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Plasticulture Strawberries

Nathaniel Bruce, Farm Business Management Specialist, University of Delaware, and

Ty Wolaver, Extension Specialist - Farm Management, University of Tennessee

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Introduction

Strawberry (*Fragaria* × *ananassa*) is a hybrid plant grown across the world for its flavorful and succulent fruit. Strawberries can be eaten many different ways in addition to being consumed fresh such as in ice cream, jam, or even chocolates. Plasticulture is a crop production system that has become the dominant way to grow strawberries in the last twenty years.

Plasticulture is a season extending production system that incorporates plastic mulches, drip irrigation, and fertigation to raise a crop. Plasticulture production offers many advantages to raising strawberries such as fewer weeds, increased plant productivity, reduced fertilizer loss, and much more. Strawberries are typically planted in the Mid-Atlantic and Northern South regions in September. This publication provides information on marketing, production, and economic consideration for individuals considering producing plasticulture strawberries.

Market Analysis

It is imperative to have a marketing plan before raising strawberries. The ideal marketing plan considers the cost of production (enterprise budgeting) in addition to marketing expenses. Strawberries have a limited shelf life as a fresh product and will not ship long distances. In addition, they are grown typically in limited acreage and volume and will often need greater marketing efforts to generate positive net returns. Market research is essential to long term success with strawberries.

There are two major markets for strawberries, fresh market and processing market. Fresh market is berries

sold fresh during harvest or shortly after direct to consumer or retailer. With fresh market strawberries the producer must develop their own marketing system, becoming the grower, packer, and wholesaler. In the processing market, processors contract strawberry producers for raw products and manufacture them into other food products. Most of the nation's strawberry processors are currency based out of California. Some producers may opt to become processors themselves by creating and selling value added products. The main benefit of the processing market is that producers do not need to develop a marketing system. There are several main differences between the fresh market and the processing market, listed below:

Variable	Fresh Market	Processing Market
Fruit Quality	High Standard	Less Stringent
Harvest	Hand Harvest	Mechanical
Profit Margin	High Potential	Lower Potential
Commissions	None	Must Be Paid
Customer Liability	Yes	No
Location	Near Population	Anywhere

Before attempting to market strawberries directly to consumers, market research is essential. Consider key attributes about your potential customer base, such as: prices willing to pay for high-quality strawberries, total population in the marketing area, who are most likely to be consumers, what options do consumers currently have, and at what volume do consumers typically purchase strawberries. A very useful tool to explore the potential

strawberry market is a SWOT analysis. SWOT stands for strengths, weaknesses, opportunities, and threats. Strengths and weaknesses are internal factors, and opportunities and threats are external factors.

Several different marketing strategies exist for selling directly to consumers such as pick-your-own, roadside stands, farmers markets, and value-added marketing.

Pick-your-own marketing is only as successful as the location of the operation. A Cornell small fruit marketing publication stated one acre of pick-your-own requires a population of 1,000 people within a 30 mile radius. Consistent yields are required to keep a returning customer base year after year. Long work hours are an issue with pick-your-own as someone has to be there at the farm. Liability is a huge factor to consider with pick-your-own strawberries as visitors will be coming to the farm.

Roadside stands are another popular marketing strategy for strawberries, but again location of the stand is important. Studies have shown that the national average for travel to roadside stands are reported to be between 40 and 60 miles meaning roadside stand customers often stop at the stand on the way to a particular destination. It is important to offer products in small, medium and large quantities at a roadside stand and make any prices clearly visible and legible. The display, packaging, and pricing must be easy to understand for the customer. It is important to update customers of any price changes or promotions with the roadside stand.

Farmers markets are only as successful as the vendors that participate in the market. Location of the farmers market can also dictate consumer willingness to purchase high quality strawberries because high quality strawberries need to be offered at fair market prices. Displays need to be well-organized, eye catching, and neat. It is important to consider all farmers markets rules and fees before committing.

