

Context


Corn is one of Cebu province’s staple foods. The crop is primarily planted in two seasons, normally adopting a corn-corn cropping pattern. However, unpredictable climatic conditions coupled with soil alkalinity (pH level greater than 7\*) often limit corn production [1]. Corn monocropping is also prone to pests such as stemborers during the second cropping, thereby reducing productivity levels. Rotating corn with peanut provides much needed nutrients to the alkaline soil as well as breaks pest cycles.

\*Based on 1,078 soil samples analyzed by the DA RFO7 Soils Lab, soil pH in Cebu province ranges from 3.86-8.75 with majority of the areas having alkaline soils at pH levels greater than 7.


Corn-Peanut Crop Rotation

Corn-Peanut Rotation is highly feasible in upland and hilly areas where corn is the major crop. This practice is done by planting peanuts after the corn is harvested. Peanuts can fix atmospheric Nitrogen through the aid of the N-fixing bacteria called rhizobia. This allows for much needed nutrients to enter the soil, improving soil fertility for the succeeding cropping. Furthermore, this CRA practice lowers the incidence of pest and diseases by breaking the cycle of pests under monocropping. Therefore, this practice reduces material costs as well as labor costs for fertilization and pest management. Hence, this strategy could result to higher profitability due to lower production cost.


Additionally, the main purpose of planting peanut after corn is to utilize the organic matter derived from decomposing crop residues into the succeeding cropping periods.



| Cropping Season |     |      |
|-----------------|-----|------|
| Jan             | Feb | Mar  |
| Apr             | May | Jun  |
| Jul             | Aug | Sept |
| Oct             | Nov | Dec  |



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**CRA**

**Corn-Peanut Crop Rotation**

can replace:

1. Corn monocropping
2. Other nutrient-depleting practices such as Corn-Sweet Potato crop rotation

uses:

1. Traditional corn variety: ex. Tiniguib
2. Open pollinated variety (OPV)
3. Hybrid corn variety: ex. pioneer

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-SOCSESKARGGEN**

- 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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Ocampo & Zamora (2016). Carbon Storage of Corn-based cropping systems in Isabela, Philippines. Philippine Journal of Crop Science. vol. 41 pp. 20-39

Philippines Statistical Authority (PSA) (2014). A Review of the Agriculture Sector in Central Visayas. Accessed from: <https://psa.gov.ph/content/review-agriculture-sector-central-visayas>

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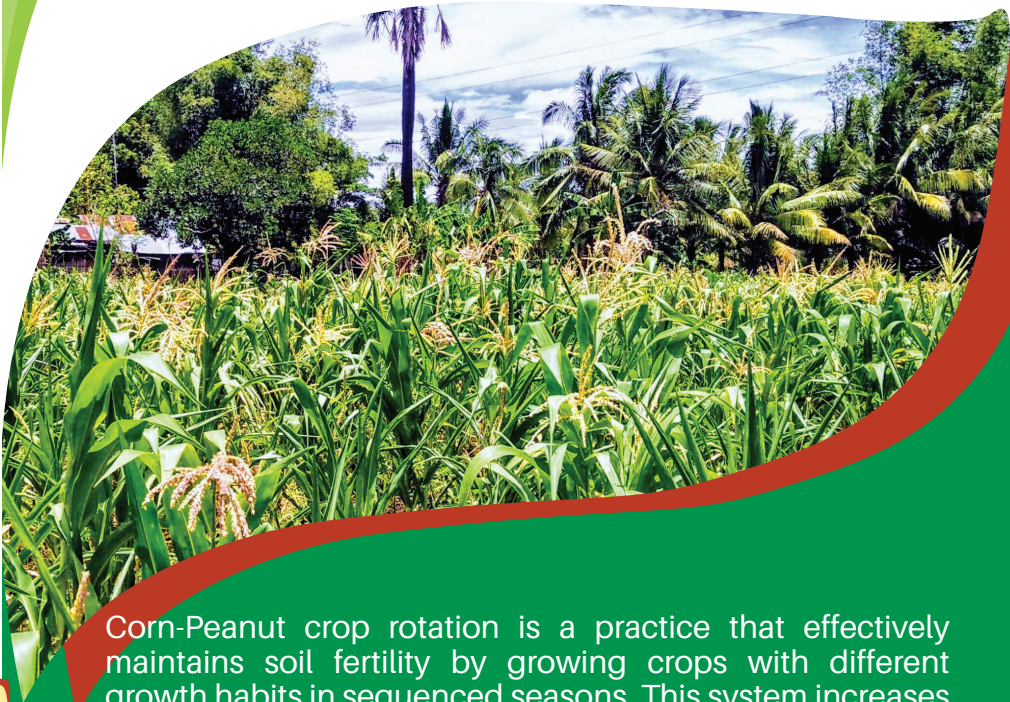
Acknowledgment

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

Corn-Peanut  
Crop Rotation



Corn-Peanut crop rotation is a practice that effectively maintains soil fertility by growing crops with different growth habits in sequenced seasons. This system increases the productivity and profitability through cost-reducing options pertaining to fertilizer and pesticide applications. As such, the carbon emission associated with crop production is less than that of conventional monocropping, thus contributing to climate change mitigation.



