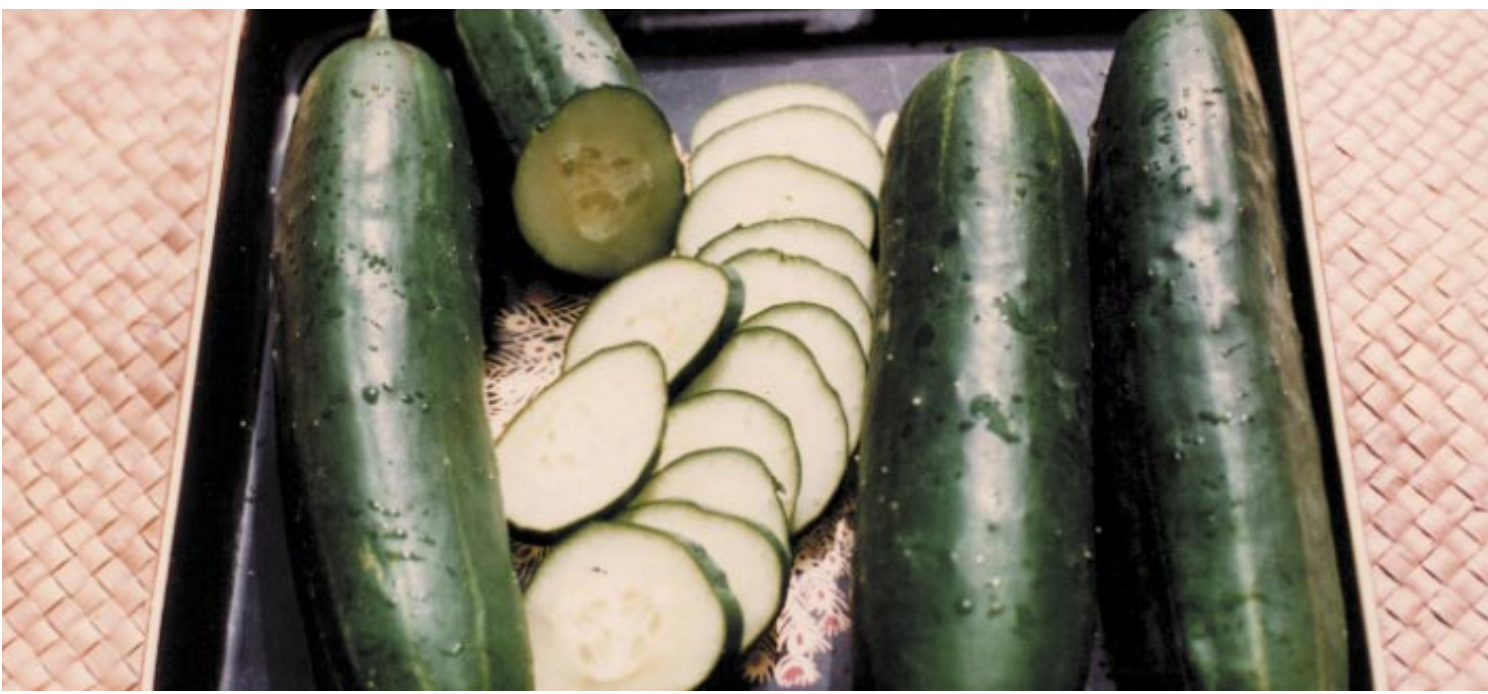
Profitability Analysis No. 08/2007

Profitability Analysis: 1-ha Organic Cucumber Production



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.

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Los Baños, Laguna
2007

First Edition 2007

ISSN: 1908-8043

Bibliographic Citation:
Philippine Council for Agriculture, Forestry and Natural Resources Research and Development. Profitability analysis: 1-ha organic cucumber production. Los Baños, Laguna: PCARRD, 2007. 13p. -(Profitability Analysis No.08/2007)

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 cost and return analysis for 1-ha organic cucumber production. Also, it contains the background information on cucumber, its varieties, soil type and site, best growing period, seedling production, land preparation, planting distance, field planting, fertilization, trellising, vine training, irrigation, weed management, enhancement of fruit set, and 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 for your use. Together, we can improve the production system for cucumber and seal its importance in our national economy.