Another direct to consumer marketing option for strawberries is value-added marketing. As mentioned earlier, the producer would also serve as the processor by changing the physical state or form of the product. Some value-added product examples for strawberries are jams and pies. Value-added marketing adds additional value to the raw product. Consider all local rules and regulations for selling value-added food products.

Production Considerations

Cultivar Selection

There are three types of strawberries: June-bearing, ever-bearing, and day-neutral. June-bearing strawberries are the most common types of strawberries planted in a plasticulture system. June-bearing strawberries flower in the spring and ripen fruit during May or June. Everbearing strawberries produce late spring and late summer/early fall crops with little or no flowering and bear fruit during the remainder of the year. They are not planted in a plasticulture system. Day-neutral strawberries are similar to everbearing but refer to the plant's response to day length. Day-neutral strawberries are not strongly influenced by day length and set fruit during the summer months. Day-neutral varieties can be planted in a plasticulture strawberry system but are not common. Some commonly planted June-bearing plasticulture strawberry varieties include: Chandler, Camarosa, Camino Real, Sweet Charlie, and Galletta. Some commonly planted day-neutral strawberry varieties include Albion and Seascope. When choosing a strawberry cultivar to grow using a plasticulture system, it is important to consider not only resistance to diseases and susceptibilities, but also how the fruit fits into marketing. Some varieties are great options for pick-your-own, while others are better suited for value-added production.

Site Selection and Planting

It is best to choose well draining fields that consist of sandy loam or clay loam for shaping plasticulture strawberry beds. Low lying areas should be avoided as they can become frost pockets where cold air settles. Some of the most reliable plasticulture sites are fields that have wooded areas or windbreaks on the northwest side of the field as wind not only has a drying effect on plant foliage which minimizes disease exposure, but also can help to stop frost. It is best to use a north-south plasticulture row orientation for uniform ripening and stands, particularly if marketing strawberries as u-pick. Cover crops such as rye or oats are planted between the plasticulture rows to suppress weeds. Drip irrigation is heavily utilized in a plasticulture system, so proximity to a clean water source is necessary. Strawberry plugs are planted in late August or early September and overwintered with a May or June harvest date, depending on climatic conditions and cultivar selection. To reduce exposure to diseases, it is recommended to rotate strawberry fields every few years and to avoid rotations with crops treated with herbicide applications or growth

regulators. Deer pressure is also something to consider when choosing a site for plasticulture strawberries. Deterrence is the best strategy to reduce deer damage to the crop by using fencing. If deer graze once, the likelihood of their returning to the field is increased dramatically. Ensure to follow local state regulations if attempting to reduce the deer population outside of established hunting seasons.



Pest Management

Disease problems for strawberries include anthracnose fruit rot, botrytis fruit rot, black root complex, phytophthora crown rot, angular leaf spot, fungal leaf diseases, neopestalotiopsis, and powdery mildew. Make sure to purchase disease-free plugs and follow good agricultural practices. As mentioned earlier, crop rotation is recommended with plasticulture strawberries. Pests of strawberries include aphids, leafrollers, potato leafhoppers, root weevils, sap beetles, slugs, spittlebugs, spotted wing drosophila, strawberry rootworms, tarnished plant bugs, thrips, two-spotted spider mites, and cyclamen mites. Consistent scouting of strawberries is essential to ensure a proper fungicide and insecticide regime can be implemented. Weed control between plastic rows is something to also consider. Cover crops between rows is a common practice to suppress weeds. In addition, herbicides can be used to control weeds between rows as well.

