Context
Rice, being the staple food in the province of Samar and in Eastern Visayas (Region 8), accounts for 21.86% of the total agricultural output of the region. Among all provinces in Eastern Visayas, Samar has the largest upland rice environment, covering 3,798 hectares of the total 6,286 hectares in the region. However, farming practices in Samar are very traditional and often result to low productivity (DA, 2013). Furthermore, the area receives heavy rainfall throughout the year and is frequently visited by typhoons. As such, the province is increasingly prone to rain-induced landslide, sea level rise and flooding during heavy rainfall events.

Alley Cropping Using Pineapple as Hedgerows in Upland Rice Production

Alley cropping using pineapple as hedgerows in rice production promotes the use of Kalinayan rice, a peculiar and popular aromatic upland rice variety in the region. Despite its relatively higher price, Kalinayan is a sought-after rice variety because of its excellent aroma, pinkish kernel and good quality (DA, 2012). Similar to other aromatic varieties, it potentially has a higher milling recovery as well (Mante, 2016).

This practice makes use of a high-value crop such as pineapple as vegetative barrier. Its effectiveness in mitigating soil erosion is comparable to shrubs and trees. It also prevents run-off and loss of nutrients, particularly N and K, thus, maintaining soil pH balance and contributing to higher organic matter and available N and K (Sharma et al., 1997).

About the Authors

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Available Technical Briefs

LUZON

Consol irriris Administration Region (CAR):
- Water Harvesting for Irrigation in Benguet
- Night Irrigation to facilitate the growth of rice

Region III-Cagayan Valley:
- Mango Production in Ilocos
- Rice-Grain Crop Rotation in Ilocos
- Rice-Tomato Rotation in Ilocos

Region II-Cagayan Valley:
- Rice-Mungbean Crop Rotation/Orientation in Isabela
- Climate Smart Rice in Isabela

Region III-Central Luzon:
- Water Conservation Technology (WAT) in Tarlac, Climate Smart Rice in Tarlac
- Crop Rotation Zero Tillage Combination in Tarlac

VISAYAS

Region VI Western Visayas:
- Stopping Agricultural Land Technology for Corn in Iloilo
- Allowing imposing Projects for High Value Crops in Iloilo

Negros Island Region (NIR):
- Use of Submergence-Tolerant Rice Varieties in Negros Occidental
- Organic Rice Production in Negros Occidental

MINDANAO

Region IX Zambales Peninsula:
- Allowing cultivation of Dry Rice in Zambales

Region X- Northern Mindanao:
- Biodynamics in Corn Production in Bukidnon
- Corn-Banana Crop Development in Bukidnon

Region XI Davao Region:
- Crop Rotation with Integrated Nutrient Management in Cebu
- Climate-Coconut Intercropping in Davao

Region XII Soccsksargen:
- Organic Farming in North Cotabato
- Interaerial Direct Quick Farming System (RDQFS) in North Cotabato

Region III-Cagayan Valley:
- Corn-Green Corn Crop Rotation in Agusan Del Norte
- Corn-Squash Crop Rotation in Agusan Del Norte

Automous Region of Northern Mindanao (ARMM):
- White Corn Intercropping in Lanao Del Sur
- Banana-Interaeral Direct Quick Farming System (RDQFS)

TECHNICAL BRIEF on Climate-Resilient Agriculture (CRA)

Eastern Visayas (Region VIII)

Alley Cropping Using Pineapple (Ananas comosus L.) as Hedgerows in Upland Rice Production

Alley cropping is one of the strategies for climate change adaptation in rice farming, it involves planting pineapple (Ananas comosus) along the contours as vegetative barrier. Upland rice, the aromatic Kalinayan variety, is planted between hedgerows. Aside from providing farmers diversified income to help limit financial risk, the practice also bears ecological benefits. It can buffer alley crops to withstand adverse weather conditions as well as increase biodiversity, reduce soil erosion improve soil properties and water use efficiency (Wolz et al., 2018).

Productivity
Increase in potential income from additional pineapple production

Adaptation
Diversified income source to reduce risk of financial losses

Improve biodiversity

Mitigation
Reduce soil erosion by 16.33 Mg/ ha/yr.

