



# Root and Tubers Crops: Production-use Systems and Food Resilience in Agri-aqua Ecosystems in Central Philippines Results of a Scoping Study

The Philippines' 36,289 km coastline - one of the longest in the world - is home to about 60% of the country's population who depend on the rich coastal and marine resources for their food, livelihoods, and ecosystem services (WorldBank, 2005). However, many coastal communities remain poor, food insecure, and vulnerable, especially in the coastal towns of Eastern Visayas (Region 8); where slow economic growth, low productivity of the fisheries and agriculture sectors, combined with natural disasters, among other factors, contribute to a continuing cycle of poverty.

Scientific and anecdotal evidence point to the potential of root and tuber crops (RTCs) in contributing to food- and nutrition-security, increasing resilience, and raising incomes in these coastal areas. Fishing communities in Region 8 already rely on RTCs to sustain them during monsoon months when the fish catch is low, and also during disasters. In the aftermath of super-typhoon Haiyan, RTCs served as reserve/survival crops and as relief and recovery components for food and income, through distribution of cassava, sweetpotato and taro planting materials.

The slow but positive growth of RTC production in Region 8 is a positive indication that their potential can be fully realized through interventions supported by FoodSTART+ and its IFAD-investment partner: FishCORAL or the Fisheries, Coastal Resources, and Livelihood Project of IFAD.

FishCORAL is being implemented by the Department of Agriculture – Bureau of Fisheries and Aquatic Resources (DA-BFAR) and targets 1,098 coastal beneficiary villages in the country. The project goal

## Research Highlights:

- RTCs are traditionally important components of the aqua-agri food and livelihood systems in FishCORAL sites and has been known to contribute hugely to food resiliency and nutrition security among coastal communities and fisherfolks.
- Further improving RTCs production and markets has great potential in providing strategic complementary livelihood for small resource-poor fisherfolks as they face the challenges of climate vulnerability and food insecurity.
- To successfully improve or develop aqua-based value chains with RTC integration, there is a need to address producer concerns such as low resource base, absence or weak links to markets, inadequate technologies, lack of access to support services, and climate-related vulnerabilities.

is to foster inclusive growth in the fishery sector to improve the socio-economic status of small-scale fisherfolk, build capacity in coastal resource management, improve the productivity of inshore waters, and explore the export potential of fisheries: all these for improved food security and nutrition, and GDP growth. Suitability mapping showed that RTCs are well suited to the focus sites of FishCORAL in Eastern Visayas (Fig. 1), one of FishCORAL's pilot regions.

## Research Site Description

Region 8 is located in the east of the central Philippine islands along the Pacific Ocean. The islands of Leyte (two provinces), Samar (three provinces), and Biliran have a total land area of 2.14 million ha. They all have a lowland coastal strip, rising to highlands in the island centers. The lowlands are well suited to agriculture, with fertile soil, abundant water, and sufficient rainfall.

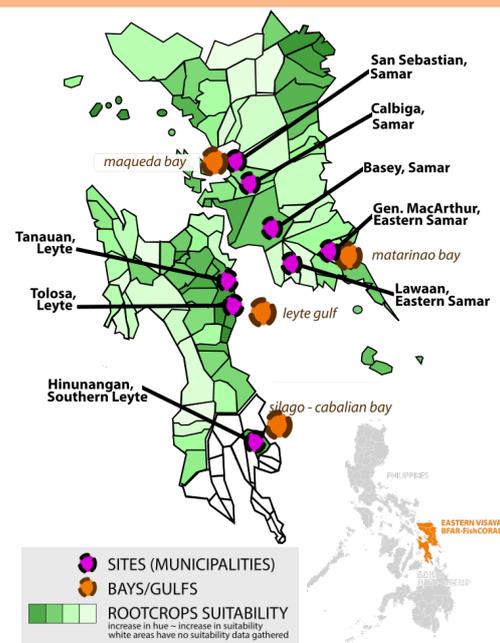


Figure 1. Location and rootcrops suitability map of FishCORAL-FoodSTART+ sites in Eastern Visayas.

