

Sample Budget for Small-Scale Commercial Tomato Operations

Margarita Velandia, Department of Agricultural and Resource Economics

Zachariah Hansen, Department of Entomology and Plant Pathology

Annette Wszelaki, Department of Plant Sciences

Ty Wolaver, Department of Agricultural and Resource Economics

Tennessee is home to a growing culture of farm-to-table agriculture with numerous farmers markets that allow consumers to purchase fresh foods directly from producers. These farmers markets sell a wide variety of fresh produce, and fresh tomatoes are a best seller in Tennessee. Small-scale and/or part-time farming operations are well-suited for open field-grown tomatoes because of the relatively low start-up cost and marketability through direct-to-consumer outlets of this crop (Orzolek, Bogash, Harsh, Kime and Harper, 2006). According to the 2017 Census of Agriculture, a large percentage of Tennessee producers growing tomatoes in the open operate less than 1 acre (82 percent); however, newer producers venturing into tomato production may be unfamiliar with production practices and effective budgeting.

Tomato budgets for large-scale commercial production are available for various states in the southeastern region (e.g., Mississippi, North Carolina), but only a few states (e.g., Kentucky) have tomato budgets for small farm operations in this region. Producers looking to grow and market tomatoes on a small scale may not find information provided by large-scale tomato budgets useful; production practices, per-unit pricing and production volume may not be the same for large-scale as for small-scale operations. For example, small-scale producers will likely sell tomatoes at direct-to-consumer outlets such as farmers markets due to lower transaction costs, as well as the lack of requirements regarding minimum volume of sale. Finally, tomato producers operating at a smaller scale may garner/collect retail input prices rather than wholesale prices due to minimum order requirements at the wholesale scale.

The objective of this sample budget is to *guide* small-scale tomato producers on things to consider when estimating their net returns. Given that the budget presented here is just an example, the actual numbers presented here *should not* be used to estimate net revenues. Every operation is unique; therefore, estimated costs and revenue may vary depending on soil conditions, tomato variety, production practices used and various other factors. The Excel version of the sample budget described at the end of this publication allows users to adjust values in the budget to more accurately reflect costs and returns associated with their operation.

Data

Sources of information used to build the sample budget came from personal interviews with two farm operators in the East Tennessee area, specialists in vegetable production, entomology, and plant pathology at the University of Tennessee (UT), as well as information from input suppliers in the southeastern region of the United States.

Sample Budget Details and Explanation

This example represents a small operation growing three vegetable crops, including tomatoes, and selling produce only through farmers markets (Table 1). The land unit of this sample budget is a 100-foot row rather than an acre. We assume tomatoes are grown in the open field, and varieties grown are traditional round red determinate types such as Empire and Celebrity. Many small-scale operations use indeterminate varieties. This culture would entail a different trellis system and a longer harvest period. Budgets for indeterminate varieties would include greater yields but higher costs for trellising, labor (trellising and marketing), fertilization and pest control. Market prices would be the same for the two types of varieties. Do not confuse indeterminate varieties with heirloom varieties, which would be associated with different costs and returns and therefore a different budget. Many indeterminate varieties are not heirlooms.

Table 1. An Example of Estimated Cost and Returns for a Small-Scale Tomato Operation