Improve soil properties and water use efficiency.
Cost of Adopting CRA

- Initial Investment: PhP 64,000
- Equipment: PhP 26,000
- Labor & Services: PhP 32,000
- Inputs: PhP 6,000
- Maintenance: PhP 32,500
- Operations: PhP 7,500

Financial Analysis

- Net Present Value: PhP 74,876 (USD 1,459)
- IRR: 87%

Sensitivity Analysis

- Projected Adoption Rate: 30%
- Current Adoption Rate: 10%

Externalities

- Social and Environmental NPV: PhP 75,595 (USD 1,473)
- Social IRR: 89%

Reasons to Invest

1. Diversification of income source to reduce risk of financial losses
2. Preservation of the Kalinayan upland rice variety
3. Increase farm biodiversity
4. Improve nutrient and water use efficiency

Reduce soil erosion

5. Reduce soil erosion

Study Site

Northern Samar and Samar

Data Gathering

1. Analysis of experiences of 6 case farms in the municipalities of Calbiga and Motiong in Samar and in the municipality of Lope de Vega in Northern Samar
2. Validation of KIIs using results of field trials in the region by the Philippine Rural Development Program (PRDP) project of the Department of Agriculture (DA)
3. Conduct of Experts’ Workshop with experts from Visayas State University and DA-Region 8 pooling knowledge and insights on emerging climate resilient farm practices
4. Conduct of workshop with Municipal Agricultural Officers (MAO) for validation
5. Review and synthesis of secondary information

Recommendations

- Alley cropping using pineapple as hedgerow is profitable for upland rice farmers in the provinces of Samar and Northern Samar.
- Farmers can complete one cropping season over the period of April-October.
- Conduct activities to increase awareness and uptake of CRA technologies.
  - Establishment of upland rice technology demonstration farms and upland rice seed banks
  - Participatory community-based farming system for upland rice
  - Participatory varietal selection and sensory analysis for upland rice varieties
- Conduct initial investment breakdown
- Initial Investment: PhP 64,000
- Cost of Adopting CRA
- Labor & Services: PhP 32,000
- Equipment: PhP 26,000
- Inputs: PhP 6,000
- Maintenance costs: PhP 32,500
- Operations: PhP 7,500

Yield & Prices

- Without CRA: 1,430 kg/ha
  - Price: PhP 32.5/kg
- With CRA: 455 + 1,040 kg/ha
  - Average annual farm yield:
    - pineapple: 455 kg/ha
      - Price: PhP 32.5/kg
    - upland rice: 1,040 kg/ha
      - Price: PhP 37.5/kg

Yield of pineapple decreases by 40%*

Social and Environmental NPV: PhP 75,595 (USD 1,473)
Social IRR: 89%

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

- IRR 89%

Initial Investment Breakdown

- Initial Investment: PhP 64,000

Net Present Value: PhP 74,876 (USD 1,459)
IRR: 87%

Assumptions:

- Period of Analysis: 10 years
- Discount Rate: 12%
- Exchange Rate: $1 = PhP 51.32

* On top of profit from conventional practice

When & Where?

- Initial investment/Breakdown
- Cost of Adopting CRA
- Net Present Value: PhP 74,876 (USD 1,459)
- IRR: 87%

Who?

- Conduct activities to increase awareness and uptake of CRA technologies.
- Farmers engaged in upland rice production are encouraged to adopt the practice.
- The government is encouraged to promote the adoption of the CRA practice and ensure programs to support the availability of pineapple suckers and quality seeds of Kalinayan rice variety. The government and the academy can continuously conduct research programs to deepen knowledge on the practice, its yield impacts and environmental externalities.

Reasons to Invest

1. Diversification of income source to reduce risk of financial losses
2. Preservation of the Kalinayan upland rice variety
3. Increase farm biodiversity
4. Improve nutrient and water use efficiency
5. Reduce soil erosion

Externalities

Social and Environmental NPV: PhP 75,595 (USD 1,473)
Social IRR: 89%

Data Gathering

1. Analysis of experiences of 6 case farms in the municipalities of Calbiga and Motiong in Samar and in the municipality of Lope de Vega in Northern Samar
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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/