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## Anemone Cut Flower Production Budget, One High Tunnel, Northern Utah, 2022

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This budget contains costs (preplant and site preparation, establishment and maintenance, and harvest and processing) and returns for the production and sale of anemone cut flowers that were grown in a high tunnel (14 feet by 40 feet). Production methods, yield, costs, and pricing were determined from Utah State University (USU) research trials, as well as feedback from Northern Utah producers. The costs and returns represent typical production in Northern Utah but should be adjusted where necessary for individual situations. Site selection, tunnel use, variety, harvest timing, pest management, and other practices will impact costs and returns to a cut-flower operation.

### Farm and Production System

This publication assumes the use of one 14-foot x 40-foot high tunnel (see Black et al., 2008) with two beds, each 4 feet x 36 feet and 6.5 feet apart from center to center (i.e., 288 square feet of total production space), using color mixes of anemone ‘Carmel’ and ‘Galilee’ planted in native soil with drip irrigation and covered with low tunnels. Anemone tubers were soaked in water for 3 hours and fungicide for an additional hour, before being “presprouted” (established in trays of moist potting mix for 2 weeks) and planted in November. All costs represent the production of multiple cultivars within the 560 square foot high tunnel. A high tunnel this size uses approximately 1% of 1 acre and is assumed to be on land already owned. However, \$45 is used as a proxy for the land cost (1% of a \$4,550 per acre lease) with the assumption that urban land rental is greater than rural (USDA-NASS, 2022).

### Crop Pricing

Stem pricing was calculated based on wholesale market testing conducted with florists across Cache Valley and the Wasatch Front from April through July of 2021 and 2022. Average prices were used to calculate revenues in Table 1. Stems were harvested once blooms were fully colored and had opened and closed once. Marketable stems were straight, undamaged, and divided into two length categories: *quality* grade stems were at least 10 inches long, while *speculation* grade stems were between 8 and 10 inches long. *Cull* grade stems were shorter than 10 inches, deformed, or damaged. Quality grade stems were sold in bunches of 10 stems for \$15.00 (\$1.50 per stem) and ordered by florists in advance, while speculation grade stems were sold in bunches of 10 stems for \$12.50 (\$1.25 per stem) and purchased in person. Stems were sold through a local cut flower co-op located approximately five miles from the farm for a fee of 30% of revenue, which is calculated as 100% of quality grade and 50% of speculation grade stems sold. Labor and mileage for delivery to the co-op, as well as the co-op fee, which included the cost of cold storage, are included in budget expenses.

### Calculated Yield

A yield of four quality and two speculation stems per plant was scaled to account for 994 plants in the high tunnel at a 6-inch x 6-inch spacing across a 288 square foot space, resulting in 3,976 quality stems (398 quality bunches) and 1,988 speculation stems (199 speculation bunches). This yield represents an upper mid-range yield from USU trials and is consistent with marketable yields of 3 to 6 stems per plant reported in other trials

(Bernstein et al., 2018; Wien, 2014). Local grower feedback indicates total yields up to 25 stems per plant are attainable with ideal conditions and management, but even with high total yields, many growers struggle to obtain marketable stem lengths.

## Supplies

Production supply costs were based on average prices available in Logan, UT, and online in summer 2022, and may vary across regions, suppliers, and time. All supplies must be purchased in Year 1, but many last multiple years. Therefore, the cost of each input is annualized across the quantity used per year and the number of years until replacement.

### Preplant and Site Preparation

- Tiller rental: One, half-day rental annually.
- Urea fertilizer (46-0-0): Each year, 2 lbs. of a 5-lb bag are needed, so one 5-lb bag is purchased every 2 years.
- Triple super phosphate fertilizer (0-45-0): Each year, 1.4 lbs. of a 5-lb bag are needed, so one 5-lb bag is purchased every 3 years.
- Muriate of potash fertilizer (0-0-60): Each year, 1.2 lbs. of a 5-lb bag are needed, so one 5-lb bag is purchased every 4 years.
- Drip irrigation kit: Each year, 320 feet of dripline will be used and replaced from a kit with 1,000 feet of dripline. A new kit is purchased every 3 years.

