Profitability Analysis No. 10/2007

Profitability Analysis: 1-ha Organic Lettuce 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 projected income statement and cash flow for a 1-hectare organic lettuce production. Also, it contains background information on lettuce, its 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 lettuce and seal its importance in our national economy.

PATRICIO S. FAYLON
Executive Director

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Introduction

Lettuce is the world's most popular salad crop. Aside from being eaten as fresh salad with dressing, lettuce can also be stir-fried with butter, nuts, mushroom, and onions or made into soup with a dash of curry.

The per capita consumption of lettuce is steadily increasing from year to year. There has been a shift in popularity from the head lettuce salad to the tossed salad. The result is a marked increase in the production of leaf lettuce.

Initial Capital	₱435,340.00
Net Return/2-month cropping cycle	₱132,784.00
Benefit-Cost Ratio (BCR)	1.79
Return on Investment (ROI)	31%
Payback Period	4 cropping cycles

Lettuce'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 lettuce is an even more viable investment opportunity. It inherits the food and nutritional value of a typical lettuce 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 ₱435,340. Estimated net return per 2-month cropping cycle stands at ₱132,784, representing a return on investment (ROI) of 31%. At this rate, the initial capital is recovered within just 4 cropping cycles.

Moreover, for every ₱1 cost incurred, the venture returns ₱1.79 to the investor.

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

Cost and returns for organic lettuce production.

Yield (kg/ha)				12,000	
Price/kg				25	
Gross Return (GR)					300,000
Expenses	**Qty**	**Unit**	**Unit Price**	**Total**	
A. Direct Materials (DM)					
Seeds	200	g	₱100/20g	1,000	
Chicken Manure, 10 tons @ ₱1,000/ton	10	ton	1000	10,000	
Carbonized Rice Hull	10	ton	500	5,000	
Fresh Rice Hull	10	ton	500	5,000	
Carton Boxes (20 kg/carton)	600	pcs	40	24,000	
Fermented Plant Juice (FPJ)				1,000	
Bio-organic Fertilizer (BOF)	5	sacks	200	1,000	
Plastic Mulch				500	
Sub-total				**47,500**	

Cost and returns... (Continued).

B. Direct Labor (DL)						
Seedling Production	15	md	220.00	3,300		
Plowing	10	mad	440.00	4,400		
Harrowing	10	mad	440.00	4,400		
Bedding	20	mad	440.00	8,800		
Manure application	10	md	220.00	2,200		
Mulching	10	md	220.00	2,200		
Transplanting	20	md	220.00	4,400		
Fertilization - basal	10	md	220.00	2,200		
Fertilization - sidedress	10	md	220.00	2,200		
Spraying	10	md	220.00	2,200		
Weeding	20	md	220.00	4,400		
Irrigation	20	md	220.00	4,400		
Harvesting	30	md	220.00	6,600		
Packing	30	md	220.00	6,600		
Miscellaneous	20	md	220.00	4,400		
Sub-total				**62,700**		
C. Other Expenses						
Transportation				10,000		
Depreciation	2	months	6,133	12,266		
Miscellaneous[1], 10% of DM				4,750		
Full-time Laborers	2	pax	4,500	18,000		
Land Rent, ₱6,000/month	2	months	6,000	12,000		
Sub-total				**57,016**		
Total Expenses (TE) per 2-month cycle					**167,216**	
Net Returns (NR) per 2-month cycle						**132,784**
Fixed Asset (FA) investment				280,390		
Working Capital (WC)[2]				154,950		
Initial Investment (FA + WC)				435,340		
Cost of Production per kg			**13.93**			
Benefit-Cost Ratio (GR/TE)			**1.79**			
Return on Investment (ROI), (NR/Initial Investment)			**31 %**			
Payback Period (FA/NR)			**4 cropping cycles**			

[1] *Cost for production of 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
Fam Utilization	exclusive to oganic lettuce
Lettuce Variety Used	leaf type varieties
Postharvest Operations	only up to packing in carton boxes

Financial assumptions.

Total Initial Investment	435,340, full equity
Depreciation Method	straight line, 0 salvage value
Marketable Yield	12,000 kg net of postharvest losses and rejects
Selling Price of Organic Tomato	₱15/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,			
- Srinkler 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
- Plastic nursery trays	100	60.00	6,000
- Weighing scale (60-kg capacity)	1	1,290.00	1,290
- Plastic crates	100	180.00	18,000
- Harvest cart - fabricated	2	10,000	20,000
Total Investment on Facilities, Tools, and Equipment			280,390

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

Facilities	Cost	Life Span	Dep.
- 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
- Plastic nursery trays	6,000	2	250
- Weighing scale (60-kg capacity)	1,290	2	54
- Plastic crates	18,000	5	300
- Harvest cart - fabricated	20,000	5	333
Total Monthly Depreciation			**6,133**