GROSS RETURNS	UNIT	QUANTITY	\$/UNIT	TOTAL
Tomatoes	lb	450.00	\$2.00	\$900.00
VARIABLE COST				
Tomato plants-hybrid ¹	plant	50	\$0.26	\$13.10
Fertilizer²				
Plant Starter (20-20-20)	lb	5.5	\$1.50	\$8.59
Calcium nitrate	lb	3.9	\$0.50	\$1.95
Potassium nitrate	lb	8.1	\$0.70	\$5.67
Soil Test³	test	1	\$15.00	\$15.00
Fungicides⁴				
Chlorothalonil 6SC	ml	22.8	\$0.01	\$0.30
Inspire Super	ml	24.42	\$0.08	\$1.89
Fontelis	ml	24.42	\$0.07	\$1.69
Mancozeb	lb	0.06	\$18.51	\$1.11
Copper	lb	0.1	\$2.85	\$0.28
Herbicide⁵				
Metribuzin	oz	0.11	\$0.92	\$0.10
Poast	pt	0.03	\$14.60	\$0.44
Insecticide⁵				
Dipel DF	oz	0.42	\$1.10	\$0.46
Radiant SC	ml	3.24	\$0.29	\$0.94
Admire Pro	ml	3.54	\$0.07	\$0.25
Plastic mulch ⁶	sq ft	400	\$0.01	\$4.47
Stakes ⁷	stake	25	\$1.05	\$26.16
Twine/string ⁷	box	1	\$8.03	\$8.03
Irrigation supplies⁸				
Drip tape	linear ft	100	\$0.25	\$25.00
Hired labor⁹				
Transplanting, bed preparation (lay plastic and drip)	hours	8	\$13.89	\$111.12
Pruning and training	hour	10	\$13.89	\$138.90
Harvesting	hour	9	\$13.89	\$125.01
Other¹⁰				
Machinery (maintenance and repairs)	100-ft row			
Cash rent	100-ft row	1	\$2.60	\$2.60
TOTAL VARIABLE COST				\$493.07
INTEREST ON VARIABLE COST¹¹		%	\$246.53	4.53%

Table 1. An Example of Estimated Cost and Returns for a Small-Scale Tomato Operation (Continued)

MARKETING COSTS	UNIT	QUANTITY	\$/UNIT	TOTAL
Annual fee ((1/No. of products sold) of total annual fee) ¹²				\$8.33
Booth fee((1/No. of products sold) of total booth fee cost) ¹²	day	20	\$20.60	\$137.33
Hired labor ((1/No. of products sold) of total hired labor) ¹³	hour	80	\$13.89	\$370.40
Crates ¹⁴	crate	15	\$14.97	\$74.83
Gas/Fuel (driving to market, (1/No. of products sold) of total cost) ¹⁵	100-ft row	1		\$96.00
Other marketing costs ¹⁶				
TOTALS MARKETING COSTS				\$686.90
TOTAL VARIABLE AND MARKETING COSTS				\$1,190.69
RETURN ABOVE VARIABLE AND MARKETING COST				(\$290.69)

Gross Returns

1. **Yield** – Tomato yields may vary by tomato variety and growing conditions. We use average yields from UT round red determinate tomato variety evaluations conducted in 2017 and 2018 (i.e., 9 lb/plant).¹ It is important to note that in direct-to-consumer market outlets such as farmers markets, there are no specific quality specifications preventing farmers from selling produce at the market. Some vendors sell “ugly” or “cosmetically challenged” tomatoes at discounted prices (e.g., 50 percent off). This information is not incorporated into our sample budget. Additionally, it is important to know that it is possible that not all tomatoes brought to the market will be sold. It is important to have a plan for tomatoes not sold at the market. Some vendors sell produce not sold at the market to local chefs at discounted prices. It is always important to start the planning process from the planting stage and adjust sales predictions based on the previous years’ sales.

2. **Prices** – Tomato prices vary greatly by farmers market locations. Prices in farmers markets located in metropolitan counties, specifically bigger cities (e.g., Knoxville, Murfreesboro), tend to be higher compared to prices in rural counties, smaller cities with lower population densities and lower average household incomes (e.g., Bolivar, Morristown). Tomatoes are priced on per pound or per container basis (e.g., quart, basket). In this publication, we assumed prices are set on a per-pound basis. According to the Tennessee farmers markets price reports, prices in 2022 have fluctuated between \$1.5 and \$4 per lb, depending on location and variety.² Tennessee farmers markets price reports can be found at <https://www.uky.edu/ccd/pricereports/TNFM>.

Variable Costs

1. **Tomato Plants** – We estimated 50 tomato plants per 100-foot row. Assuming a 6-foot spacing between rows and 24-inch spacing between plants, we calculated approximately 50 plants per 100-foot row. The cost per tomato plant is estimated as the average cost per plant in some nurseries from surrounding states. Small-quantity orders may represent a higher cost per plant.