**45%**

**Productivity**

Higher annual farm income due to higher crop yield compared to non-adopters



**Adaptation**

Improved resistance to drought and rising temperatures



**Mitigation**

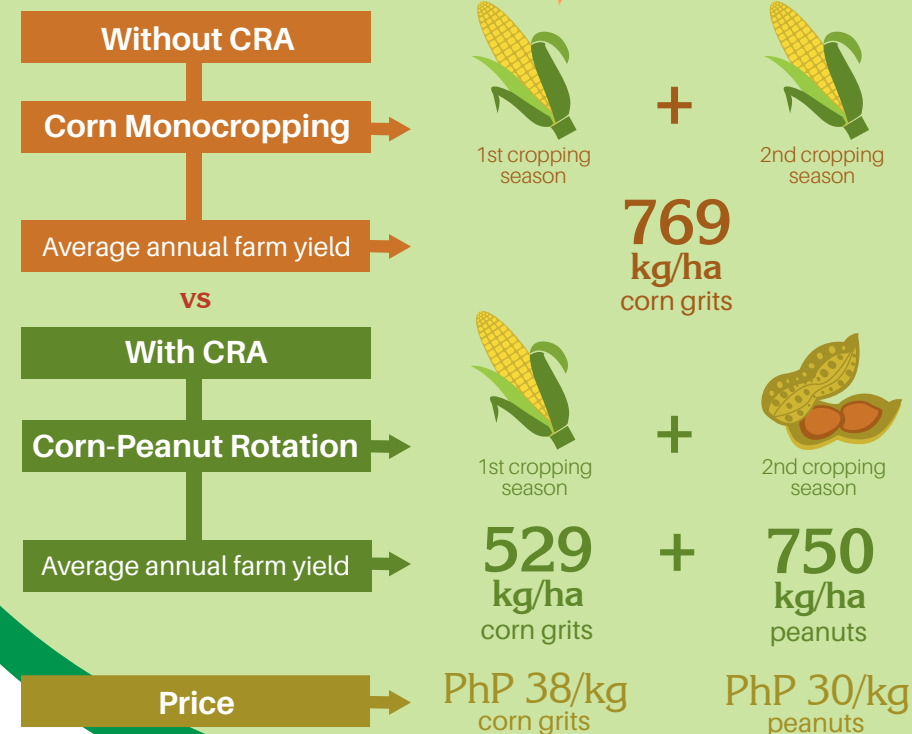
Improved soil fertility through nitrogen fixing leading to fewer inorganic fertilizers used



## Cost & Benefit



## Yield & Prices



## 5 Reasons to Invest

- 1 Increased soil fertility through Nitrogen-fixation
- 2 Lower risk of pests and diseases
- 3 Higher potential farm yield and income due to diversity in production

## Financial Analysis

| Net Present Value        | IRR  |
|--------------------------|------|
| PhP 134,972<br>USD 2,630 | 162% |

## Sensitivity Analysis

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

- Yield of corn decreases by 50%
- Yield of peanut decreases by 50%

- 4 Decreased use of fertilizers and pesticides leading to **lower GHG emissions**
- 5 Increased carbon sequestration by peanut and corn in the soil

## Externalities

Social and Environmental NPV  
PhP 140,976  
USD 2,747

Social IRR  
168%

## Aggregate Impact\*

\*within the Province of Cebu

| Current Adoption Rate | Projected Adoption Rate |
|-----------------------|-------------------------|
| 10%                   | 50%                     |

| Total Area Planted (ha) | Aggregate NPV    |
|-------------------------|------------------|
| 1,400 ha                | PhP 52.9 million |

## Assumptions:

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

## Recommendations

**All parts of Cebu province are recommended to invest in this cropping system.**

**When & Where?** Although recommended in all parts of Cebu, the mid and northern parts of the province have better edaphic factors in growing corn than in southern Cebu.

**Support and training may be provided.**

**What?** The local government unit, the provincial agriculture office and Department of Agriculture Regional Field Office - 7 (DA-RFO7) may provide inputs such as seeds and fertilizer subsidies to farmers opting to adopt corn-peanut rotation. Training components can also be provided so that aspiring farmers will be encouraged to adopt this CRA practice.

**Large and small scale farmers are encouraged to invest in corn-peanut rotation.**

**Who?** Large scale farmers can sell to the private sector while small scale farmers can cater to the local market. The DA-RFO 7 in coordination with other agencies (e.g. Philippine Crop Insurance Corporation, state colleges and universities) should take the lead in scaling out this CRA practice.

## Initial Investment Breakdown

Initial Investment  
PhP 51,500

Labor & Services  
PhP 12,300

Carabao & Equipment  
PhP 29,500

Inputs  
PhP 9,700

## Cost of Adopting CRA

Initial Investment  
Installation costs (Year 1)  
PhP 51,500

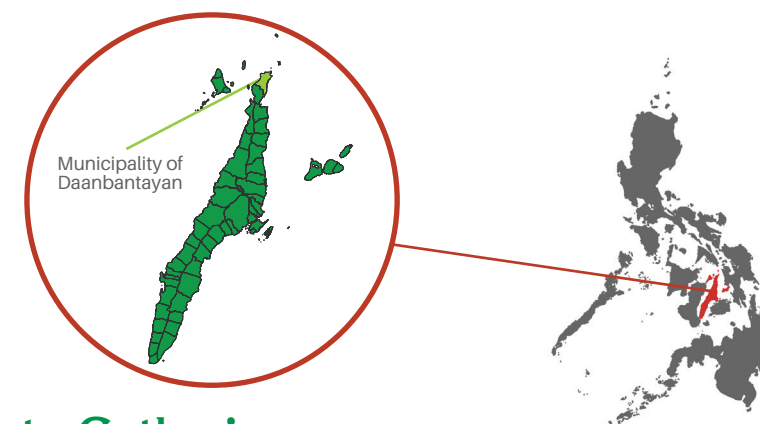
Maintenance  
Annual costs (Years 2-10)  
PhP 24,600

Operations  
Irregular/ non-permanent costs  
PhP 8,300



## Study Site

## Cebu Province



## Data Gathering

- 1 Analysis of 18 case farms identified by the Municipal Agriculturists in Daanbantayan, 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/>