Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific
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Roots and Tubers for Livelihood Enhancement in Meghalaya, India
Results of a Scoping Study

Meghalaya, which means "the abode of clouds" in Sanskrit, is a mountainous state in northeast India that is home to several ethnic minorities. It is still heavily forested, with significant areas of dense primary subtropical forests, and is considered to be among the most ecologically diverse habitats in the world. Despite the rich biodiversity, Meghalaya's population remains poor and food insecure, with nearly half living below the poverty line.

A key contributing factor to poverty is low productivity in the agricultural sector, which is the main source of income of majority of the population. Unsustainable farming practices are common, mainly due to the exhaustion of soil nutrients, deforestation through slash-and-burn or shifting cultivation (*jhum* system) and a reduction of fallow periods. Food security in Meghalaya is also affected by the state's dependence on a food supply that is imported from other states and the inherent vulnerability to natural hazards.

IFAD presently supports three projects that are designed to improve family income and quality of life in rural Meghalaya, including the Meghalaya Livelihood and Access to Market Project (Megha-LAMP). Both FoodSTART+ and Megha-LAMP recognize that root and tuber crops (RTCs) have great potential to increase smallholders' incomes and reduce food insecurity in Meghalaya, especially in times of food shortage. Both projects are working together to fully realize this potential through science-based approaches, including this scoping study, which aims to generate background information on livelihood, food availability, and vulnerability status in the region in order to develop practical action plans.

Research Highlights:

- Meghalaya is prone to disasters (earthquakes, floods, storms, and landslides) and Root and Tuber Crops (RTCs) are known to better cope with these unfavorable conditions and be more resilient to climate change.
- There is great diversity in RTCs produced by smallholders in Meghalaya, although potato is the only RTC produced at large scale for the market.
- RTCs production can greatly benefit of enhanced access to quality planting material of higher yielding and disease-resistant varieties.
- A number of opportunities exist for enhanced postharvest management and marketing including by promoting RTCs' health and nutritional benefits, exploiting value adding opportunities and better integration with the livestock sector.

Research Site Description

Meghalaya covers an area of approximately 22,430 km^2 and encompasses the Meghalaya subtropical forest ecoregion. Its mountain forests are distinct from the lowland tropical forests to the north and south. At the same time, climate also varies with altitude, with lower elevations experiencing high temperatures most of the year and the highest elevations experiencing the opposite and even subzero winter temperatures. In terms of rainfall, Meghalaya is considered the wettest place on earth, with an average annual rainfall of about 11,500 mm.

Two of the 11 districts in Meghalaya were selected as study sites in view of the importance of RTCs in their area: East Khasi Hills in the central part and West Garo Hills at the westernmost part. In both districts, most of the land is undulating, hilly terrain with some flat valley areas. Primary data collection for the scoping study was carried out in one village in each district.

Figure 1. Map of India showing the location of Meghalaya and the FoodSTART+ project areas.

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.

CIP International Potato Center — A CGIAR Research Center
CIAT International Center for Tropical Agriculture — Since 1967 / Science to cultivate change
CGIAR Research Program on Roots, Tubers and Bananas
IFAD Investing in rural people
European Commission

Scoping Study Highlights

Production, area, and yield. There is great diversity in RTCs produced by farming households in Meghalaya, although potato production and area is significantly above that of other RTCs (Fig. 2). Cassava and sweetpotato show a slow but steady increase in area and production. Nevertheless, yields of potato, sweetpotato and cassava (at 9, 6 and 4 t/ha, respectively) are far below the national average of 20, 35 and 10 t/h. This implies that there is considerable scope for yield improvement. East Khasi accounts for 64% of the potato area and register the highest productivity (though well below the national average). Colocasia and sweetpotato are also cultivated in significant amounts in all elevations, while cassava is found in low-altitude areas. In the West Garo Hills, both temperate and tropical RTCs such as cassava, sweetpotato, Colocasia, yam and potato are cultivated.

Surprisingly, even though Colocasia is cultivated in large areas in all districts, statistics regarding area, production and yield are missing in published reports. Similarly, yam is not reported, although it occupies a considerable area in districts such as West Garo Hills.