2. **Fertilizer** – Based on interviews with two tomato producers located in East Tennessee, we included a plant-starter mixture, calcium nitrate and potassium nitrate as the fertilizer products for the tomato sample budget. We assumed that no lime is needed, based on soil test results. We assumed a general-purpose plant starter N-P-K ratio of 20-20-20; however, appropriate N-P-K proportions are determined by soil test results and therefore may vary from operation to operation. Because of the variability of fertilizer recommendations based on soil test results, suggested fertilizer quantities are based on recommendations for the absence of a soil test from the latest version of the

¹ <https://vegetables.tennessee.edu/tomato-variety-trials/>

² <https://www.uky.edu/ccd/pricereports/TNFM>

*Southeast U.S. Vegetable Crop Handbook*³ for tomato production. Additionally, prices of the fertilizers listed in this sample budget were gathered from some input suppliers in the southeastern region. The minimum amount sold at local suppliers is 25-lb bags for plant starter and 50-lb bags for both potassium and calcium nitrates. Fertilizer costs listed in the sample budget do not represent actual fertilizer expenses. For example, although only about 4 lbs of calcium nitrate may be necessary for a 100-foot row of tomatoes, the minimum amount of calcium nitrate sold at local suppliers is generally 50 lbs. It is important to notice that since the sample budget assumes a grower who produces multiple vegetables, calcium nitrate may be used for other vegetables. On the other hand, producers may be able to find fertilizer products for sale in smaller quantities but at a higher cost. For example, 5-lb bags of calcium nitrate are available online at \$13.99 per bag.⁴

3. Soil Test – Soil testing is crucial for tomato crop quality and performance, as many of the causes of poor fruit development are associated with poor plant nutrition (Orzolek et al., 2006). Soil tests guide fertilizer requirements for new operations during the initial growing season. Any deficiency or overapplication issues are often identified, allowing an opportunity for fertilizer application adjustments in subsequent years. Soil test fees in the sample budget are from UT Extension’s Soil, Plant, and Pest Center Fee Schedule.⁵

4. Fungicides – The products listed are components of a spray program considered to be a minimum requirement for the successful control of foliar diseases. Quantities in the sample budget are based on the following recommendations: a) Mancozeb — 4 applications at 1.15 lb per acre each time — which is equivalent to about 0.015 lb per application for a 100-foot row for a total of 0.06 lb; b) Copper — 4 applications at 1.75 lb per acre each time — which is equivalent to 0.024 lb per application for a 100-foot row for a total of 0.10 lb; c) Chlorothalonil 6SC — 2 applications at 828 ml per acre each time — which is equivalent to 11.4 ml per application for a 100-foot row for a total of 22.8 ml; d) Fontelis — 3 applications at 591 ml per acre each time — which is equivalent to about 8.14 ml per application for a 100-foot row for a total of 24.42 ml; and e) Inspire Super — 3 applications at 591 ml per acre each time — which is equivalent to about 8.14 ml per application for 100-foot feet for a total of 24.42 ml. Both Fontelis and Inspire Super are needed because the labels limit their usage, so both are needed to complete a full-season spray schedule rotation. For bacterial disease control, both Mancozeb and Copper are needed; neither is satisfactory alone. Mancozeb substitutes Chlorothalonil for fungal disease control. Because of the long pre-harvest interval for Mancozeb this one is replaced by Chlorothalonil during harvest, and Copper is also dropped at this time. Prices of the suggested fungicides were gathered from local input suppliers. Similar to fertilizers, fungicide costs listed in the sample budget do not represent actual fungicide expenses. It is important to notice that since the sample budget assumes a grower who produces multiple vegetables, some fungicides may be used for other vegetables, **as long as they are labeled for the other crops**. For additional information on fungicides, contact Dr. Zachariah Hansen (zhansen1@utk.edu).