Harvest and Storage

Strawberries are typically fully ripe for harvest four to five weeks after blossoms appear. Make sure to check the field for blossoms and take note of when they occurred to time harvest up with maximum ripeness. Strawberries will be fully ripe when the length of the berry is red. If planning on storing strawberries prior to marketing, they can be picked before the length of the berry is a bright red color as they will ripen 24-48

hours when picked off the runners. If marketing strawberries directly to consumers or through U-Pick, post harvest handling isn't something to consider as the customer will be purchasing berries directly. If marketing strawberries differently, cold storage can be utilized until strawberries are sold to the consumer. The optimal temperature to store strawberries is 32 - 36 degrees fahrenheit with high humidity. It is not recommended to wash strawberries prior to going into cold storage to avoid deterioration. Strawberries can also be frozen and sold as such if part of the marketing strategy. Strawberries that are harvested that have blemishes or other issues are ideal candidates for value-added marketing. Post harvest handling for marketing value-added products will be subjugated by local ordinances. It is recommended to research all local regulations prior to attempting to market value-added strawberry products.

Labor Requirements

Plasticulture strawberry production is highly labor intensive because the crop is mostly harvested by hand. Labor needs for planting and laying plastic per acre is about 10 to 15 hours. For production during fruiting labor needs are approximately 30 to 50 hours per acre. Harvest hours vary considerably depending on marketing strategy but can be substantial.

Economic Considerations

Whether you're planning to grow strawberries commercially—such as using black plastic—or on a smaller scale, like in a U-pick operation, it's essential to develop a production plan in the summer or fall prior to the year of harvest.

Commercial Production

In commercial strawberry production, planting typically occurs in late summer or early fall, about 6 to 8 months before the first harvest. This timeline requires upfront investment and careful cost management well before any revenue is generated.

Estimated costs for commercial production can vary, but general figures suggest:

- **Establishment costs:** Approximately \$8,500 per acre
- **Production costs:** Around \$22,000 per acre

These costs are incurred primarily before any strawberries are sold. Additionally, there are **fixed costs** to consider—such as equipment, storage and working facilities, and land—which include principal payments, interest, and depreciation. Because strawberries are replanted annually in most commercial operations, establishment costs recur every year. This means any single-season losses—due to disease, market downturns, or labor shortages—cannot be offset by future harvests from the same planting.

Small-Scale Production

Small-scale strawberry production also involves significant variability in cost. Generalized figures for a 100-foot row include:

- **Establishment (variable) costs:** Around \$230
- **Production (variable) costs:** About \$560

Like in commercial settings, most of these costs are incurred before any revenue is realized. Smaller-scale operations may even face higher land costs per unit of production, since expenses for land, buildings, and equipment are spread across a smaller production area.

Revenue Variability

Strawberry revenues can vary widely. While the highest returns are typically from selling fresh berries, not all fruit may meet the aesthetic or quality standards for direct sale. Because strawberries are highly perishable, a significant portion may need to be processed into value-added products (like jams, jellies, or other preserved goods) to avoid spoilage and maximize income.

See enterprise budgets, cost categories and estimates, for example. These figures are illustrative; your actual costs and revenue categories may differ significantly.

Value-Added Sales

A portion of the strawberry harvest may not be suitable for sale as fresh berries. Creating value-added products—such as jams, jellies, freeze-dried berries, or strawberry lemonades—can help recover costs and reduce waste. These products offer several benefits:

- Extend shelf life through preservation
- Increase consumer satisfaction by offering more product variety
- Allow for higher pricing, thus potentially increasing revenue per unit

However, producing value-added products also comes with significant challenges, including:

- High upfront costs for processing, preserving, and storing products
- Increased variable costs per unit
- Higher fixed costs due to added equipment and facility needs
- Greater labor requirements
- Ongoing risks of unsold inventory or spoilage—even in processed products

Despite these drawbacks, value-added sales can be an effective strategy to improve profitability and reduce waste by enabling more of the strawberry harvest to be sold.

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Fresh Market Strawberry Production - Establishment Budget

Per-acre costs for establishment of June-bearing strawberry production using a plasticulture system.

