

Context

One of the greatest challenges facing the vegetable industry of Cebu is the development of production systems that adequately meet year-round consumer demand for safe and quality fresh vegetables. The region is often faced with frequent typhoons, erratic precipitation, and widespread pest and disease issues. Protected cultivation technology has been introduced to prevent significant damage to vegetable crops, especially during wet seasons and heavy rains. However, small-scale farmers have been reluctant to adopt this technology due to its associated investment costs. Hence, this study was conducted in Cebu province to evaluate the profitability of protected cultivation and compare it with open-field cultivation to help farmers, stakeholders and investors make an informed decision.

Protected Vegetable Cultivation

Protected cultivation technology using rain shelters has been introduced in Mantalongon, Dalaguete, Cebu to protect vegetable crops from erratic and high precipitation, strong winds and pests and diseases. Although there is no definite ideal size of rain shelters, farmers in Mantalongon have protected structures that can measure up to 1.5 meters in height, 2.5 meters in width and 20 meters in length. Average dimensions cover 150 sq. m. The frame is made of round steel pipes and is covered with polyethylene plastic. It can last more than ten years but the plastic cover, which costs PhP 5,000 on the average, is replaced every three (3) years. The plastic cover is installed at the beginning of the cropping period.

Wet Season			Dry Season		
Jan	Feb	Mar	Jan	Feb	Mar
Apr	May	Jun	Apr	May	Jun
Jul	Aug	Sept	Jul	Aug	Sept
Oct	Nov	Dec	Oct	Nov	Dec

Protected Vegetable Cultivation

can replace:

1. Open field cultivation during wet season
2. Excessive use of pesticides for crop protection

can go well with:

Watering system through the installation of drip irrigation

can be applied to:



Available Technical Briefs



LUZON

Cordillera Administrative Region (CAR)

- Water Harvesting Tank for Cabbage in Benguet
- Blight-Tolerant Potatoes in Benguet

Region I-Ilocos Region

- Mango Production in Ilocos
- Rice-Corn Crop Rotation in Ilocos
- Rice-Tomato Rotation in Ilocos

Region II-Cagayan Valley

- Rice-Rice-Mungbean Crop Rotation/Diversification in Isabela
- Climate-Smart Rice in Isabela

Region III-Central Luzon

- Water Conservation Technology (AWD) in Tarlac
- Climate-Smart Rice in Tarlac
- Crop Rotation-Zero Tillage Combination in Tarlac



VISAYAS

Region VI-Western Visayas

- Sloping Agricultural Land Technology for Corn in Iloilo
- Small Water Impounding Project for High Value Crops in Iloilo

Negros Island Region (NIR)

- Use of Submergence-Tolerant Rice Variety in Negros Occidental
- Organic Red Rice Production in Negros Occidental



MINDANAO

Region IX-Zamboanga Peninsula

- Alternate Wet And Drying for Rice in Zamboanga Sibugay
- Coconut-Yellow Corn Intercropping in Zamboanga Sibugay

Region X-Northern Mindanao

- Biodynamics in Corn Production in Bukidnon
- Corn-Banana Crop Diversification in Bukidnon

Region XI-Davao Region

- Crop Rotation with Integrated Nutrient Management in Davao
- Cacao-Coconut Intercropping in Davao

Region IVA-CALABARZON

- Coconut-based Integrated Farming System in Quezon
- Rainwater Harvesting in Vegetable Production in Quezon

Region IVB-MIMAROPA

- Rice-Onion Crop Rotation in Oriental Mindoro
- Stress-Tolerant Rice in Oriental Mindoro

Region V-Bicol Region

- Organic Corn Farming in Camarines Sur
- Climate-Smart Rice (Green Super Rice) in Camarines Sur

Region VII-Central Visayas

- Corn-Peanut Crop Rotation in Cebu
- Protected Vegetable Cultivation in Cebu

Region VIII-Eastern Visayas

- Alley Cropping Using Pineapple as Hedgerow in Upland Rice Production in Samar
- Protected Vegetable Cultivation in Samar