5. Herbicides, Insecticides & Fumigants – Insect and weed plant pressure may vary from operation to operation; therefore, different products may be applied based on specific problems. In the sample budget, we suggest some products for weed and insect control that should be used as examples rather than recommendations. The products listed in the herbicides section are Metribuzin and Poast. The first product is used to control annual grasses and broadleaf weeds, including jimsonweed, common ragweed, smartweed and velvetleaf. This product can also be used as a post-emergent herbicide, but rates in the sample budget only represent rates to be applied before transplanting. Poast is used as a post-emergent herbicide to control annual and perennial grasses only. Application rates are taken from the latest version of the *Southeast U.S. Vegetable Crop Handbook*⁶; additional recommendations for the application of this product can be found in the same publication. Insecticide products include Dipel DF, Radiant SC and Admire Pro. Dipel DF should be used for small caterpillars only for best results, and it should be used a couple of times early in the fruiting cycle since it is not harmful to beneficial insects. The rate used for this sample budget is two applications totaling 0.42 oz per 100-foot row. Radiant SC is used for all sizes of caterpillars at a rate of 3.24 ml per 100-foot row. Finally, Admire Pro can be used to control insects such as aphids, Colorado potato beetle, leafhoppers and whiteflies. This product should be applied to the soil once per year at a rate of 3.54 ml per 100-foot row. We are assuming fumigants are unnecessary for growers of this size. Like fertilizers, herbicide and insecticide costs listed in the sample budget do not represent actual fungicide expenses. For more information on herbicides, contact Dr. Annette Wszelaki (awszelak@utk.edu).

³ <https://vegetables.tennessee.edu/wp-content/uploads/sites/167/2022/01/2022-southeast-us-veg-crop-handbook-reduced-size.pdf>

⁴ <https://amzn.to/3PICvrX>

⁵ <https://soillab.tennessee.edu/brochure-and-fees/>

⁶ <https://vegetables.tennessee.edu/wp-content/uploads/sites/167/2022/01/2022-southeast-us-veg-crop-handbook-reduced-size.pdf>

6. **Plastic Mulch** – Many farmers use plastic mulch for growing tomatoes. Black plastic mulch warms the soil, retains moisture and has a positive impact on yield, fruit size and fruit quality in tomatoes planted in the spring. Black plastic mulch also aids in controlling weed growth and reduces certain diseases (Rutledge et al., 1999). Black plastic mulch is commonly sold in rolls of 4 by 4,000 feet. However, only about 100 linear feet of plastic mulch, or 400 square feet, is needed for a 100-foot row of tomatoes. Some input suppliers sell smaller quantities of plastic mulch rolls but at a higher price. Nonetheless, if a farmer is growing other vegetables, plastic mulch may also be used in the production of other vegetables, and therefore the cost of a 4 x 4,000-foot plastic mulch roll can be split among the total area of vegetables grown using plastic mulch. Unused material may also be used in subsequent growing seasons.

7. **Stakes and String** – The purpose of staking and stringing tomato plants is to maintain plant foliage and elevate fruit off the ground, which will have an impact on the fruit quality and will facilitate harvesting (Ivors, 2010). Wooden stakes of 1 square inch by 4 to 4.5 feet long are commonly used. Stakes are usually placed every other plant. Given the estimated 50 tomato plants per 100-foot row, approximately 25 stakes are required for a 100-foot row area. A box of string is assumed to be more than enough to cover 100-foot row of tomatoes.

8. **Drip Irrigation System** – We assume this operation uses a drip irrigation system. Costs associated with irrigation in this sample budget include only drip tape. Similar to plastic mulch, drip tape is commonly sold in rolls of 750 linear feet. Approximately 100 linear feet of drip tape are needed for 100-foot row of tomato plants. Drip tape is also used for the production of other vegetables, and the remaining drip tape can be used for the production of other vegetable crops or in subsequent growing seasons. Although the sample budget only reflects the cost associated with 100 linear feet of drip tape, actual expenditures can be higher because of the minimum amount of drip tape sold by input suppliers. Smaller quantities of drip tape may be sold at a premium. Installation cost is not included in the sample budget but should be considered. Although the cost of water is not included in this budget, if a farm has no access to a well, the cost of using municipal water can be fairly high as there are no special fees for water used for agricultural purposes in Tennessee.

9. **Hired Labor** – Tomatoes, similar to most other vegetables, are a labor-intensive crop; therefore, a separate section for labor is included in the sample budget. Estimated hours associated with pre-harvest, harvest, and post-harvest activities comprise the labor expenses. Labor requirements were estimated based on farmer interviews and conversations with UT vegetable specialist Dr. Annette Wszelaki. Additional labor associated with plastic removal and other end-of-season cleanup is not included in the sample budget but should be considered when estimating net returns over variable costs.