### Establishment and Growth

- Plant stock: Assuming all tubers are replaced annually, 994 tubers are needed each year.
- Plastic trays (1020 size): For presprouting, 25 trays are needed, as each tray holds 40 tubers. Trays are replaced every 5 years.
- Potting mix: Each tray requires 0.3 cubic feet of potting mix for presprouting, so 9 cubic feet are needed to fill all the trays. Three, 3.8 cubic ft bags are purchased each year for presprouting.
- Five-tier shelving unit: This serves as a proxy to estimate the cost of the space needed to store the trays of tubers while they are presprouting.
- Low tunnels: Initial low tunnel construction costs (see Rauter et al., 2021) were divided by the number of years until materials need to be replaced to determine the annual cost.
- Water usage: One high tunnel requires 23 irrigation events, with 130 gallons of water applied per event, resulting in the use of 3,000 gallons of culinary

water from November through June. However, irrigation frequency and amount are dependent on month and environmental conditions. The price of water per 1,000 gallons varies across Utah, and a mean residential rate of \$2.48 per 1,000 gallons is used here (Utah Division of Drinking Water, 2015).

- Rodent bait: One package contains 16, 4-oz packets and four packets are used each year. One package is purchased every 4 years.
- Slug bait: Each year, 0.25 lbs. of a 1-lb container are used, so one container is purchased every 4 years.
- Ant bait: One package contains 24 bait stations, and six packets are used each year. One package is purchased every 4 years.

### Harvest and Processing

- Harvest snips: One pair is replaced after two years.
- Buckets: Six 5-gallon buckets are needed each year and should be replaced every 4 years.
- Floral preservative: Each year, 1 lb of a 5-lb package is used, so one package is purchased every 5 years.
- Rubber bands: One 1-lb bag is purchased and used each year.
- Bouquet sleeves: Bunches are wrapped before sale based on florist preference. One square of brown kraft paper can be cut in half to wrap two bunches of flowers; one bundle of 2,200 kraft paper squares is purchased every 4 years.

### Hired Labor

Labor was priced at \$16.80 per hour (\$15.00 per hour plus employer-related costs), per feedback from local growers and within the mid-range of non-supervisory wages reported by the USDA-ERS (2022). Labor costs may vary depending on region and experience.

### Depreciation

Straight line depreciation was calculated for the high tunnel with no salvage value assumed at the replacement year. Initial costs were divided by the number of years until materials need to be replaced to determine the annual depreciation cost. High tunnel calculations were based on the low-cost high tunnel used at USU (Black et al., 2008), with costs updated to represent 2022 prices (Rauter et al., 2022). Costs will vary depending on the design and materials used.

## Net Returns and Other Considerations

Using the cost assumptions above, as well as yield and pricing from USU trials, the net returns from a 14-foot x 40-foot high tunnel are \$1,953.74 (\$3.49 per square foot) for the harvest period (Table 1). There are multiple factors that may have a significant impact on net returns. These include pricing differences across sales outlets, geographical area, and production decisions.

### Markets and Yield

The returns in Table 1 are based on selling 100% of the quality grade stems at \$15 per bunch of ten stems and 50% of the speculation grade stems at \$12.50 per bunch of ten stems. This assumes four quality grade and two speculation grade stems harvested per plant. The percentage of stems sold was based on local grower feedback that indicates that florists will place advance orders for quality stems but will only buy speculation stems as an impulse purchase to fill day-to-day needs. The number of stems for each grade and percentage that can be sold will vary. Table 2 shows the returns associated with altering the percentage of quality stems sold from 50% to 100% and yield from 2 to 8 stems per plant, assuming no speculation stems are sold. The return is positive with a yield of at least four quality stems per plant and a minimum of 75% sold. Lower yields or lower percentages sold would result in low or negative returns, while the ability to sell any speculation stems would increase returns.

There are other items that can affect net returns. Some cut flower farms sell directly to the final customer, such as at farmers markets or through subscriptions. Selling flowers as arrangements or adding on-farm experiences are other ways that individual farms may increase returns. Direct-to-consumer sales outlets are a good choice for anemone, since short stem lengths often limit wholesale marketability. Additionally, as harvest ends by early June, anemone may be followed with a warm season crop to maximize use of the high tunnel space. This budget is meant to only look at anemone production and does not consider these alternatives.

