Profitability Analysis No. 09/2007

Profitability Analysis: 1-ha Organic Tomato Production

ISO 9001:2000

Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
Department of Science and Technology

Providing science solutions for a vibrant agriculture and sustainable environment

About PCARRD

The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) is one of the sectoral councils under the Department of Science and Technology (DOST). Established in 1972, PCARRD formulates policies, plans, and programs for science and technology-based development in the agriculture, forestry, and natural resources (AFNR) sectors. It coordinates, evaluates, and monitors the national research and development (R&D) efforts in AFNR. It also allocates government and external funds for R&D and generates resources to support its programs.

The first DOST council to earn an ISO 9001:2000 certification for its quality management system, PCARRD is engaged in active partnerships with international, regional, and national organizations and funding institutions for joint R&D, human resource development and training, technical assistance, and exchange of scientists, information, and technologies.

The Council supports the National Agriculture and Resources Research and Development Network (NARRDN), composed of national multi- and single-commodity and regional R&D centers, cooperating stations, and specialized agencies. As such, PCARRD has been a potent arm in catalyzing the Philippine AFNR sectors toward self-sufficiency and global competitiveness.

MAILING ADDRESS	PHILIPPINE COUNCIL FOR AGRICULTURE, FORESTRY AND NATURAL RESOURCES RESEARCH AND DEVELOPMENT Los Baños, Laguna
TELEPHONES	Los Baños - (63) (049) 536-0014 to 536-0015/ 536-0017 to 536-0020 & 536-0024
FAX	Los Baños - (63) (049) 536-0016/536-0132 DOST Bicutan, Tagig, Metro Manila (63) (02) 837-1651
E-MAIL	pcarrd@pcarrd.dost.gov.ph
WEBSITE	http://www.pcarrd.dost.gov.ph

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Message

I congratulate PCARRD-DOST for coming up with this Profitability Analysis, which is not just a publication, but more importantly, a science and technology (S&T)-based solution. PCARRD has put together the necessary information that would make agribusiness venture more technically and financially viable.

The tested package of technology (POT) that PCARRD and its research and development (R&D) partners have developed and included in this publication, together with the encouraging financial projections, highlights the role of S&T in achieving our national development goals.

I am optimistic that with the dissemination of the Profitability Analysis, which PCARRD has prepared for a significant number of priority commodities and products, our people will develop greater appreciation of S&T-based entrepreneurship in agriculture and natural resources sectors.

Hon. ESTRELLA F. ALABASTRO
Secretary
Department of Science and Technology
Republic of the Philippines

Message

Agribusiness is among the flourishing enterprises in the country today. However, many of our people, particularly the small and medium entrepreneurs could not easily engage in agribusiness due to constraints in the establishment process.

This publication, the Profitability Analysis, is a very laudable initiative by PCARRD-DOST having put together a set of solutions addressing startup constraints. Specifically, this publication contains key technical and financial information necessary to start, operate, and profit from a science and technology (S&T)-based agribusiness enterprise.

I commend PCARRD for pursuing the development of this publication. This very important contribution will definitely help boost entrepreneurship, especially in the rural sector; create additional income and job opportunities; and promote the production of high quality agribusiness products.

Cong. LUIS R. VILLAFUERTE
Chair, Committee on Aquaculture and Fisheries
Member, Committee on Science and Technology
Member, Committee on Agriculture
House of Representatives

Foreword

This year, the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) offers a new technology publication that promises to be fully utilizable and handy.

The Profitability Analysis (PA) arose from our yearning to address your needs as small and micro entrepreneurs, farmers and growers. More than just a handout, this innovative package of information provides tools to help you gain and secure a niche in your business enterprise.

The PA series is based on our study of selected commodities. Here you will find the technical and financial data you will need to put up an agricultural enterprise. It presents analytical tools you can use in project planning and in predicting how the business would operate under a set of assumptions. Thus, it ensures that your projects are technically and economically feasible for implementation. Through the profitability analysis and other information, we at PCARRD, hope to contribute substantially in providing livelihood options for Filipinos, especially those in rural communities.

Specifically, this PA contains the projected income statement and cash flow for a 1-hectare organic tomato production. Also, it contains the recommended production system including information on varieties, soil type and site, best growing period, seedling production, land preparation, field planting, fertilization, water management, and weed, pest, and disease management. It also includes information about harvesting, postharvest handling,and marketing.

Feel free to use the information in these pages. Contact us for further information you may need or better yet, for any suggestions on how we can make this publication better. Together, we can improve the production system for organic tomato and seal its importance in our national economy.

PATRICIO S. FAYLON
Executive Director

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Introduction

Tomato is considered the most important vegetable in the world. In fact, it is planted to about 4.4 million ha around the world. In the Philippines, around 17,500 ha is grown to tomato with Pangasinan and Bukidnon as the top producing areas.

