110.00 |
| Hand weed | August | 50.00 | | 50.00 |
| Pesticide sprays | August | 15.00 | 140.00 | 155.00 |
| Harvest | August | 3,334.00 | 556.00 | 3,890.00 |
| Fertilize | September | 10.00 | 100.00 | 110.00 |
| Hand weed | September | 50.00 | | 50.00 |
| Pesticide sprays | September | 15.00 | 140.00 | 155.00 |
| Harvest | September | 3,334.00 | 556.00 | 3,890.00 |
| Harvest | October | 1,333.00 | 222.00 | 1,555.00 |
| Take down irrigation | October | 25.00 | | 25.00 |
| Take up plastic | October | 200.00 | | 200.00 |
| Marketing/advertising | | 800.00 | 400.00 | 1,200.00 |
| Land cost | | 200.00 | | 200.00 |
| Interest on investment | | 200.00 | | 200.00 |
| Real estate taxes | | 15.00 | | 15.00 |
| Total | | 11,801.00 | 5,684.00 | 17,485.00 |
| Preplant preparation | | 205.00 | 1,070.00 | 1,275.00 |
| Total, annual system | | 12,006.00 | 6,754.00 | 18,760.00 |

**Perennial System, Planting Year**

| Operation | Month | Labor or Service ($/acre) | Materials ($/acre) | Total Cost ($/acre) |
|---|---|---|---|---|
| Fertilize | April | 10.00 | 175.00 | 185.00 |
| Rototill | April | 75.00 | | 75.00 |
| Bed shaper, plastic mulch, trickle irrigation line | April | 50.00 | 650.00 | 700.00 |
| Set plants | May | 600.00 | 2000.00 | 2600.00 |
| Herbicide | May | 10.00 | 55.00 | 65.00 |
| Overhead irrigation | May | 40.00 | 250.00 | 290.00 |
| Remove flowers and runners, once | May | 335.00 | | 335.00 |
| Remove flowers and runners, twice | June | 670.00 | | 670.00 |
| Fertilize | June | 10.00 | 100.00 | 110.00 |
| Remove flowers and runners, once | July | 335.00 | | 335.00 |
| Fertilize | July | 10.00 | 100.00 | 110.00 |
| Hand weed | July | 50.00 | | 50.00 |
| Pesticide sprays | July | 15.00 | 140.00 | 155.00 |
| Fertilize | August | 10.00 | 100.00 | 110.00 |
| Hand weed | August | 50.00 | | 50.00 |
| Pesticide sprays | August | 15.00 | 140.00 | 155.00 |
| Harvest | August | 3,334.00 | 556.00 | 3,890.00 |
| Fertilize | September | 10.00 | 100.00 | 110.00 |
| Hand weed | September | 50.00 | | 50.00 |
| Pesticide sprays | September | 15.00 | 140.00 | 155.00 |
| Harvest | September | 3,334.00 | 556.00 | 3,890.00 |
| Harvest | October | 1,333.00 | 222.00 | 1,555.00 |
| Take down irrigation | October | 25.00 | | 25.00 |
| Herbicide | November | 10.00 | 55.00 | 65.00 |
| Apply mulch | November | 50.00 | 500.00 | 550.00 |
| Marketing/advertising | | 800.00 | 400.00 | 1,200.00 |
| Land cost | | 200.00 | | 200.00 |
| Interest on investment | | 200.00 | | 200.00 |
| Real estate taxes | | 15.00 | | 15.00 |
| Total, first year | | 11,661.00 | 6,239.00 | 17,900.00 |

bearing strawberries are in demand in your area.

The annual system provides more consistent production throughout the summer if planting dates or blossom removal periods are staggered. Also, cost estimations vary depending on the relative yield of the first compared with the second-year crop.

To estimate the number of dayneutrals to plant, multiply by 50 the maximum number of hours you and other workers can spend on dayneutrals during any one week. For one acre, the work load requires ten persons during August and September. The work load is irregular through the first season with April, May, June, July, August, September, and October requiring 1, 9, 6, 4, 33, 33, and 14 percent of the effort, respectively. With dayneutral strawberries, the labor cost is approximately twice the cost of materials.

The most important assumption of this analysis is that the grower sells the berries at the designated price. This requires that the grower identify the markets and transport the berries to them in excellent condition. The cost of cooling and transportation is estimated at $0.10 per pound, but it can vary depending on the distance to market. Transportation costs are usually high because no single buyer is likely to purchase large quantities. Consider all these factors before assuming the large investment involved in dayneutral strawberry culture.