### Management Practices

Management practices, such as cultivar selection, planting date, winter insulation, and presprouting, can also influence net returns. USU research trials were conducted in North Logan, UT, from 2020 to 2022 to determine anemone yield with varying management practices. All tubers were soaked in water for 3 hours

and fungicide for an additional hour, before being directly planted or presprouted (established in trays of moist potting mix for 2 weeks before planting). Tubers were planted from November to March and left bare or covered with AG50 frost fabric from planting until late April. Anemones that were presprouted before planting in November and covered with low tunnels produced the highest marketable yield of four quality and two speculation stems per plant. Budgets for the other management practices tested are presented in Table 3. Planting in November always resulted in positive economic returns, while economic returns were positive for January and February plantings when low tunnels were used, and March plantings always resulted in economic losses.

## Summary

Anemone holds strong profit potential as a high tunnel cut flower crop in Northern Utah, with net projected returns of \$3.49 per square foot, assuming a mid-range yield of four quality grade and two speculation grade stems per plant. Net returns vary with yield, marketing success, and management practices. Planting presprouted tubers with low tunnels in late fall is recommended to maximize returns.

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**Table 1. Anemone cut flower production budget based on one, 14-foot x 40-foot high tunnel (April to June harvest). Yields and costs are based on a presprouted, mid-November planting of tubers covered with low tunnels.**

REVENUES						
	Output	Units	Total Bunches	% Sold	Price/Unit	Total
	Quality	Bunches	398	100%	\$15.00	\$5,964.00
	Speculation	Bunches	199	50%	\$12.50	\$1,242.50
<b>TOTAL REVENUES</b>						<b>\$7,206.50</b>
OPERATING EXPENSES						
Supplies	Input	Units	Price/Unit	Quantity	Years to Replacement	Annual Expense
Preplant & Site Preparation	Tiller rental	Half day rental	\$50.00	1	1	\$50.00
	Urea fertilizer (46-0-0)	5-lb bag	\$16.00	1	2	\$8.00
	Muriate of K fertilizer (0-0-60)	5-lb bag	\$16.00	1	4	\$4.00
	Triple super phosphate fertilizer (0-45-0)	5-lb bag	\$16.00	1	3	\$5.33
	Drip irrigation kit	Kit	\$170.00	1	3	\$56.67
Establishment & Maintenance	Anemone tubers, 5-6 cm	100 tubers	\$50.00	10	1	\$500.00
	Captan fungicide	8-oz. bottle	\$16.00	1	4	\$4.00
	1020 trays	10 pack	\$12.00	3	5	\$7.20
	Potting mix	3.8-cu.-ft. bag	\$38.00	3	1	\$114.00
	5-tier shelving unit	2 pack	\$210.00	1	5	\$42.00
	Low tunnels	40' low tunnel	\$48.00	2	1	\$96.00
	Water usage	1000 gallons	\$2.48	3	1	\$7.44
	Rodent bait	16 pack	\$17.00	1	4	\$4.25
	Slug bait	1-lb container	\$10.00	1	4	\$2.50
	Ant bait	24 pack	\$26.00	1	4	\$6.50
Harvest & Storage	Harvest snips	Snip	\$22.00	1	2	\$11.00
	Buckets	Bucket	\$5.00	6	4	\$7.50
	Preservative	5-lb bucket	\$22.00	1	5	\$4.40
	Rubber bands	1-lb bag	\$10.00	1	1	\$10.00
	Kraft paper sheets	1 bundle (2200 sheets)	\$86.00	1	4	\$21.50
<b>Total Supply Expenses</b>						<b>\$962.79</b>



<b>OPERATING EXPENSES CONTINUED</b>						
<b>Labor</b>	<b>Input</b>	<b>Units</b>	<b>Quantity</b>	<b>Wage</b>	<b>Annual Wage</b>	
Preplant & Site Preparation	Soil tillage	Hours	2	\$16.80	\$33.60	
	Apply fertilizer	Hours	0.5	\$16.80	\$8.40	
	Install irrigation	Hours	1	\$16.80	\$16.80	
Establishment & Maintenance	Presprouting labor	Hours	6.5	\$16.80	\$109.20	
	Planting labor	Hours	5	\$16.80	\$84.00	
	Pesticide applications	Hours	0.5	\$16.80	\$8.40	
	Hand weeding	Hours	20	\$16.80	\$336.00	
	Install low tunnels, plastic, and shade	Hours	4	\$16.80	\$67.20	
Harvest & Storage	Ventilate and remove snow	Hours	16	\$16.80	\$268.80	
	Harvest	Hours	20	\$16.80	\$336.00	
	Processing	Hours	20	\$16.80	\$336.00	
	Delivery to co-op	Hours	10	\$16.80	\$168.00	
<b>Total labor expenses</b>						<b>\$1,772.40</b>