**About FoodSTART+** Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific (FoodSTART+) is a three-year project (2015-2018) that builds on and expands the scope of the concluded IFAD-supported Food Security Through Asian Root and Tuber Crops (FoodSTART) project. It is coordinated by the International Potato Center (CIP) and implemented in collaboration with the International Center for Tropical Agriculture (CIAT) in Asia. The project is also working closely with the CGIAR Research Program on Roots, Tubers and Bananas (RTB) and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). It is funded by the International Fund for Agricultural Development (IFAD) and the European Union (EU).

The project aims to enhance food resilience among poor households in upland and coastal communities of the Asia-Pacific region through introducing root and tuber crops (RTCs) innovations. To achieve this goal at scale, the project develops, validates and implements effective partnership strategies with IFAD investment projects to promote RTCs for food security.

The project's key components are:

1. Project start-up and scoping studies including mapping on food vulnerability of RTC production and use;
2. Research for development (R4D) partnership development;
3. Needs and opportunities analysis on gender sensitive RTC innovations;
4. R4D action planning and launching; and
5. Documentation and knowledge products development.

The first series of FoodSTART+ Research Briefs features the results of the country scoping studies under Component 1. They present an in-depth look at the RTC production trends, vulnerabilities and opportunities in the target countries. The scoping studies were conducted during the first year of project implementation.



FishCORAL sites in Region 8 include four bays: Matarinao Bay, Leyte Gulf, Maqueda Bay, and Cabalian-Silago Bay where agri-aqua livelihoods and food systems are important. Small-scale fisherfolk maintain crop gardens in the uplands to meet basic needs.

## Scoping Study Highlights

**Production, area, and yield.** RTCs grown in the region include cassava, sweetpotato, taro and aroids (i.e. yautia and giant taro). Smallholder RTC production ranges from backyard gardens to plots of about 0.25 ha on the average. Some market-oriented farmers have about 0.5-1.0 ha in mixes, rotation, or intercropped between root crops and vegetables, while commercial farms for cassava and sweetpotato range in area from 0.25–2 ha.

Since 2010, RTCs have shown steady growth at 8%, mostly due to cassava expansion for the feed industry. However, RTC production turned negative in 2014 after super typhoon Haiyan. Recent data shows that on the average, smallholder RTC yields in the focus sites are low and are close to the regional average: about 5 t/ha and 10 t/ha for sweetpotato and cassava, respectively. Meanwhile, commercial RTC production is higher, specifically in the western part of Leyte with about 20-25 t/ha and 20-40 t/ha, for sweetpotato and cassava, respectively.

### Postharvest, utilization, and marketing.

RTCs are mainly consumed fresh or used as feed for backyard pigs. In some areas, they are processed as special delicacies for tourists (*binagol* from giant taro; *sagmani* from taro, sweetpotato and yautia chips) or sold in local markets (*maruya*, *botse*, and *guinataan*) (Fig. 2). Processing methods are traditional and the shelf-life of products is short: 2-5 days for most traditional delicacies or 2-3 months for dried chips. Local markets are often limited and products need quality and packaging improvements.

Calbiga in Maqueda Bay is a major trading post that supplies RTCs to the northern cities/towns or to places south of Tacloban City. Moreover, an animal feed production facility established in 2015 in Ormoc that uses cassava as a raw material provides huge opportunities for supply chain development in the focus sites.

## Constraints and Opportunities

### Changing gender roles and perspectives

- Both men and women are engaged in RTC production; but RTC subsistence farming, processing, and selling are mainly done by women, as the men are engaged in other livelihood activities.

