# Sweetpotato consumption in Orissa, India and implications for nutrition and livelihood improvement

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## Abstract

This paper presents sweetpotato consumption patterns among poor farming households in Orissa, India and discusses implications for research and development to improve their Vitamin A nutrition and livelihood improvement. It draws from results of a study involving review of secondary information, a sample survey among farming households, and series of stakeholders' workshops.

Orissa is India's primary sweetpotato-growing state, with an average annual production of over 400,000 tons from 47,900 hectares of land. Sweetpotato is commonly grown along with vegetables and rootcrops in Orissa's smallholder farms, Yields averaging 8.56 tons/ha are very low compared to the Asian average of 15 tons/ha.

Orissa is also a major consumer of the crop, especially for the period following harvest (i.e. October to February). The next most important food crop after cereals, sweetpotato is traditionally grown by tribal communities in mountain districts. Orissa ranks first in terms of sweetpotato consumption among farming households, based on a 2008 survey conducted in eastern India. Average daily consumption is estimated at 87.9 g/day. There is higher sweetpotato consumption by those in lower social castes and tribal groups (88%), by pregnant women (93.6 g/day), lactating mothers (84.9 g/day) and children below 5 years (67.1 g/day).

The paper discusses implications for research and development in: 1) introducing orange-fleshed sweetpotato (OFS) as part of a food-based strategy to combat the high rate of Vitamin A malnutrition in India, 2) increasing income generation through sweetpotato livelihoods, 3) addressing needs and opportunities for improved crop productivity under Orissa's less-favorable growing environment.

**Keywords:** Sweetpotato, consumption, nutrition, livelihood, India.

## Background

Since 2003, the International Potato Center (CIP) and national partners in India have undertaken collaborative research to evaluate and select promising orange-fleshed sweetpotato (OFSP) clones. To date, 4 OFSP clones have been recommended/approved for official variety release in India's key sweetpotato-growing states (Attaluri 2008).

CIP and Indian partners have also begun to pilot various mechanisms for introducing OFSP as part of food-based interventions for enhancing Vitamin A nutrition among poor farming households in eastern India. These include farmers' trainings, on-farm demonstration plots, community-based nurseries, and promotional/educational activities for women and children (Attaluri and Rath 2006, Campilan 2006).

At this stage in the OFSP research-for-development process, it is necessary to develop a

comprehensive strategy in high-betacarotene sweetpotato utilization for nutrition and livelihood improvement. A critical step is to assess existing sweetpotato consumption patterns among target consumer groups, and to identify opportunities for integrating OFSPs in local food systems.

This paper presents key findings from a study on sweetpotato consumption in the eastern Indian state of Orissa. CIP's collaborative work on OFSP targets Orissa, being India's leading sweetpotato producer and where the country's highest rates of poverty incidence and Vitamin A malnutrition are found.

## Brief profile of orissa state, india

Orissa is considered the poorest of the fourteen major Indian states with 47 percent of its rural population, or 17.35 million people, living below the poverty line (National Family Survey, 2001). Major indicators for income, socio-economic welfare, health and education are consistently below national averages.

More than one-third of the population comes from the lower socio-cultural and economic groups – 36% represent scheduled tribes and castes. Moreover, there is high discrepancy among districts in terms of socio-economic indicators. For South Orissa, 87% of the population is classified poor and its development indicators are often worse than sub-Saharan Africa.

Orissa is located on India's eastern coast, with a terrain that extends from the Eastern Ghat plateau to the flat alluvial land on the Gulf of Bengal coastline. Three quarters of its total land area of 155,707 sqm is hilly with altitudes reaching 1500m. Due to its geographic location, Orissa is highly prone to natural disasters including cyclones, floods and drought.

Agriculture contributes 23% of net state domestic product (NSDP) and provides employment to 65% of the population (Orissa Directorate of Agriculture 2007). The annual agricultural calendar consists primarily of two cropping seasons -- *karif* (wet south west monsoon) and *rabi* (dry post-monsoon). Orissa's agriculture is mainly a rice-based system, although most of it is unirrigated. *Karif* rice is the dominant crop in Orissa, occupying 67% of cultivated land for the season. *Rabi* is primarily for growing horticultural crops – such as pulses and vegetables – with rice grown only on 13% of the land.

## Sweetpotato production in Orissa

India is South Asia's main sweetpotato producer, accounting for 68% of the region's total production of 1.6 million tons annually. Within India, Orissa is the main sweetpotato-growing state and contributes one-third of India's overall production.