	Quantity	Your Quantity	Units	Price	Your Price	Total	Calculated Estimate
Variable costs							
Custom Hire ¹	1.0		acre	\$69.10		\$69.10	
Soil test	1.0		acre	\$15.00		\$15.00	
Fertilizer/lime							
10-10-10	300.0		pounds	\$0.16		\$48.00	
Urea	75.0		pounds	\$0.19		\$14.25	
Fumigants	1.0		acre	\$217.90		\$217.90	
Plants	17,424.0		plants	\$0.30		\$5,227.20	
Drip Tape	6,453.0		ft.	\$0.03		\$193.59	
Plastic Mulch	6,453.0		ft.	\$0.03		\$193.59	
Row Covers	20.0		2,000 ft	\$99.00		\$1,980.00	
Labor	10.0		hours	\$17.96		\$179.60	
Labor (operator)	1.0		hour	\$20.00		\$20.00	
Fuel	53.4		gal.	\$3.10		\$165.54	
Repairs and Maintenance	1.0		acre	\$82.57		\$82.57	
Additional Expenses							
Additional Expenses							
Operating Interest	1.0		acre	\$122.42		\$122.42	
Total Variable Costs						\$8,528.76	
Fixed costs							
Tractors and Equipment ²	1.0		acre	\$181.92		\$181.92	
Additional Expenses	1.0		acre				
Land Charge	1.0		acre	\$250.00		\$250.00	
Total Fixed Costs						\$431.92	
Total Costs						\$8,960.68	

1. Custom hire includes plowing, disking, harrowing, pest scouting, and broadcast spreading of soil amendmants and grass seed.

2. Includes overhead and trickle irrigation systems.

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

Fresh Market Strawberry Production - Production Budget

Per-acre costs for mature production.

Harvest costs based on average yield of 10,000 quarts for plasticulture production.

	Quantity	Your Quantity	Units	Price	Your Price	Total
Income						
Strawberries	11,000		quarts	\$5.00		\$55,000.00
Variable Costs						
Custom Hire ¹	1.0		acre	\$46.55		\$46.55
Plant Analysis Kit	1.0		kit	\$25.00		\$25.00
Fertilizer						
Soluble 20-20-20	20.0		pounds	\$1.12		\$22.40
Foliar fertilizer						
Tracite 20-20-20	20.0		pounds	\$2.22		\$44.40
Herbicides	1.0		acre	\$1.55		\$1.55
Insecticides	1.0		acre	\$49.15		\$49.15
Fungicides	1.0		acre	\$238.90		\$238.90
Irrigation Labor	10.5		hours	\$17.96		\$188.58
Labor	35.0		hours	\$17.96		\$628.60
Labor (operator)	1.5		hours	\$20.00		\$30.00
Labor (harvest)	10,000.0		quarts	\$1.00		\$10,000.00
Harvest supplies						
Clamshell (1 qt.)	10,000.0		quarts	\$0.30		\$3,000.00
Clamshell Flat	1,000.0		flats	\$1.20		\$1,200.00
Marketing expense (10% of income) ²	10%		total sales	\$55,000.00		\$5,500.00
Fuel	61.8		gal.	\$3.10		\$191.58
Repairs and Maintenance	1.0		acre	\$96.50		\$96.50
Additional Expenses						\$0.00
Additional Expenses						\$0.00
Interest on Variable Expenses (8%)	1.0		acre	\$850.53		\$850.53
Total Variable Costs						\$22,113.74
Fixed Costs						
Tractors and equipment ³	1.0		acre	\$273.88		\$273.88
Additional Expenses						\$0.00
Additional Expenses						\$0.00
Establishment Cost	1.0		acre	\$8,960.68		\$8,960.68
Interest on Fixed Expenses (8%)	1.0		acre	\$369.38		\$369.38
Land charge	1.0		acre	\$250.00		\$250.00
Total Fixed Costs						\$9,853.94
Total Costs						\$31,967.68
Returns Over Variable Costs						\$32,886.26
Net Returns						\$23,032.32

1. Custom hire includes plowing, disking, harrowing, pest scouting, and broadcast spreading of soil amendmants and grass seed.