### Climate change, food resilience, and vulnerability

- RTCs have always played important roles at times of hunger and in disaster situations as a survival food crop. During extreme weather and monsoon months, fishing households optimize the use of their limited landholdings

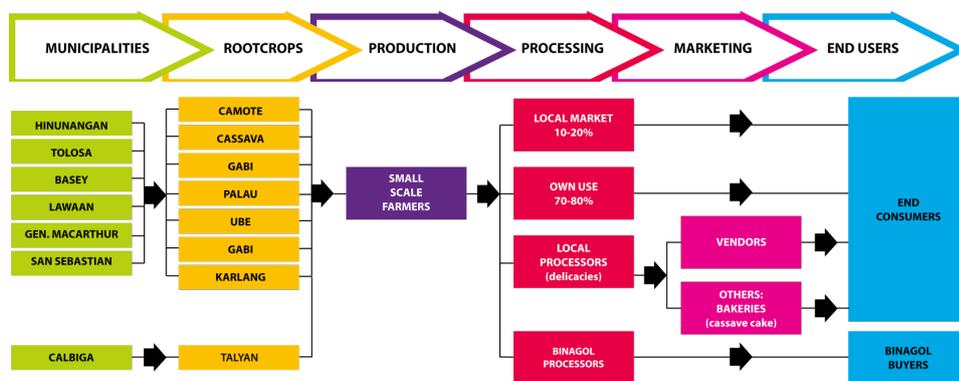


Figure 2. RTC Value Chain Map in FishCORAL-FoodSTART+ Sites in Eastern Visayas, Philippines.

by growing RTCs, which consequently contribute significantly to household and community food and livelihood resilience.

- Even before Haiyan, progressive local government units (LGUs) and peoples' organizations (POs) had established sweetpotato and cassava nurseries as part of their programs for food security and livelihoods. Thus, these communities were saved from hunger immediately after the typhoon when food relief deliveries were difficult. These LGUs and POs also helped in the provision of planting materials for post Haiyan rehabilitation and recovery efforts. Other government and non-government agencies also distributed RTCs in large volumes for food relief and recovery and RTC planting materials for rehabilitation. At the FishCORAL sites; sweetpotato, cassava and taro were distributed in coastal areas that suffered the most destruction.

### Food security and nutrition

- For much of the year, RTCs serve as supplemental foods. However, during times of low or no fish catch, such as monsoon months and typhoons, they take on a different role as an important alternative food source.
- RTCs are nutrient-rich and are good energy, vitamin and micro-nutrient sources that can potentially combat both undernutrition and malnutrition.
- They are also an excellent raw material for processing that can cater to a growing market for healthy food.

### Challenges according to farmers

- Farmers raised issues on low yields, resource inadequacies, lack of access to support services, and limited markets. Low yields of RTCs in the region are often due to depleted soils, poor agricultural practices, and widespread use of traditional cultivars.
- Lack of information of the nutrient and health benefits of RTCs among farmers, consumers, and even technicians perpetuate the low status of RTCs.
- RTCs have huge potential for value chain upgrading or development as the supply of planting materials has increased since their distribution after typhoon Haiyan.
- The region benefits from the Philippine national RTC center in Leyte, and the production and processing innovations developed there, along with partner agencies. For instance, fish/seaweed-based products such as noodles, chips,

and pickles can be blended with root crops, while sweetpotato-based sauces can complement ready-to-eat milkfish processing that is present in the region.

- In Basey, fisherfolk-farmers are interested in RTC-based aquaculture feeds because they command a high price.
- The *binagol* cluster can also be further expanded and improved to serve a bigger market outside the region.

## Conclusions and Recommendations

FishCORAL-FoodSTART+ interventions are timely due to the increased RTC production post-Haiyan, which is currently oversupplying the local market. The focus sites can become **RTC growth points for food and livelihood development** within the fish-farm systems by adding value to the farm resources through the inclusion of high value RTCs.

The project can contribute to gender equity and empowerment as both **women and men can be involved in the value chain development** process with their respective roles in RTC production, processing and marketing. Government agencies, the academe, research institutions, and the local government units can be engaged for this purpose.

In the agri-aqua systems of FishCORAL sites, the low resource base of fisherfolk-farmers and poor links to markets, access to relevant technologies, and support services imply that the approach to improved livelihoods and food security should integrate a **holistic process that builds local skills and capabilities**.

### Literature Cited

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