Orissa's average annual production is over 400,000 tons from 47,900 hectares of land (Orissa Directorate of Agriculture 2007). It is grown in 28 of the 30 districts in the state although it is mostly cultivated by tribal communities in mountain districts, where it is the most important food crop after cereals.

Sweetpotato yields in Orissa are very low, averaging 8.56 tons/ha, when compared to the yield average in its neighboring states, i.e. 13.89 tons/ha in Bihar, and to the Asian average of 15 tons/ha (Indian Horticultural Information Service 2005). It is grown on very small landholdings, mostly between 0.19 and 0.45 ha ((Edison et al 2008). Poor lateritic soils, sub-optimal crop management practices and competition with other food and cash crops are among the key reasons cited for low sweetpotato productivity and production in Orissa.

The crop is grown in both *karif* and *rabi* seasons, although 84% of sweetpotato is harvested during the former (Orissa Directorate of Agriculture 2007). As a rainfed crop, sweetpotato is grown on *chaur* (lowland) after harvesting paddy rice. It is also grown along riverbanks/beds after water recedes from their fields. In addition, sweetpotato is planted along with vegetables and rootcrops in Orissa's smallholder farms, homegardens and riverbeds.

## General dietary and nutritional trends

Vitamin A deficiency leads to deaths of up to 1 million children annually around the world. One-third of these occur in India alone, where 57% of children up to 5 years old suffer from this nutrient deficiency. While chiefly caused by inadequate dietary intake, the wider socio-economic causes and consequences of Vitamin A malnutrition are now increasingly recognized.

In times of food shortages, women eat least and last in a society which also discriminates them against opportunities for education, livelihood and political participation. Meanwhile, drug-based supplementation is expensive for developing countries like India to sustain. Also, it does not fully benefit hard-to-reach populations such as ethnic communities in remote regions marginalized by social class, economic status and geographic isolation.

Cereals remain the staple food in Orissa but, as with the rest of the country, the average diet remains largely deficient in micronutrients. Based on the National Family Health Survey (2001), cereals consumption in Orissa meets the recommended dietary level, but protective foods (e.g. vegetables) are consumed lower than the minimum level required for a nutritionally adequate diet.

In a 2003 household survey by the National Institute of Nutrition, over half (57%) of Orissa's population consumed less than 50% of the recommended daily allowance for Vitamin A. In times of disasters and food shortages, poor households cope by shifting from cereals to cheaper alternative staples, and by reducing overall food consumption, as reported by 80% and 73% respectively (Pandey et al 2007). Women are the most affected during these crisis situations, since men and children are prioritized for food.

## Sweetpotato consumption patterns

Besides being India's lead sweetpotato producer, Orissa is also a major consumer of the crop.

A 2008 survey was conducted in three eastern states (Orissa, Bihar and Uttar Pradesh) jointly by CIP, The Micronutrient Initiative and Social and Rural Research Institute in India.

The survey revealed that sweetpotato consumption is higher for the period October-February, which follows the usual harvesting time for sweetpotato and when rice supply begins to decrease. Of the 200 survey respondents, 68% eat sweetpotato during the year but this increases to 80% during the October-February period.

Orissa ranks first in terms of average daily consumption, at 87.9 g/day. The survey indicated high sweetpotato consumption among lower social castes and tribal groups (88%). Across social categories, there was also high level of consumption by pregnant women (93.6 g/day), lactating mothers (84.9 g/day) and children below 5 years (67.1 g/day).

The three primary reasons cited for consuming sweetpotato are: 1) good for health and nutrition, 2) preferred food by children, and 3) easy to prepare. On the other hand, the least commonly cited reasons: are 1) readily available, 2) important food for religious festivals, and 3) easy to digest.

From the same survey, Tables 1 and 2 present consumption patterns in Orissa as compared with two other eastern Indian states, and among children and women. In Orissa, sweetpotato is generally eaten during breakfast (63% of respondents) before leaving for work or school. Among children and lactating mothers, at least half of respondents said there is no fixed time for eating sweetpotato although it is generally consumed during daytime.

Sweetpotato is consumed in boiled form by 100% of survey respondents in Orissa. Burning/roasting sweetpotato roots is also highly popular (80%). Sweetpotato food preparation is similar whether for children, lactating mothers or pregnant women.