PATRICIO S. FAYLON
Executive Director

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Introduction

Cucumber, a native of Asia, has been cultivated for over 3,000 years. It is one of the most popular salad vegetables and one of the quickest maturing among the vine crops.

Immature cucumber fruits can be made into salad and pickles. Large yellow types are boiled and used as stew ingredient. Ripe fruits are processed into jellies; seed kernels are eaten as snack food; and young shoots are eaten raw or steamed. It is certainly a nutritious favorite among Filipinos.

Cucumber's food and nutritional value, matched with its market potential, makes it a viable agribusiness option for small and medium entrepreneurs. Producing organic cucumber is an even more viable investment opportunity as it inherits the food and nutritional value of a typical cucumber while creating a profitable market niche of its own.

Initial Capital	₱493,510.00
Net Return/2-month cropping cycle	₱121,864.00
Benefit-Cost Ratio (BCR)	1.68
Return on Investment (ROI)	25%
Payback Period	4 cropping cycles

A 1-ha organic cucumber production is a profitable investment requiring a total initial capital of ₱493,510. Estimated net return per 2-month cropping cycle stands at ₱121,864, representing a Return on Investment (ROI) of 25%. At this rate, the total initial investment (which includes fixed assets and working capital) is recovered within just four cropping cycles.

Moreover, for every ₱1 cost incurred, the venture returns ₱1.68 to the investor.

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

Cost and returns for organic cucumber production.

Yield (kg/ha)				20,000	
Price/kg				15	
Gross Return (GR)					**300,000**
Expenses	**Qty**	**Unit**	**Unit Price**	**Total**	
A. Direct Materials (DM)					
- Seeds	2	kg	1,750	3,500	
- Trellis - Ipil Posts	3,300	pcs	10	33,000	
- GI Wire #16	50	kg	52	2,600	
- Synthetic Straw	100	rolls	30	3,000	
- Chicken Manure	15	tons	1000	15,000	
- Fresh Rice Hull	10	tons	500	5,000	
- Carbonized Rice Hull	1	ton	500	500	
- Fermented Plant Juice (FPJ)				1,000	
- Fermented Fruit Juice (FFJ)				1,000	
- Bio-organic Fertilizer (BOF)	5	tons	200	1,000	
Sub-total				**65,600**	
B. Direct Labor (DL)	**Qty**	**Unit**	**Unit Price**	**Total**	
- 1st Plowing	6	md	440	2,640	
- 1st Harrowing	4	md	440	1,760	
- 2nd Plowing	4	md	440	1,760	
- 2nd Harrowing	4	md	440	1,760	
- Furrowing	2	md	440	880	
- Planting	10	md	220	2,200	
- Decomposed Manure Application	4	md	220	880	
- Tea Manure Application	4	md	220	880	
- Sidedressing 3x	12	md	220	2,640	
- Spraying of Supplements	16	md	220	3,520	
- Trellising	20	md	220	4,400	
- Vine Training	8	md	220	1,760	
- Irrigation	16	md	220	3,520	
- Weeding	4	md	220	880	
- Spot Weeding/ Roguing	6	md	220	1,320	
- Harvesting	48	md	220	10,560	
- Packing	30	md	220	6,600	
- Miscellaneous	20	md	220	4,400	
Sub-total				**52,360**	

Cost and returns... (Continued).

C. Other Expenses	Qty	Unit	Unit Price	Total		
Transportation	2	months	5,000	10,000		
Depreciation	2	months	6,808	13,616		
Miscellaneous[1], 10% of DM				6,560		
Full-time Laborers	2	pax	4,500	18,000		
Land Rent, ₱6,000/month	2	months	6,000	12,000		
Sub-total				**60,176**		
Total Expenses (TE)/2-month Cycle					**178,136**	
Net Returns (NR)/2-month Cycle						**121,864**

Fixed Asset (FA) Investment	328,990
Working Capital (WC)[2]	164,520
Initial Investment (FA + WC)	**493,510**

Cost of Production/kg	**8.91**
Benefit-Cost Ratio (GR/TE)	**1.68**
Return On Investment (ROI), (NR/Initial Investment)	**25%**
Payback Period (FA/NR)	**4 cropping cycles**