Tomato can be eaten fresh in salads, sauces, and sandwiches. It is also used to flavor soups, meat, and fish dishes. It can be made into candies, dried fruit, and wine. Various products can also be derived from processing tomato. These include purees, juice, ketchup, canned whole and diced. It is certainly a nutritious favorite among Filipinos.

Initial Capital	₱519,534.00
Net Return/4-month cropping cycle	₱1,182,225.00
Benefit-Cost Ratio (BCR)	6.43
Return on Investment (ROI)	228%
Payback Period	1 cropping cycle

Tomato's food and nutritional value, matched with its market potential, makes it a viable agribusiness option for small and medium entrepreneurs. And because it can be grown successfully under organic conditions, producing organic tomato is an even more viable investment opportunity. It inherits the food and nutritional value of a typical tomato while also creating a profitable market niche of its own.

A 1-ha organic tomato production is a profitable investment requiring a total initial capital of ₱519,534. Estimated net return on a 4-month cropping cycle stands at ₱1,182,225, representing a large ROI of 228%. At this rate, the initial investment is recovered within just 1 cropping cycle.

Moreover, for every ₱1 cost incurred, the venture returns ₱6.43 to the investor.

The package of technology (POT) for organic tomato production is the recommended production technology of PCARRD's research and development network.

Cost and return for organic tomato production.

Yield (kg/ha)				35,000	
Price/kg				40	
Gross Return (GR)					**1,400,000**
Expenses	**Qty**	**Unit**	**Unit Price**	**Total**	
A. Direct Materials (DM)					
Seeds	0.3	kg	1,950	585	
Trellis - bamboo or ipil posts	3,000	pcs	10	30,000	
GI wire #16	100	kg	52	5,200	
Synthetic Straw	40	rolls	30	1,200	
Net Bags	100	pcs	25	2,500	
Biofertilizers					
Chicken Manure	15	ton	1,000	15,000	
Carbonized Rice Hull	5	ton	500	2,500	
Fermented Plant Juice (FPJ)				1,000	
Fermented Fruit Juice (FFJ)				1,000	
Compost, 1 ton	20	sacks	50	1,000	
Bio-pesticides					
Bio-spray (commercial brand)				1,000	
Planting Materials (aromatic plants, etc)	5	tons	200	1,000	
Sub-total				**61,985**	

Cost and return... (continued).

B. Direct Labor (DL)	Qty	Unit	Unit Price	Total		
Seedbed Preparation and Care of Seedlings	12	md	220.00	2,640		
Plowing	10	mad	440.00	4,400		
Harrowing	8	mad	440.00	3,520		
Furrowing	2	mad	440.00	880		
Fertilization - basal	4	md	220.00	880		
Transplanting	20	md	220.00	4,400		
Fertilization - sidedress	16	md	220.00	3,520		
Weeding	16	md	220.00	3,520		
Cultivation	4	md	220.00	880		
Trellising	20	md	220.00	4,400		
Spraying	8	md	220.00	1,760		
Irrigation	20	md	220.00	4,400		
Vine Training	8	md	220.00	1,760		
Roguing	4	md	220.00	880		
Biofertilizer Preparation	6	md	220.00	1,320		
Harvesting, hauling, sorting, and packing	60	md	220.00	13,200		
Sub-total				**52,360**		
C. Other Expenses	**Qty**	**Unit**	**Unit Price**	**Total**		
Transportation				10,000		
Depreciation	4	months	6,808	27,232		
Miscellaneous[1], 10% of DM				6,199		
Full-time laborers	2	persons	4,500	36,000		
Land Rent, ₱6,000/month	4	months	6,000	24,000		
Sub-total				**103,430**		
Total Expenses (TE) per 4-month cycle					**217,775**	
Net Returns (NR) per 4-month cycle						**1,182,225**
Fixed Asset (FA) investment				**328,990**		
Working Capital (WC)[2]				**190,544**		
Initial Investment (FA+WC)				**519,534**		
Cost of Production per kg				**6.22**		
Benefit-Cost Ratio (GR/TE)				**6.43**		
Return on Investment (ROI), (NR/Initial Investment)		**228%**				
Payback Period (FA/NR)		**1 cropping cycle**				

[1] Cost of production for hot pepper spray, tea manure, insect pollinators, etc

[2] Total cash required per cycle = TE - Depreciation

Technical assumptions.

Production Cycle	4 months
Farm Size	1 ha
Farm Utilization	exclusive to oganic tomato
Tomato Variety Used	salad type varieties (no significant differences in yield and farm gate prices
Post-harvest Operations	only up to packing in recyclable plastic crates

Financial assumptions.