## Perennial System, Second Fruiting Year

| Operation | Month | Labor or Service ($/acre) | Materials ($/acre) | Total Cost ($/acre) |
|---|---|---|---|---|
| **Remove mulch** | **March** | **50.00** | | **50.00** |
| Overhead irrigation | April | 40.00 | 250.00 | 290.00 |
| Fertilize | April | 10.00 | 100.00 | 110.00 |
| Pesticide sprays | May | 10.00 | 40.00 | 50.00 |
| Fertilize | May | 10.00 | 100.00 | 110.00 |
| Hand weed | May | 200.00 | | 200.00 |
| Pesticide sprays | June | 15.00 | 140.00 | 155.00 |
| Fertilize | June | 10.00 | 100.00 | 110.00 |
| Hand weed | June | 50.00 | | 50.00 |
| Harvest | June | 4,000.00 | 667.00 | 4,667.00 |
| **Pesticide sprays** | **July** | **15.00** | **140.00** | **155.00** |
| Fertilize | July | 10.00 | 100.00 | 110.00 |
| Hand weed | July | 50.00 | | 50.00 |
| Harvest | July | 1,333.00 | 222.00 | 1,555.00 |
| Pesticide sprays | August | 15.00 | 140.00 | 155.00 |
| Fertilize | August | 10.00 | 100.00 | 110.00 |
| Hand weed | August | 50.00 | | 50.00 |
| Harvest | August | 3,000.00 | 500.00 | 3,500.00 |
| Pesticide sprays | September | 15.00 | 140.00 | 155.00 |
| Fertilize | September | 10.00 | 100.00 | 110.00 |
| Hand weed | September | 50.00 | | 50.00 |
| Harvest | September | 1,667.00 | 278.00 | 1,945.00 |
| Harvest | October | 667.00 | 111.00 | 778.00 |
| Take down irrigation | October | 25.00 | | 25.00 |
| **Take up plastic** | **October** | **200.00** | | **200.00** |
| Marketing/advertising | | 1,067.00 | 533.00 | 1,600.00 |
| Land cost | | 200.00 | | 200.00 |
| Real estate taxes | | 15.00 | | 15.00 |
| Total, second year | | 12,794.00 | 3,761.00 | 16,555.00 |
| Preplant preparation | | 205.00 | 1,070.00 | 1,275.00 |
| Total, perennial system | | 24,660.00 | 11,070.00 | 35,730.00 |

## Cost Summary

### Annual and Perennial Dayneutral Strawberry Culture

| | Year 0 | Year 1 | Year 2 | Total |
|---|---|---|---|---|
| ANNUAL SYSTEM | | | | |
| **Yield (lb/A)** | 0 | 12,000 | 12,000 | 24,000 |
| **Expense ($/acre)** | 1,275.00 | 18,760.00 | 18,760.00 | 38,795.00 |
| **Revenue ($/acre)** | 0.00 | 28,000.00 | 28,000.00 | 56,000.00 |
| **Profit ($/acre)** | -1,275.00 | 9,240.00 | 9,240.00 | 17,205.00 |
| **Cumulative profit ($/acre)** | -1,275.00 | 7,965.00 | 17,205.00 | 17,205.00 |
| PERENNIAL SYSTEM | | | | |
| **Yield (lb/A)** | 0 | 12,000 | 16,000 | 28,000 |
| **Expense ($/acre)** | 1,275.00 | 17,900.00 | 17,830.00 | 37,005.00 |
| **Revenue ($/acre)** | 0.00 | 28,000.00 | 26,667.00 | 54,667.00 |
| **Profit ($/acre)** | -1,275.00 | 10,100.00 | 8,837.00 | 17,662.00 |
| **Cumulative profit ($/acre)** | -1,275.00 | 8,825.00 | 17,662.00 | 17,662.00 |

## Profit Summary

### Annual versus Perennial Dayneutral Strawberry Culture

| | Cost per pint ($) | Return per pint ($) | Net per pint ($) |
|---|---|---|---|
| Perennial system | 0.99 | 1.46 | 0.47 |
| Annual system | 1.21 | 1.75 | 0.54 |
| Difference | 0.22 | 0.29 | 0.07 |