Nutritional content of lettuce per 100 g fresh edible portion:

Fat : 0.2 g
Fiber : 0.7 g
Protein : 1.2 g

Package of Technology

Varieties

Black Seeded Simpson, Corell, Green Ice, Grand Rapids, Green Span, Lollo Rossa, and Panorama

- Leaf type
- Leaves: tender, smooth, frilled, puckered, ruffly
- Color: red, bronze, dark green, apple green, chartreuse
- Plant type: non-heading, spreading
- Maturity: 40–50 days after sowing
- Yield: 12 t/ha

Site

- 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 Type

- Sandy loam, well-drained
- Top soil 24 inches deep
- pH 6.0–6.8

Best Growing Period

- June to February in low-elevation areas
- Throughout the year in mid- and high-elevation areas

Seedling Production

- Seed source: local seed companies/ seed dealers
- Amount of seeds/ha: 200–275 g
- No. of plants/ha: 40,000–80,000

Media Mix

- 2 parts garden soil
- 2 parts fully decomposed chicken manure or compost
- 1 part carbonized rice hull

Sowing in Seedbed
- Soak seeds 4 hours before sowing
- Line-sow 2 seeds every 3 cm, cover lightly with soil
- Mulch with rice hull, coir dust or chopped rice straw

Sowing in Seed Boxes
- Line sow seeds thinly, cover lightly with soil
- Prick in nursery trays using prepared soil mix at 2-leaf stage

Care and Maintenance
- Provide partial shade during dry season and rain shelter during wet season
- Water regularly
- Fertilize with tea manure 4 days after emergence or at pricking

Hardening
- One week before transplanting
- Expose seeds fully to sun to minimize transplant shock
- Reduce frequency of watering to slow down top growth and increase root volume

Land Preparation

Clearing
- Remove plant debris, stones, and non-biodegradable materials

Cultivation
- Plow and harrow twice

Bedding
- Prepare raised beds, 6-in high, 0.75–1.0 m wide, 0.5 m apart
- For clay soils, incorporate 500 g/m^2 rice hull to improve soil texture
- Put rice straw mulch or mulching film
- Make holes: 30 cm x 30 cm; 3 rows/bed
- Drench the holes with full strength tea manure

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

Field Planting

Seedling Preparation
- Water the beds or tray thoroughly and uproot the seedlings carefully using a dibble

Transplant
- 2-week old seedlings
- 1 seedling per hole
- Late in the afternoon to minimize transplant shock

Planting Distance
- 30 cm between hills and 30 cm between rows
- 3 rows/bed

Fertilization

Basal, at Planting
- Apply 1 kg fully decomposed chicken manure/m^2 and 500 g carbonized rice hull/m^2

Supplements
- Drench the beds with undiluted tea manure
- Spray fermented plant juice at the rate of 1 tbsp/gal water weekly

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

Water Management
- Irrigate before and after transplanting
- Use furrow or overhead irrigation, if available
- Mulch the beds to conserve soil moisture
- During hot dry days, water in the morning and in the early afternoon
- During rainy season, plant in raised beds, 30 cm high to avoid waterlogging
- Water must penetrate the soil to a depth of 18 inches

Weed Management

- Mulch the beds to suppress weed growth
- Keep the beds weed free but allow creeping weeds to grow in between beds

Pest and Disease Management

Insect Pests and Their Control

- Cabbage Looper
- Aphids
- Control
  - Spray hot pepper solution directly to the pests (100 g macerated hot pepper + 1 tbsp soap/16 li water)
  - Plant corn around the area to act as trap crop to aphids
  - Attract aphid predators such as ladybug and green lacewing by wetting the lettuce leaves
  - Intercrop with chives and spring onion
  - Plant flowering species such as sunflower, cosmos, and zinnia to attract beneficial insects

Insect Pests and Their Control

- Lettuce drop or wilting
  - Crop rotation
  - Thorough land preparation
- Bottom rot
  - Mulching
  - Crop rotation
  - Drench the beds with compost tea
  - Water only in the morning and early afternoon
- Downy Mildew
  - Crop rotation
  - Mulching
  - Pruning of infected leaves
  - Spraying with compost tea
  - Avoid overcrowding

	• 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
Physiological Disorder	• Tip-burn - Provide adequate water supply - Avoid over fertilization
Harvesting	• Harvest during early morning • Harvest dates: 40–50 days after sowing
Postharvest Handling/ Packaging	• Spray with cool water to remove field heat • Remove mature leaves before packing • Pack in boxes in upright position • Transport in iced styroboxes or refrigerated vans
Marketing	*Before Planting* • Arrange contract growing agreements with institutional buyers such as fastfood centers, hotels, restaurants, and airline companies* • Check the requirements of special markets, weekend markets 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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