Total Initial Investment	519,534, full equity
Depreciation Method	straight line, 0 salvage value
Marketable Yield	35,000 kg net of postharvest losses and rejects
Selling Price of Organic Tomato	₱40/kg at farm gate
Marketing of Produce	picked up by bulk buyers
Labor Rate	₱4,500/month
Land Rent	₱6,000/month

Investment on facilities, tools and equipment.

Facilities	Quantity	Unit Price	Cost
Irrigation System	1	120,000	120,000
- Water Pump, Couplers,			
- Sprinkler Head, PVC pipe			
Composting System			64,000
- Shredder (engine motor)	1		
- Drum composter (200-L capacity)	3		
Nursery (200 m^2)			15,000
- Bamboo poles, frames, plastic			
- Roof, clear black net for shading			
Packing House (Shed Type)			20,000
- Bamboo tables, sink, and water source			
Tools and Equipment			
- Knapsack sprayer (16-L capacity)	2	1,900.00	3,800
- Scythe	5	140.00	700
- Hoe	5	400.00	2,000
- Shovel	3	200.00	600
- Rake	5	200.00	1,000
- Plastic drums (200-L capacity)	10	800.00	8,000
- Weighing scale (60-kg capacity)	1	1,290.00	1,290
- Knife	6	100.00	600
- Plastic crates	400	180.00	72,000
- Harvest cart - fabricated	2	10,000	20,000
Total Investment on Facilities, Tools, and Equipment			**328,990**

Monthly depreciation (straight line method, zero salvage value).

Facilities	Cost	Life Span	Dep.
- Irrigation system	120,000	5	2000
- Composting system	64,000	5	1067
- Nursery (200 m^2)	15,000	2	625
- Packing house (shed type)	20,000	2	833
Tools and Equipment			
- Knapsack sprayer (16-L capacity)	3,800	2	158
- Scythe	700	2	29
- Hoe	2,000	2	83
- Shovel	600	2	25
- Rake	1,000	2	42
- Plastic drums (200-L capacity)	8,000	2	333
- Weighing scale (60-kg capacity)	1,290	2	54
- Knife	600	2	25
- Plastic crates	72,000	5	1200
- Harvest cart - fabricated	20,000	5	333
Total Depreciation Monthly			**6808**

Nutritional content of tomato per 100g edible portion:

Calcium	: 10 mg
Carbohydrates	: 3.6 mg
Fat	: 0.1 g
Iron	: 0.6 mg
Niacin	: 0.6 mg
Phosphorus	: 16 mg
Protein	: 1.0 g
Vit. A	: 1,700 IU
Vit. B1	: 0.1 mg
Vit. B2	: 0.02 mg
Vit. C	: 21 mg
Water	: 94 g

Package of Technology

Commercial Varieties **Floradade, Monteverde, Mountain Fresh, and Walter F1**	• Salad type • 150-250 g/fruit • Thick flesh • Moderately firm • Flat round to high round • Yield: 35 t/ha
Site	• Has adequate supply of irrigation water • With farm-to-market road • Must be at least 1 km away from farms that use chemical fertilizer and pesticides
Soil Type	• Sandy loam or clay loam • Has good drainage • pH 5.5–6.0
Best Growing Period	• September to March in low-elevation areas • Throughout the year in mid- and high-elevation areas
Seedling Production	• Seed source : local seed companies or seed dealers • Amount of seeds/ha : 200–300 g • Number of plants/ha : 33,333
Soil Mixture	• 2 parts garden soil • 2 parts compost or fully decomposed chicken manure • 1 part carbonized rice hull

Sowing

- Soak seeds in tap water for 4 hours, then air dry
- Prepare five seedbeds; each bed measures 1 m x 10 m
- Incorporate 1kg compost or fully decomposed chicken manure and 300 g carbonized rice hull
- Water the seedbeds and make shallow lines across the bed, 7cm–10 cm apart
- Line-sow 2 seeds every 3 cm, cover lightly with fine soil
- Mulch with rice hull or chopped rice straw
- Water again after mulching

Care and Maintenance

- Provide partial shade during dry season and rain shelter during wet season
- Water regularly
- Fertilize with tea manure diluted with equal amount of water at 4 days after emergence and twice a week thereafter

Preparation of Tea Manure

- Fill burlap sack with partially decomposed cow, carabao or horse manure
- Place sack of manure inside a plastic drum (200-L capacity); put weight
- Fill drum with water and cover with net or cloth
- Ferment for 1 week

Hardening

- 1 week before transplanting, expose the seedlings fully to sunlight
- Water the seedbeds only when seedlings show temporary wilting

Land Preparation

- One plowing and two harrowings
- Make furrows 1.0 m apart
- Incorporate 1 kg fully decomposed chicken manure and 500 g carbonized rice hull per linear meter

- Dig holes 0.40 m apart along the furrow
- Drench each hole with 0.5 L undiluted tea manure