10. **Other** – Other costs include cash rent. Cash rental rates are based on the 2022 USDA-NASS reported cash rental rates for irrigated cropland in Tennessee (\$187/acre). Substantial differences may exist in cash rental rates reported by NASS and the prevailing rate in each location. Small operations may consider renting equipment, as they may not have the initial capital to invest in any type of equipment. Machinery and equipment repair and maintenance costs should be considered. These costs are not included in this budget as they would vary greatly from operation to operation, depending on the equipment used.

11. **Interests on Variable Cost** – There is a time delay between some production expenses and the time tomatoes are sold. These expenses may be covered from savings, but borrowing may be necessary to cover all expenses. We assume 4.35 percent annual interest is paid on 50 percent of the variable cost listed in the sample budget.

12. **Marketing Costs (Farmers Market Free)** – There are costs associated with using farmers markets as a market outlet to sell tomatoes (e.g., annual membership and booth fees). The sample budget assumes there are three vegetable crops sold at the farmers market; therefore, costs associated with farmers markets participation only represent a third of the actual costs, as fees are split among the three vegetable crops sold at the market. We use the average annual participation fees and booth fees from seven farmers markets randomly selected in Tennessee.

13. **Marketing Costs (Hired Labor)** – Farmers markets in Tennessee last three hours on average although there are some that can last up to five hours; therefore, three hours of labor are calculated per market day. Additionally, approximately one hour for booth setup and take-down is included in the marketing hours for a total of four hours per market day. Assuming a grower offers tomatoes throughout the growing season (June 15 to November 1) and attends farmers markets each week of the season, a total of 20 days x 4 hours totals 80 hours for selling tomatoes at

a farmers market. Only a third (1/3) of this cost is included in the sample budget, as we assume the operation from the sample budget sells two more vegetable crops at the farmers market, and therefore total hired labor cost is split between these three crops. Additionally, travel time from farm to farmers market may vary by location but should be considered when estimating costs associated with selling produce at farmers markets .

14. **Crates** – Plastic crates of 30-lb capacity are assumed to be used to taking tomatoes to market.

15. **Gas (Driving to Market)** – The cost is estimated based on the assumption that the farm is 30 miles away from the farmers market. Gas prices were estimated using average gas prices in Tennessee as of August 15, 2022 (\$3.6/gal). Assuming a vehicle with a gas mileage of 15 miles per gallon, we estimated a total of 4 gallons required to cover 60 miles (round trip).⁷ If this farmer attends all 20 days of the season, that means a total of 80 gallons is required to cover 1,200 miles. The total cost of gas necessary for transportation from and to the market is divided by three, as this cost is split among the three vegetable crops sold at the market.

16. **Marketing Costs (Other)** – There may be additional costs associated with marketing, such as business cards, bags, signage, tents, tables and other marketing materials that are not included in the sample budget but should be considered when selling produce at farmers markets.

17. **Fixed Costs** – Costs associated with land taxes (if land is owned), insurance, depreciation (if equipment is owned) and management labor are not included in these sample budgets but should be considered when estimating net returns.

Excel Sample Budget

An Excel spreadsheet version of the sample tomato budget (Table 1) is available on the Department of Agricultural & Resource Economics website at <https://arec.tennessee.edu/extension/budgets/>. Growers can modify values and details in this Excel Workbook highlighted in gray and thus use it to evaluate their own production costs and returns. If quantities and details of the sample budget are modified, original values can be restored when clicking on the “Reset Defaults” button on the bottom right of the sample budget. The “Print” button allows the user to print a one-page summary of the sample budget.

Users should note that input prices used in this sample budget were current as of September 2022 and are subject to change. Input prices were collected from a handful of randomly selected businesses; therefore, users are encouraged to conduct a thorough search when sourcing input suppliers.

References

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For more information, you can reach out to the following authors:

Margarita Velandia, Department of Agricultural and Resource Economics, mvelandia@utk.edu

Zachariah Hansen, Department of Entomology and Plant Pathology, zhansen1@utk.edu

Annette Wszelaki, Department of Plant Sciences, annettew@utk.edu

Ty Wolaver, Department of Agricultural and Resource Economics, tymwola@utk.edu

⁷ <https://www.fueleconomy.gov/trip/> My trip calculator can be used to estimate fuel cost.



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