2. Marketing expenses can vary greatly depending on market location, travel costs, market access expenses, and labor.

3. Includes irrigation systems.

Note: A quart of strawberries weighs approximately 1.4 pounds.

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

Strawberry Budget - Establishment, 100' row

	Quantit	Your Quantity	Units	Price	Your Price	Total	Calculated Estimate
Variable Costs							
Site Prep	1		hr	\$ 20.00		\$ 20.00	
Transplants	200		plants	\$ 0.64		\$ 128.00	
Soil test	1		-	\$ 15.00		\$ 15.00	
Fertilizer							
10-10-10	2		pounds	\$ 1.20		\$ 2.39	
Irrigation applied fertilizer							
Herbicide Application	1		-	\$ 1.06		\$ 1.06	
Pesticide Application	1		-	\$ 4.82		\$ 4.82	
Fungicide Application	1		-	\$ 12.48		\$ 12.48	
Irrigation							
Dripline	100		ft	\$ 0.23		\$ 23.00	
Water Usage	1246		gallons	\$ 0.01		\$ 7.41	
Planting Labor	5		hr	\$ -		\$ -	
Operating Loan Interest - 8% of variable	1		8%	\$ 214.17		\$ 17.13	
Additional Expense							
Additional Expense							
Total Variable Costs						\$ 231.30	
Fixed costs							
Attachments, good for 3 years	1		-	\$ 341.82		\$ 113.94	
Tiller - 7 years	1		7	\$ 1,149.00		\$ 164.14	
Land Principal + Interest, prorated	1		8%	\$ 47.29		\$ 51.07	
Repairs - 5% of equipment cost	1		5%	\$ 57.45		\$ 57.45	
Additional Expense							
Additional Expense							
Total Fixed Costs						\$ 386.61	
Total Costs						\$ 617.91	

Strawberry Budget - Production, 100' row

	Quantity	Your Quantity	Units	Price	Your Price	Total	Calculated Estimate
Income							
Strawberries	100		quarts	\$ 8.00		\$ 800.00	
Value Added	-		-	\$ -		\$ -	
Value Added	-		-	\$ -		\$ -	
Value Added	-		-	\$ -		\$ -	
Total Revenue						\$ 800.00	
Variable Costs							
Replacement of Plants; 1/3 of establishment variable costs	1		-	\$ 77.10		\$ 77.10	
Fertilizer							
10-10-10	5		pounds	\$ 1.20		\$ 6.00	
Liquid Urea 23-0-0	1		gallon	\$ 23.95		\$ 23.95	
Irrigation							
Water Usage	5607		gallons	\$ 0.01		\$ 33.36	
Herbicide Application	1		-	\$ 1.06		\$ 1.06	
Pesticide Application	1		-	\$ 4.82		\$ 4.82	
Fungicide Application	1		-	\$ 12.48		\$ 12.48	
Working and Harvesting Labor	90		hours	\$ -		\$ -	
Packaging							
Clamshell Containers, quart	100		quarts	\$ 0.17		\$ 16.65	
Labels	450		labels	\$ 0.03		\$ 14.95	
Marketing expense (10% of income)	1		-	\$ 80.00		\$ 80.00	
Operating Loan Interest - 8% of variable	1		-	\$ 292.00		\$ 292.00	
Additional Expense							
Additional Expense							
Total Variable Costs						\$ 562.37	
Return over Variable Cost						\$ 237.63	
Fixed costs							
Attachments, good for 3 years	1		-	\$ 341.82		\$ 113.94	
Tiller - 7 years	1		7	\$ 1,149.00		\$ 164.14	
Land Principal + Interest, prorated	1		8%	\$ 47.29		\$ 51.07	
Repairs - 5% of equipment cost	1		5%	\$ 57.45		\$ 57.45	
Additional Expense							
Additional Expense							
Total Fixed Costs						\$ 386.61	
Total Costs						\$ 948.98	
Net Return						\$ (148.98)	