

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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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

| | |
|-----------------------------------|-------------------|
| Initial Capital | P493,510.00 |
| Net Return/2-month cropping cycle | P121,864.00 |
| Benefit-Cost Ratio (BCR) | 1.68 |
| Return on Investment (ROI) | 25% |
| Payback Period | 4 cropping cycles |

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.

A 1-ha organic cucumber production is a profitable investment requiring a total initial capital of P493,510.

Estimated net return per 2-month cropping cycle stands at P121,864, 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 P1 cost incurred, the venture returns P1.68 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, P6,000/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 organic 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 | P15/kg at farm gate |
| Marketing of Produce | picked up by bulk buyers |
| Labor Rate | P4,500/month |
| Land Rent | P6,000/month |

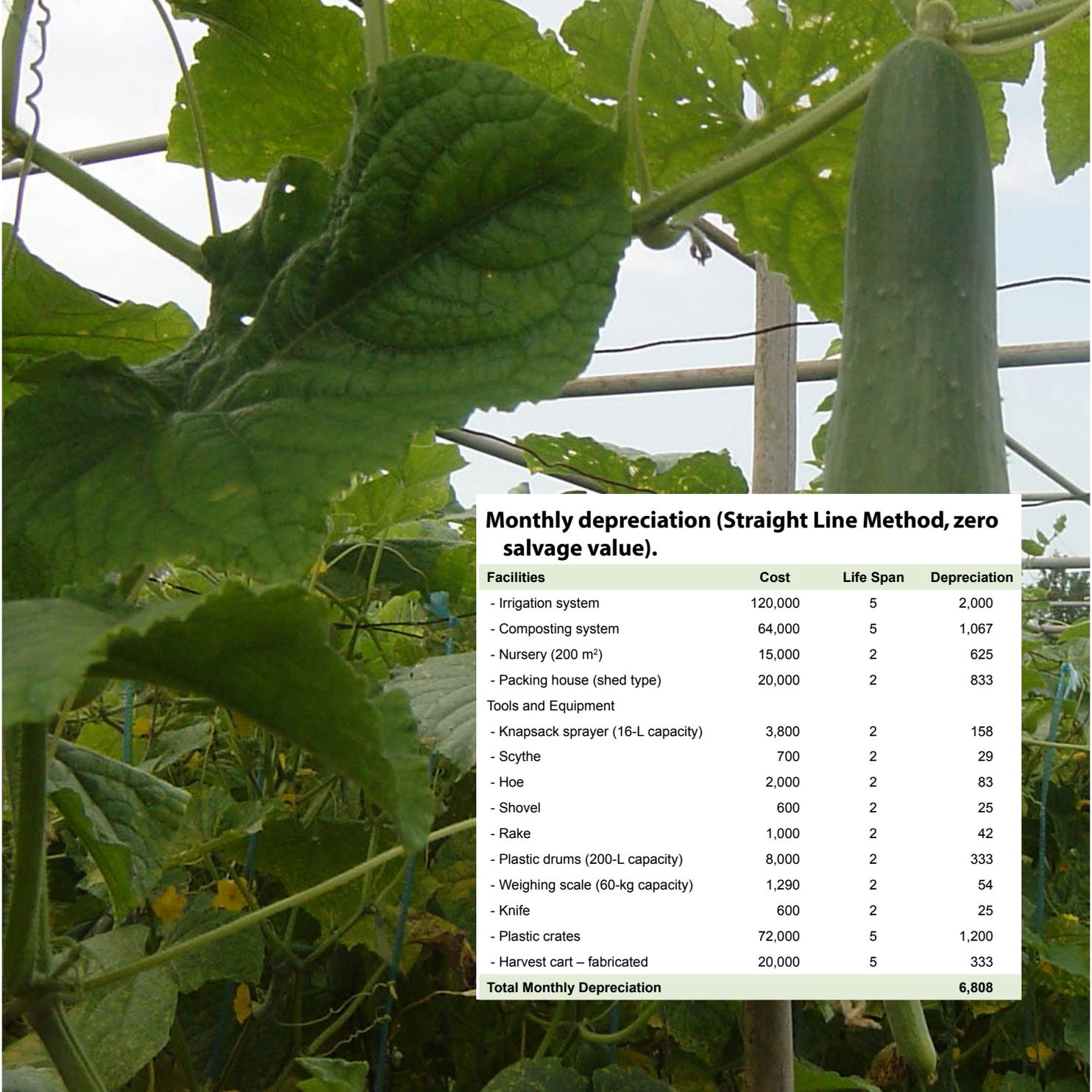




Investment facilities, tools, and equipment.

| 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**

* *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 products.*

Credits

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