<b>Delivery Fees</b>	<b>Description</b>	<b>Units</b>	<b>Quantity</b>	<b>Revenue</b>	<b>Fee</b>	<b>Total Cost</b>
	30% delivery charge from co-op	Bunches	497	\$7,206.50	30%	\$2,161.95
	Mileage to co-op	Miles	100		\$0.52 per mile	\$52.00
<b>TOTAL OPERATING EXPENSES</b>						<b>\$4,949.14</b>

<b>FIXED EXPENSES</b>						
	<b>Input</b>	<b>Units</b>	<b>Price/Unit</b>	<b>Quantity</b>	<b>Years to replacement</b>	<b>Annual expense</b>
<b>Annual High Tunnel Depreciation</b>	High Tunnel (14'x40')	High tunnel	\$1,050.00	1	8	\$131.25
	Initial construction labor	Hours	\$16.80	20	8	\$42.00
	Plastic film (6 mil 24'x50')	Roll	\$194.00	1	4	\$48.50
	Shade cloth (20'x48')	Roll	\$295.00	1	8	\$36.88
<b>TOTAL FIXED EXPENSES</b>						<b>\$258.63</b>

<b>OWNERSHIP COSTS</b>	
Land	\$45.00
<b>TOTAL OWNERSHIP COSTS</b>	<b>\$45.00</b>

<b>TOTAL COSTS</b>	<b>\$5,252.76</b>
<b>NET PROJECTED RETURNS (14' x 40' High Tunnel)</b>	<b>\$1,953.74</b>
<b>NET PROJECTED RETURNS (ft<sup>2</sup>)</b>	<b>\$3.49</b>

**Table 2. Stem yield and marketing sensitivity on net projected returns for anemone cut flowers.**

Net Projected Returns <sup>a</sup> (per ft <sup>2</sup> )				
Stem Yield	2	4	6	8
% Sold	-----quality stems per plant-----			
50%	-\$3.66	-\$1.79	\$0.07	\$1.94
75%	-\$2.72	\$0.07	\$2.87	\$5.66
100%	-\$1.79	\$1.94	\$5.66	\$9.39

<sup>a</sup>Calculations assume a price of \$15 per bunch of 10 stems. Returns were calculated as shown in Table 1, except that speculation grade stems (8-10" length) were excluded. Only the stem yield and percent sold of quality grade stems (>10" length) were adjusted while all other inputs were held constant.

**Table 3. Management practice sensitivity on net projected returns for anemone cut flowers.**

Net Projected Returns <sup>a</sup> (per ft <sup>2</sup> )						
Planting Date	Presprouting? <sup>b</sup>		Presprouting?		Presprouting?	
	No	Low Tunnel? <sup>c</sup>	Yes	Low Tunnel?	No	Low Tunnel?
November	\$0.21	No	\$0.50	No	\$2.35	\$3.49
January	-\$0.63	No	-\$1.12	No	\$2.47	\$1.99
February	-\$1.41	No	-\$1.12	No	\$0.91	\$2.05
March	-\$1.41	No	-\$1.90	No	-\$1.43	-\$1.92

<sup>a</sup>Returns were calculated using the same inputs as Table 1, assuming 100% of quality grade stems were sold at a price of \$15 per bunch of 10 stems and 50% of speculation grade stems were sold at a price of \$12.50 per bunch of 10 stems, with yield and labor costs adjusted based on Utah State University research trials from 2020-22.

<sup>b</sup>All tubers were soaked in water for 3 hrs and fungicide for an additional hour, before being directly planted in the high tunnel or 'presprouted' (established in trays of moist potting mix for 2 weeks before planting in the high tunnel).

<sup>c</sup>Low tunnels consisted of AG50 frost fabric over conduit hoops from planting until late April.



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