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

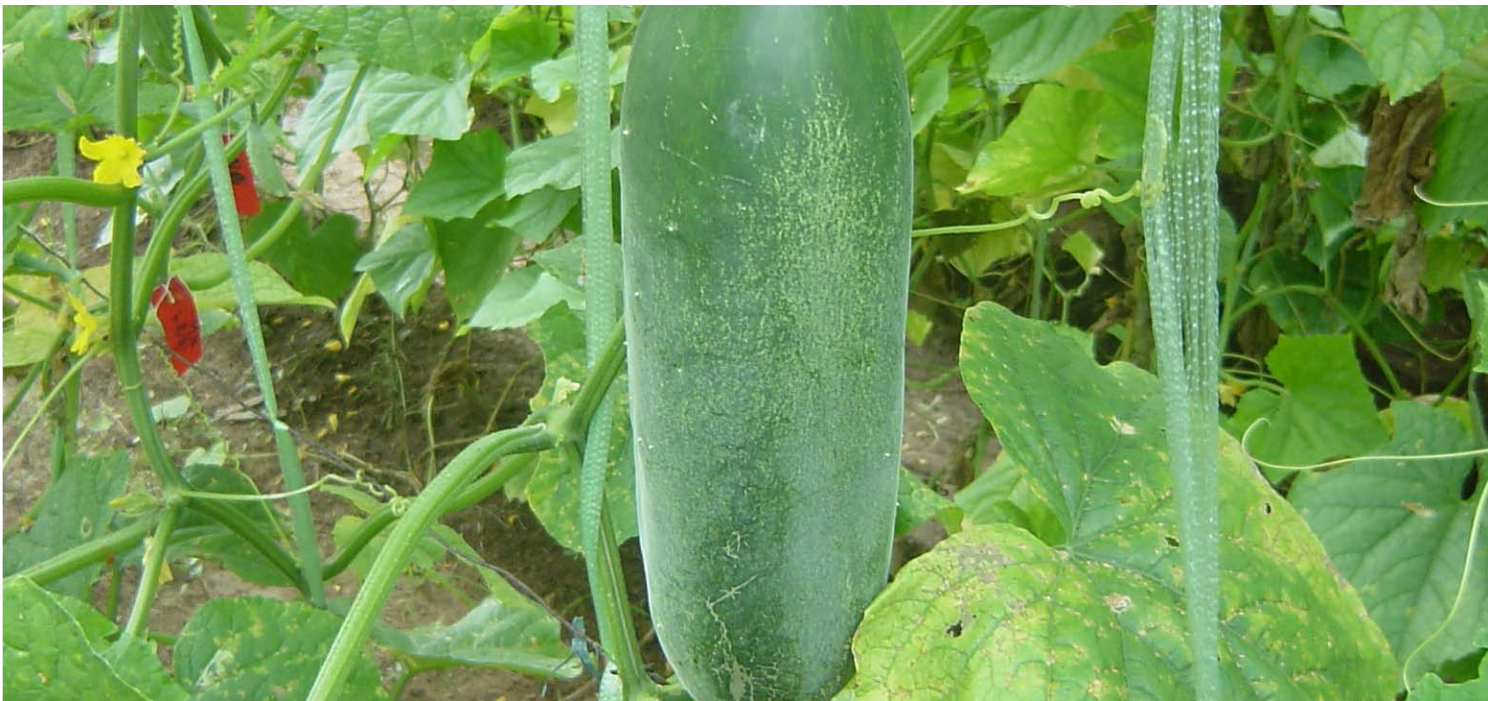
[2] Total cash required per cycle = TE-depreciation.

Technical assumptions.

Production Cycle	2 months
Farm Size	1 ha
Soil Type	clay loam requiring 2 plowings and 2 harrowings
Farm Utilization	exclusive to oganic cucumber
Cucumber Variety Used	slicing type variety
Postharvest Operations	only up to packing in recyclable plastic crates