Region XII-SOCCSKARGGEN

- Organic Rice Farming in North Cotabato
- Integrated Rice-Duck Farming System (IRDFS) in North Cotabato

Region XIII-Caraga

- Corn-Rice-Green Corn Crop Rotation in Agusan Del Norte
- Corn-Squash+Corn Crop Rotation in Agusan Del Norte

Autonomous Region of Muslim Mindanao (ARMM)

- Coconut-White Corn Intercropping in Lanao Del Sur
- Coconut-Banana Intercropping in Lanao Del Sur

References

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About the Authors

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TECHNICAL BRIEF on Climate-Resilient Agriculture (CRA) Central Visayas (Region VII)

Protected Vegetable Cultivation



During the wet season, supply of vegetables drops because of the increased difficulty for farmers to produce quality vegetables. Protected cultivation technology utilizes rain shelters to protect crops from adverse climatic conditions such as high precipitation and strong winds. Farmers can potentially produce year-round supply of vegetables and increase their farm income by capturing higher market prices during unfavorable weather conditions.



Productivity

Increased average annual yield during wet season for every 150 sq.m. structure



Adaptation

Reduced occurrence of pest and disease



Mitigation

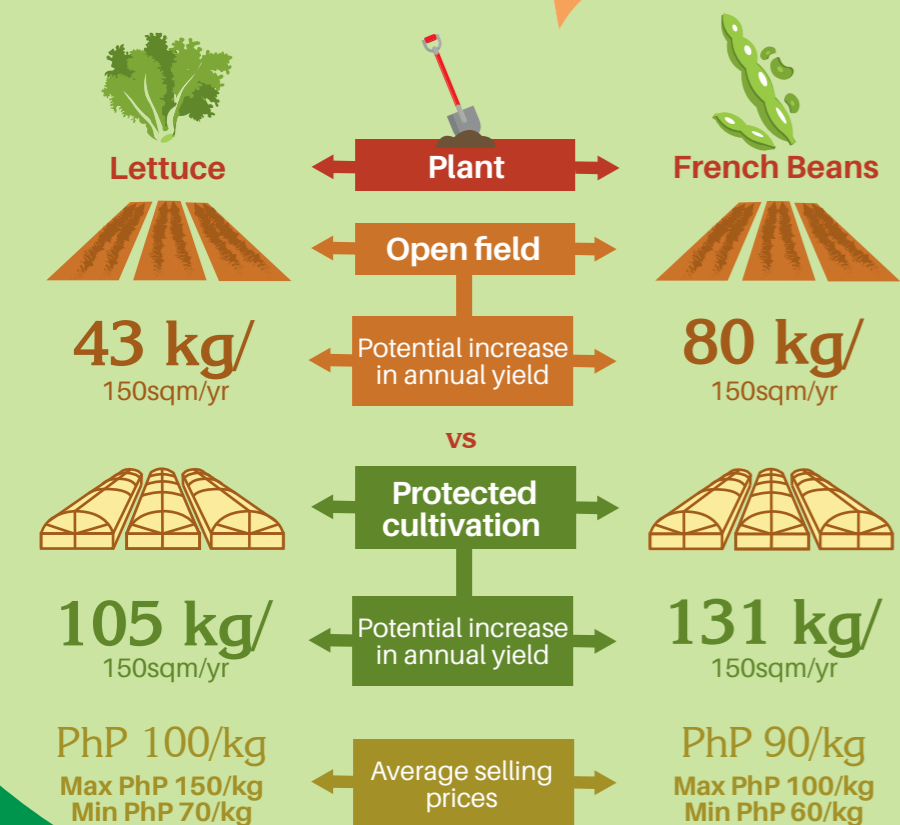
Reduced carbon emission and groundwater contamination due to reduced pesticide and fertilizer application



Cost & Benefit



Yield & Prices



5 Reasons to Invest

- 1 Opportunity for farmers to **produce quality vegetables** even during the wet season
- 2 **Better pest and disease management** due to a controlled production environment
- 3 **Higher potential farm income** compared to traditional open field cultivation

