

Vegetable soybean: a healthy, tasty, and profitable crop for tribal communities of northeast India

Key Fact

Vegetable soybean generates income for small-scale farmers in northeast India, where demand for nutritious legumes is outstripping supply.

Summary

Legumes contribute about 13% of India's per capita total protein intake but are by far the most important source of protein for tribal communities, whose people are among the poorest in India and often do not consume dairy products. While grain soybean is commonly grown throughout the country to produce oil and meal, vegetable soybean is a newcomer, both for farmers and consumers. Over the past decade, improved vegetable soybean varieties bred from lines developed at AVRDC – The World Vegetable Center have been introduced and distributed to farmers in northeast India. From an initial distribution of seed to 60 farmers in Jharkhand in 2008, demand has increased sharply; in 2012, nearly 50,000 farmers approached AVRDC partners for seed. The hardy crop has low labor requirements and is well-suited to the sandy and often shallow soils of Jharkhand. The tasty, protein-rich seeds of this versatile green legume can be boiled, steamed, stir-fried, or roasted, and make an excellent substitute for green peas.

Facts and figures

- The first vegetable soybean varieties suited to local conditions in northeast India were identified in 2001.
- Released in 2008, variety 'Swarna Vasundhara' has low labor requirements and is well-suited to the sandy and often shallow soils of Jharkhand.
- A farmer's net income can be increased by around INR1700/kg (US\$31.5/kg) of vegetable soybean seed planted in a 400 m² field.
- Vegetable soybean has almost double the protein and six times the energy content of green peas, India's most commonly consumed fresh legume.
- In an evaluation of the project, 93% of families cited taste as a motivating factor to cultivate vegetable soybean.

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Although grain soybean grown for oil and meal is the largest legume crop in India, until recently **vegetable soybean** was virtually unknown in the country. That began to change when AVRDC – The World Vegetable Center, the Indian Council of Agricultural Research (ICAR) and six NGO partners in Ranchi and Khunti districts of Jharkhand encouraged farmers to expand production of the crop as part of a Sir Ratan Tata Trust (SRTT)-funded project to improve vegetable production and consumption in the region.

In East Asia, the large seeded, sweet type of soybean (*Glycine max*) has been consumed as a fresh vegetable for centuries. Immature pods are boiled in salted water and the extracted seeds serve as a nutritious snack food.

Green vegetable soybean seed has up to 13% protein on a fresh weight basis and high levels of healthy monounsaturated fatty acids, and vitamins C and E; it is also one of the few natural sources of anti-cancer isoflavones. Cooked vegetable soybean has the highest net protein utilization value (NPU; the ratio of amino acid converted to proteins) among all soy products, and when combined with rice, supplies complete protein to the diet.

Vegetable soybean has almost double the protein and six times the energy content of green peas, India's most commonly consumed fresh legume, with 60% more calcium and twice the phosphorus and potassium levels. While green peas are available only in the cool season, vegetable soybeans are picked in October — a festival month in Eastern India when few other legumes are available and prices are high.

Vegetable soybean is particularly important to tribal communities. Numbering over 82 million, tribal people are the most disadvantaged group in India with the worst nutritional status. Tribal people constitute the largest percentage of the population in the states of northeast India, such as Jharkhand. They do not consume dairy products and overwhelmingly rely on legumes to provide most of their protein requirements.

Vegetable soybean began circulating in northeast India during the millennium decade of 2000-2010. The first vegetable soybean varieties suited to local conditions were identified in 2001. The introduction of improved AVRDC lines led to the release of the variety 'Swarna Vasundhara' in 2008 by the ICAR research station in Jharkhand. The hardy crop has low labor requirements and is well-suited to the sandy and often shallow soils of Jharkhand. This new variety was distributed to 60 farmers in 2008, and promoted through field days and training events. The following year, 470 farmers grew the crop; by the third year more than 3000 farmers were growing vegetable soybean and by the fourth year demand from 50,000 farmers for seed greatly outstripped available supplies.

Mr. Khudiram Munda, a 31-year old farmer from the tribal village of Uludih near Ranchi in Jharkhand is typical of many new vegetable soybean growers. He sowed 4 kg of seed provided by AVRDC in July 2010 in a 400 m² field. He harvested 250 kg of green pods about 80 days later and sold them to four nearby local markets for INR20/kg (US\$0.37/kg).