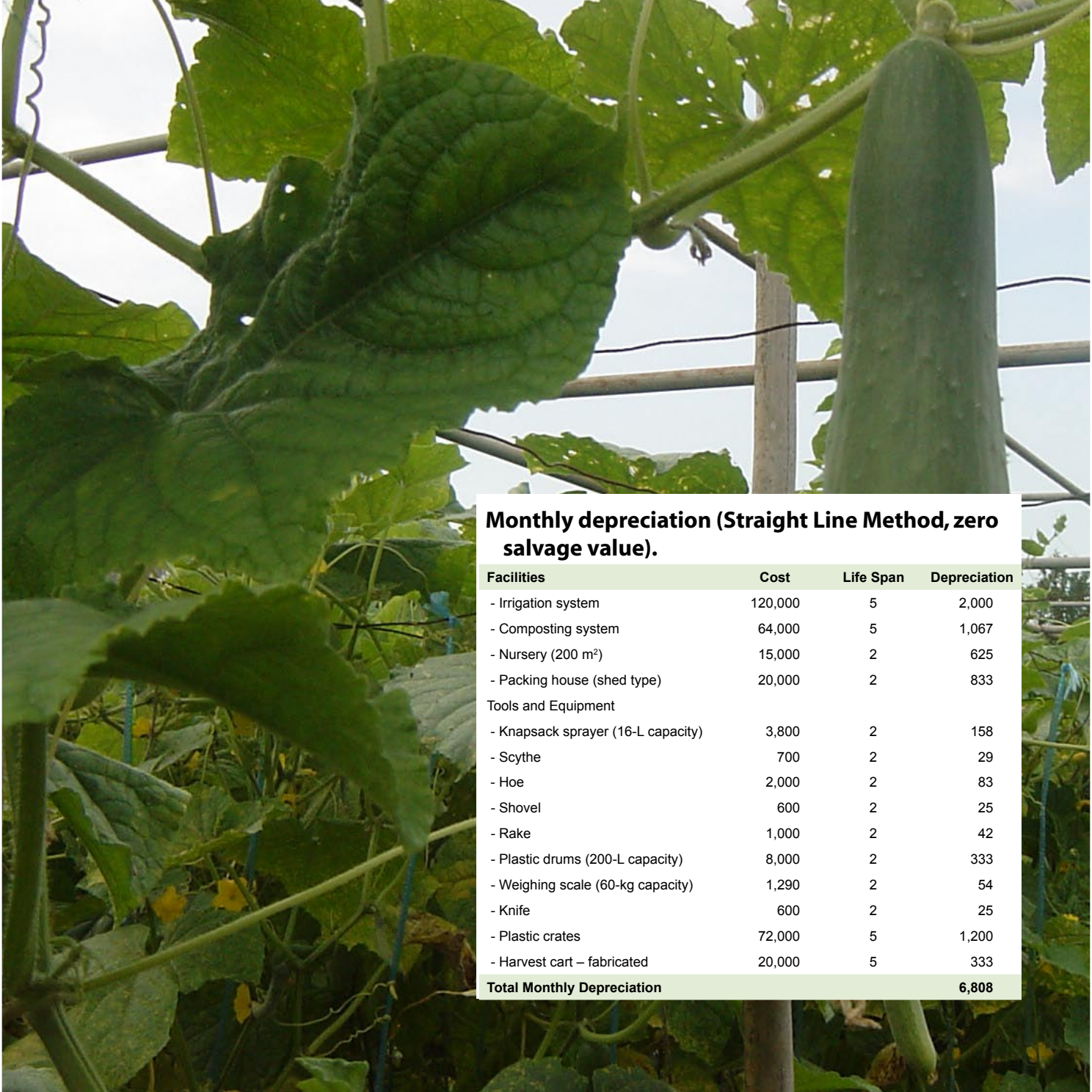
Financial assumptions.

Total Initial Investment	493,510, full equity
Depreciation Method	straight line, 0 salvage value
Marketable Yield	20,000 kg net of postharvest losses and rejects
Selling Price of Organic Cucumber	₱15/kg at farm gate
Marketing of Produce	picked up by bulk buyers
Labor Rate	₱4,500/month
Land Rent	₱6,000/month



Investment 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, 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	Depreciation
- Irrigation system	120,000	5	2,000
- Composting system	64,000	5	1,067
- 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	1,200
- Harvest cart – fabricated	20,000	5	333
Total Monthly Depreciation			**6,808**