Field Planting

- Transplant seedlings at 3–4 weeks after emergence
- Water the seedbeds thoroughly and gently uproot the seedlings
- Plant one healthy seedling per hole
- Replant missing hills at once
- Provide trellis to prevent the plants from lodging

Fertilization

Basal application

- Apply 1 kg fully decomposed chicken manure and ½ kg carbonized rice hull per linear meter and ½ L undiluted tea manure per hole

Side dressing

- Apply 500 g/linear meter fully decomposed chicken manure or compost during the 1st and 2nd hilling-up at 28 and 45 days after transplanting

Supplements

- Apply weekly as soil drench – tea manure diluted with water (1:1)
- As foliar spray – fermented plant juice at 1 tbsp/gal of water during the vegetative stage
- As foliar spray – fermented fruit juice at 1 tbsp/gal of water during flowering up to fruit setting

Preparation of Fermented Plant Juice

- Collect young leaves and shoots of legumes or other fast-growing plants
- Cut into small pieces and mix with crude sugar (3 kg plant parts : 1kg sugar)
- Place the mixture in a net bag, put this inside the plastic pail, put weight, then cover with paper or cloth

- Store mixture in a cool, dark place for 5–7 days
- Collect fermented juice, place in a glass container, and cover

Preparation of Fermented Fruit Juice

- Chop ripe banana, papaya, and squash fruits
- Mix with crude sugar or molasses (3 kg chopped fruits: 1 kg sugar
- Pour mixture in a net bag, place in a plastic pail, put weight, then cover with paper or cloth
- Store the mixture in a cool, dark place for 5–7 days
- Collect the fermented juice, pour inside a glass container, and cover with paper or cloth

Weeding and Cultivation

- Cultivate by off-barring at 14 days after transplanting
- Hill-up at 28 and 45 days after transplanting
- Spot weed as needed
- Apply mulch after planting to control weeds

Water Management

- Irrigate before and after transplanting
- Irrigate weekly if necessary
- Apply mulch to conserve moisture

Insect Pest and Disease Management

Major Insect Pests

Tomato hornworm

- Control
  - Hand pick hornworm
  - Plant repellant crops like marigold and opal basil around and along the rows
  - Plant dill as trap crop
  - Spray hot pepper solution (100g macerated hot pepper + 1 tbsp soap/16 L water)

Tomato Fruitworm

- Control
  - Spray the plant with water in the morning to attract ladybug. It eats 60-fruitworm eggs/day.
  - Use garlic and onion spray to repel fruitworm
  - Spray with hot pepper solution

Diseases

Mosaic

- Control
  - Rouging
  - Plant barrier crops
  - Spray with lactic acid bacteria serum (LABS) to increase plant resistance

Preparation of Compost Tea

- Place ripe compost in a cloth bag
- Put the compost tea bag in a glass jar
- Pour water inside jar and let stand overnight

Preparation of LABS

- Pour new rice washing in a glass jar
- Let it stand for 20 minutes to collect lactic acid bacteria from the air. Cover the jar with paper
- Store the jar in a cool dark place for 1 week
- Strain the fermented solution and set aside
- Prepare milk solution by placing and mixing 1 tbsp powdered milk in a glass of water. Add 1 part fermented rice washing to 10 parts milk solution.
- Cover glass jar with paper and store for a week
- Remove the scum on top of the solution
- Strain the fermented milk solution or the pure culture LABS.

Postharvest Handling/Packaging

- Harvesting could be done continuously for 1 month or more depending on variety and cultural practices
- Harvest tomato fruits at mature green and breaker stages
- Harvest early in the morning, 2-3 times a week
- Classify fruits according to market standards
- Pack in plastic crates

Marketing

Before planting

- Arrange contract growing agreements with institutional buyers such as fastfood centers, hotels, restaurants, airline companies*
- Check the requirements of special markets, weekend markets, farms stands, and supermarkets
- Organize consumer groups**

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* Institutional buyers have specific requirements for volume, quality, and dependability of supply

** Consumer groups are composed of individuals who are health conscious, prefers environment-friendly food products, knowledgeable about the benefits of organically grown products, and can afford the premium price of organic food products.

Credits

Production: PCARRD Secretariat with the support of the agricultural resources management research, planning and development, and the applied communication divisions
Lead Experts and Science and Technology Consultants: **Gloria Rodulfo** and **Luis Santiago**
Content Analysts: **Bethilda E. Umali** and **Ma. Teresa L. de Guzman**
Investment Analysts: **: Luis Santiago** with **Don Joseph M. Medrana**
Editor: **Joel Eneristo A. Joven**
Layout and Design: **Paul Jersey G. Leron**
Photo Credits: **Dr. Rodel G. Maghirang, Ms. Gloria S. Rodulfo,** and **Dr. Jose Balaoing**
Production Assistant: **Carmelita B. Alamban**

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