Financial Analysis

Net Present Value	IRR
PhP 57,838 USD 1,127	58%

Sensitivity Analysis

The CRA practice will still be **more profitable** than non-CRA practice even when:

↓ Selling price of lettuce and french beans decrease by **70%**

- 4 **Lower pesticide and fertilizer use** leading to better soil and water quality
- 5 Contributes to **curbing carbon emissions** because of reduced use of pesticides and fertilizers

Externalities

Social and Environmental NPV
PhP 58,505
USD 1,140

Social IRR
59%

Aggregate Impact*

*within the Municipality of Mantalongan

Current Adoption Rate	Projected Adoption Rate
3%	25%

Total Area Planted (ha)	Aggregate NPV
395 ha	PhP 202 million

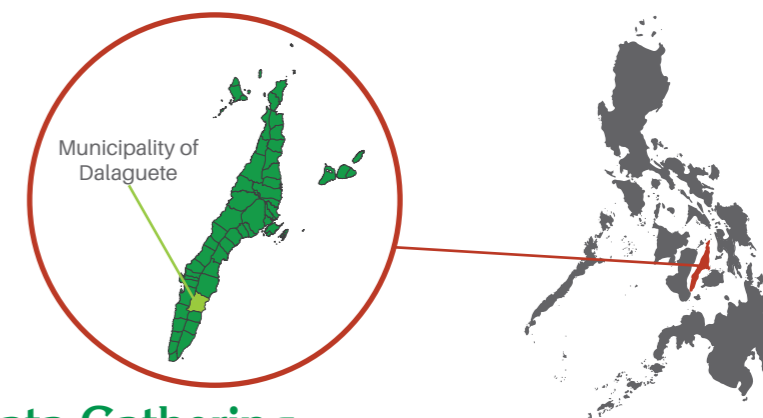
Assumptions:

Period of Analysis	Discount Rate	Exchange Rate
10 years	10%	\$1 = PhP 51.32



Study Site

Cebu Province



Data Gathering

- 1 Analysis of 18 case farms located in key vegetable producing areas in Dalaguete, Cebu
- 2 Conduct of Experts' Workshop with experts from the academe (Visayas State University) and the government (Department of Agriculture Region 7) pooling knowledge and insights on emerging climate resilient farm practices
- 3 Conduct of workshop with 40 Municipal Agricultural Officers (MAO) to validate and add to results from Experts' Workshop and case farms
- 4 Review and synthesis of secondary information

The CIAT CBA Methodology

Cost-Benefit Analysis (CBA) is used to determine the relative profitability of alternative cropping practices, involving the comparison of the annual flows of incremental benefits with that of incremental costs. The CIAT CBA Online Tool analyzes the full benefits and costs of identified practices and adoption response at both individual farmer level and at aggregate level for a particular area.

Specifically, the tool can:

- 1 Quantify economic and some environmental trade-offs of adopting CRA practices.
- 2 Provide sensitivity analysis
- 3 Estimate the level of peak adoption

<http://cbatool.ciat.cgiar.org/>

Recommendations

- When & Where?** Adopt during wet season in places prone to heavy rains. Protected cultivation technology is best adopted during the wet season (June-December), especially in places that are prone to heavy rains such as municipalities of Dalaguete and Argao in Southern Cebu.
- What?** Plant other high value crops. Aside from lettuce and French beans, other high value crops that are vulnerable to strong winds and rain, such as tomatoes and bell peppers, will also benefit from protected cultivation during the wet season.
- Who?** Small-scale farmers are encouraged to invest in the practice. Local government unit, the DA, and the private sector are also encouraged to extend financial and technical support to incentivize adoption among farmers.

Initial Investment Breakdown

- Initial Investment PhP 40,000
- Labor & Services PhP 6,000
- Structure & Equipment PhP 27,000
- Inputs PhP 7,000

Cost of Adopting CRA

- Initial Investment Installation costs (Year 1) PhP 40,000
- Maintenance Annual costs (Years 2-10) PhP 12,000
- Operations Irregular/ non-permanent costs PhP 9,000