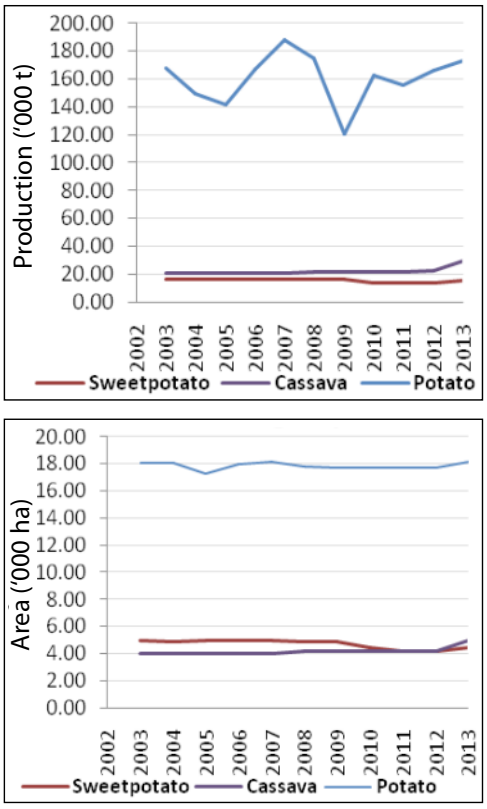

Figure 2. RTC production and area trends in Meghalaya, India (2002-2013).

Crop utilization. Tubers are a major component of the tribal diet in Meghalaya. Boiled tubers (fresh or dried) of Colocasia or sweetpotato are consumed in the early morning and evening. Fresh plant parts such as tender leaves, shoots, and petioles and semi-processed products from tuber crops are also consumed regularly. Apart from human consumption, cooked or raw cassava leaves and roots, sweetpotato vines and roots, and vegetative parts of potato are fed to livestock, predominantly pigs. Tribes also have specific varieties to meet medicinal needs, although this is poorly documented.

Postharvest, processing, and marketing. Postharvest RTCs processing is seldom found, except in cassava, which is made into dried chips or flour and then stored. Fried potato chips are also processed on a very small scale and sold in local markets.

There are no well-developed formal marketing channels for any of the agricultural commodities at the focus sites, except in East Khasi Hills where more than 75% of East Khasi farmers sell potatoes to wholesalers in regulated markets (Sah et al., 2011). Women are more involved in making decisions about marketing RTCs, with more than 80% of marketing tasks performed by the womenfolk.

Constraints and Opportunities

Changing gender roles and perspectives

- In rural Meghalaya, women dominate decision-making and are responsible for most tasks. Except for land preparation, the remaining farm activities such as harvesting, storage and marketing are completely in the hands of women.

Climate change and natural disasters

- Meghalaya is prone to disasters and earthquakes, floods, storms, and landslides are recurring phenomena. RTCs are known to survive in unfavorable conditions brought about by many of these natural calamities.
- In other parts of India, RTCs cultivation, particularly cassava is gaining popularity due to the resilience to climate change and its production has proved both sustainable and profitable.

Food security and nutrition

- Food insecurity is a major concern in the study sites. Nearly 46% of households report not consuming sufficient food in the past 12 months.
- Although it is common knowledge that vegetables and RTCs are good for health, most people lack knowledge about their micronutrient content. There is an urgent need for nutrition education so that farmers and consumers can appreciate the value of the food crops that they produce, purchase and consume.

Organizational capacity

- Meghalaya has a structured network of self-help groups and various types of cooperatives, through which external support and interventions can be channeled.

Challenges according to farmers

- Production problems include low yield, poor availability of quality planting material of recommended varieties, inadequate supply and high prices of inputs such as fertilizer and pesticides, and biotic/abiotic stresses.
- Lack of postharvest processing, organized marketing and storage facilities result in spoilage and marketing difficulties.
- Low and fluctuating prices as well as poor market infrastructure and inadequate road networks discourage farmers from marketing RTCs.

Conclusions and Recommendations

Value chain studies on potato and cassava are needed to provide a good foundation for the development of enterprises that add value to these crops.

Lack of quality planting materials hampers productivity, thus **production of good-quality planting materials** should be increased. For instance, the most dominant high-yielding potato variety, Kufri Jyoti, has started showing decline in yield and greater susceptibility to potato blight. There is a need for **testing and introducing appropriate new potato varieties** that are high yielding, tolerant of diseases, and acceptable to local consumers.

At present, only local landraces of sweetpotato are cultivated. **Varieties with more health benefits,** such as orange and purple-fleshed varieties, could be field-tested and introduced for cultivation.

Colocasia production, which is susceptible to blight, would benefit from the **introduction of blight-tolerant varieties** for testing in farmers' fields.

RTCs are major components of livestock feed in the state, but there is need for better **knowledge and technology for proper storage and higher nutritional quality** to maximize benefits.

Farmers of Garo districts make flour from cassava, but are not aware of the economic opportunities through this value addition. An intervention involving **marketing of cassava flour, as well as capacity building on other value adding activities**, could help farmers increase incomes.

RTCs appear to have lost their popularity especially among the urban population. Promotional activities could be implemented to **inform the public of the benefits and importance of RTCs.**

Literature Cited

Sah U, Dubey SK, Sharna JP. 2011. Potato marketing in the North East Region of India: a diagnostic study. J. Community Mobilisation Sustain. Dev. 6(2): 194-201.

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