Over 80% of respondents expressed willingness to try OFSPS, but 43% of them said they might not do so if it is more expensive than the current price of traditional sweetpotato varieties. Sweetpotato consumers eat other Vitamin-A rich vegetables and fruits (e.g. spinach, tomato, carrot, papaya, mango). However, these other food sources are much more expensive, thus amounts consumed were estimated to be of limited quantity and frequency.

**Table 1. Daily time schedule in sweetpotato consumption**

| Time of consumption | All | BIHAR | ORISSA | UP | Children | Lactating mothers | Pregnant women |
|---|---|---|---|---|---|---|---|
| **Base: All** | **200** | **60** | **41** | **99** | **100** | **61** | **39** |
| Morning/breakfast | 33 | 5 | 63 | 37 | 36 | 26 | 36 |
| Afternoon/lunch | 26 | 3 | 39 | 34 | 27 | 23 | 28 |
| Evening/supper | 21 | 3 | 54 | 17 | 22 | 16 | 23 |
| Night/dinner | 3 | 3 | 2 | 3 | 5 | 0 | 3 |
| Any time (no fixed time) | 54 | 92 | 15 | 47 | 50 | 61 | 34 |

**Table 2. Manner of preparing sweetpotato food**

| Manner of preparation | All | BIHAR | ORISSA | UP | Children | Lactating mothers | Pregnant women |
|---|---|---|---|---|---|---|---|
| **Base: All** | **200** | **60** | **41** | **99** | **100** | **61** | **39** |
| Boil it | 98 | 100 | 100 | 95 | 99 | 95 | 97 |
| Burn/Roast it | 58 | 18 | 80 | 73 | 58 | 57 | 59 |
| As vegetable | 11 | 0 | 44 | 3 | 11 | 10 | 10 |
| For preparing desserts | 2 | 0 | 0 | 3 | 2 | 2 | 0 |

## Implications for nutrition and livelihood improvement

Available information from the field survey and secondary sources validates the potential role of sweetpotato nutrition and livelihood improvement among Orissa's poor farming households. Sweetpotato remains a major crop cultivated and consumed especially by those in the lower socio-economic and nutritionally vulnerable groups in the state. These findings support the targeting of Orissa for OFSP research-for-development efforts by CIP and national partners.

To develop a strategy for incorporating OFSP in a food-based intervention for nutrition improvement in Orissa, the following key considerations are recommended:

1. There is a need and opportunity to improve sweetpotato yields in Orissa. Adaptive research could focus on developing and introducing improved crop management practices under Orissa's less-favorable growing conditions and low-external input systems. Efforts to promote the cultivation of OFSP could capitalize on its potentially superior agronomic traits over traditional varieties including shorter maturity, higher yield and higher use-value and consumer demand. Equally important is the development of a support scheme to make available planting materials of OFSPs through community-based systems for multiplication, maintenance and distribution of sweetpotato planting materials. This is a critical measure in the absence of a functioning formal seed system for sweetpotato.
2. Unlike in other regions in Asia and Africa where it is a staple crop, sweetpotato is primarily consumed in Orissa as supplement to rice, snack item and/or buffer food during crises. To better contribute to the goal of Vitamin A nutrition improvement, OFSP has to be integrated in a strategy for dietary diversification while exploiting sweetpotato as a cheap and readily available food source. This also requires an inter-sectoral platform among organizations – both public and private – working in agriculture, health and education. To date, CIP has already expanded its partnership platform in Orissa which now includes a broader set of organizations from the NGO and private commercial sectors.

3. Increased consumption of OFSP and integrating this in local diets require efforts to stimulate demand from the consumption-utilization end of the value chain. There is room for diversifying food preparations, including processed products, beyond the traditional practice of boiling and roasting. While only a small portion of sweetpotato roots are currently sold, the potential for reaching target consumers through market chain development could be explored especially in the urban setting.

4. India's increased policy support for food-based nutrition interventions, to reach the hard-to-reach populations, provides a better enabling environment for OFSP introduction in Orissa. Research-for-development initiatives for OFSP directly supports the Indian government's current plan of action to combat micronutrient deficiencies, which put locally available micro-nutrient rich food as a priority over or alongside synthetic sources of Vitamin A. Similarly, the 2008-2012 collaborative workplan between the Indian Council of Agricultural Research (ICAR) and CIP includes OFSP-related research priorities: a) sweetpotato crop improvement for high beta-carotene content with wide local adaptability, and b) sweetpotato product development for economic and health gains.

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