Package of Technology

Varieties	
General Lee, Jackson 27, Poinsett, and Thalia	• Slicing type • Smooth, medium size • Dark green fruit with prominent white spines • Can be harvested at 35–40 days after sowing • Long shelf life • Yield: 20 t/ha
Site	• Has adequate irrigation water supply • With farm-to-market road • Must be at least 1 km away from farms that use chemical fertilizers and pesticides
Soil	• Sandy loam or clay loam • Has good drainage • pH 5.5–7.5
Best Growing Period	• June to March in low-elevation areas • Throughout the year in mid- and high-elevation areas
Land Preparation	• One plowing and one harrowing in sandy loam soil • Two plowings and two harrowings in clay loam soil
Planting Distance	
Single Row Planting	• 1 m between furrows • 0.30 m between holes along the furrow

Field Planting

- Sow 2–3 seeds per hole, 1 cm deep
- Cover lightly with soil
- Mulch with rice hull, rice straw, or any available mulching material
- Two days after emergence, pull out seedlings in excess of two per hill
- Replant in missing hills

Fertilization

Basal Application Before Planting

- 1 kg fully decomposed chicken manure /linear meter
- 500 g carbonized rice hull/linear meter; 1 inch thick
- 0.5 L full strength tea manure per hole

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

Side Dressing

- Apply 100 g fully decomposed chicken manure/compost per hill 30, 45, 60 days after emergence (DAE)

Supplements at Weekly Interval

- Drench with tea manure mixed with equal amount of water
- Spray with fermented plant juice (1 tbsp/gal of water) during the vegetative stage
- Spray with fermented fruit juice (1 tbsp/gal of water) during the fruiting stage

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 : 1 kg sugar)

- Place the mixture in a net bag, put inside a 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

Trellising

- Provide trellis soon after emergence
- Trellis materials: 3,300 pcs "ipil-ipil" or "kakawate" posts, 2 m long
- Trellis construction:
  - Set up posts every 3 m along the row and 1 m between rows
  - Connect posts by installing GI wire #16 near the bases, in the middle, and near the top ends
  - Attach synthetic straw or abaca twine from the topmost wire to support growing vines; one piece of straw or twine per plant

Vine Training

- Start vine training when the plants are about 6 inches tall

Irrigation

During dry season

- Apply furrow irrigation twice a week in sandy loam soil and once a week in clay loam soil

During wet season

- Irrigate as need arises

Weed Management

- Do off-barring at 20 days after emergence and hilling up at 1st side dressing
- Apply mulch after planting
- Regularly do spot weeding
- Allow creeping weeds to grow in between plants/furrow

Enhancement of Fruit Set

- Increase population of insect pollinators
- Introduce 1-2 colonies of honey bee
- Plant sunflower, cosmos, and other flowering plants within the production area

Pest and Disease Management

Insect Pests and Their Control

- Beetle
  - Dust the leaves with ash of rice hull or wood
- Leaf folder
  - Spray with hot pepper solution (100g macerated hot pepper + 1 tbsp soap/16 L water)
  - Attract predation by planting flowering plants
- Aphids
  - Spray with hot pepper solution
  - Encourage predation by keeping the plant wet in the morning
  - Plant corn as trap crop
- Thrips and mites
  - Spray with "alagaw" (*Premna odorata* B.) extract
  - Plant corn as trap crop
  - Prune severely infested plant part

Disease and Their Control

- Powdery mildew/downy mildew
  - Spray with compost tea mixed with equal amount of water
  - Prune infected leaves
  - Apply crop rotation
  - Apply mulching
- Mosaic
  - Rogue infected plants
- 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

Harvesting	• Harvesting starts 38–45 days after emergence and every 2 days • Harvest all marketable fruits including deformed and damaged to promote the production of more fruits
Post-Harvest Handling/ Packaging	• Do not expose fruits to high temperature to maintain freshness • Sort harvested fruits and grade according to market standards • Pack in plastic crates lined with banana leaves
Marketing	*Before planting* • Arrange contract growing agreements with institutional buyers such as fastfood centers, hotels, restaurants, airline companies, and food processors* • Check the requirements of special markets, weekend markets, farm 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; prefer environment-friendly food products; knowledgeable about the benefits of organically grown products; and can afford the premium price of organic food product*s.

Credits

Production: PCARRD Secretariat with the support of the agricultural resources management research, planning and development, socio-economics research, and the applied communication divisions
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Special thanks to: **Patricio S. Faylon, Digna O. Manzanilla, Leah J. Buendia, Albert P. Aquino,** and **Lily Ann D. Lando**


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