Mr. Munda's family consumed the green vegetable soybean seeds boiled like green peas. They found the dry seeds could be very tasty if soaked overnight to remove the seed coat, then fried with ginger, garlic, turmeric and other spices and eaten with rice. Vegetable soybean has become an important source of income and food for his family. Vegetable soybean seed also can be cooked as *dhal*—a staple legume porridge.

Six members of *Jeevanba mahila mandal*, a 15-member women's self-help group from Iti village, grew vegetable soybean on an average of 10 decimals of land. Almost 50% of pods at green stage were consumed as curry. "We liked it very much," the members said. "The rest we have kept as seed for cultivation next year, and we will return back some seed to PRADAN's Agriculture cooperative for multiplying in other areas."

In an SRTT evaluation of the project, 93% of families cited taste as a motivating factor to cultivate vegetable soybean, and more than 70% of farmers were impressed with yields of 'Swarna Vasundhara.' The nitrogen the crop produces that is fixed in the soil also benefits subsequent crops. Taking these factors and the value of seed sales into account, SRTT estimated that net income can be increased by around INR1700/kg (US\$31.5/kg) of seed planted in a 400 m² field.

AVRDC is testing 16 new vegetable soybean lines with a wide range of seed colors and qualities in trials across India. Some lines have a "basmati rice" flavor—a popular taste that commands a high price. Two new high yielding varieties are ready for official release. The

main effort now is to increase production of vegetable soybean and to continue promoting its consumption in Jharkhand to create a strong and permanent demand for this new crop.

Testimonials

Khudiram Munda, farmer in Uludih village, Jharkhand: “My children like the taste [of vegetable soybean] and I like it because it has vitamin A, which is good for the eyes.”

Rutu Purty, a widowed tribal woman from Iti village: “I have a good crop stand in the field and average 50-60 pods per plant because I sowed the seed in the ridge and applied a little urea during hoeing. I have prepared curry by mixing green pod with potato and tomato. The taste of curry is very good and my family members liked it. I’ll harvest the seeds and will sow it again next year.”

Mariom Purthy, a tribal woman from Iti village: “I am happy that harvesting the green pods of vegetable soybean starts from the first week of September, the most acute food crisis period for tribal people like us. I usually boiled green seed of vegetable soybean and fed it to my children during these days. My children liked it and they are in good health.”

Sateng Samad, a young farmer from Iti village: “Vegetable soybean is a good substitution for short-duration paddy (60 days) or black gram in rainfed uplands of Jharkhand. My family ate the fresh green seeds during the rainy season and used the dry seeds as *dhal* during other times. The vegetable soybean added some fertilizer to my land by fixing nitrogen in the roots. Earlier I got very little amount of paddy from this land.”

Sivendra Kumar, Principal Scientist, Indian Council of Agricultural Research Horticulture and Agro Forestry Research Programme: “Cultivation and consumption of the crop will provide nutritional security to the people of Jharkhand.”

Ram Kishore Lakra, farmer in Jharkhand: “Swarna Vasundhra’ can boost our sales from June-September. Last year I sold this vegetable at INR12 a kg.”

Additional case study information

Costs and benefits

The Sir Ratan Tata Trust provided about US\$1 million for the development and dissemination of the improved vegetable soybean along with other vegetables. According to a project evaluation by the Trust:

- 1 kg of soybean seed can yield more than 50 kg of produce from 5 decimals (about 215 m²) of land
- 1 kg of vegetable soybean can fetch up to INR10-15 in the market
- Possibility of net income to rise by INR1740/kg of vegetable soybean planted per 10 decimals (about 430 m²) of land
- 72% of families growing vegetable soybean were impressed with the yield they were getting for very little investment and effort.

DFID contribution to research

DFID supports AVRDC through core funding.

Milestones

- 2001: 'Himso-1563' is the first vegetable soybean variety released by the Indian Council of Agricultural Research. It has a 100-120 day maturity period, and yields about 5 t/ha.
- 2003: In the Himalayan and northeast regions of India, farmers begin growing vegetable soybean at home. The seeds are consumed fresh and are also fermented for long-term use.
- 2008: AVRDC and ICAR begin evaluations of nine high yielding vegetable soybean lines in on-station trials under open field conditions.
- 2008: 'Swarna Vasundhra' a vegetable soybean variety bred from elite germplasm line GC 89009-1-1-2 developed by AVRDC, is recommended by ICAR for release and cultivation in Jharkhand and Bihar for the *Kharif* season (June-September). The variety can be harvested in 75-80 days, is resistant to rust and pod borer, and yields about 15 t/ha.
- 2008: AVRDC launches a project to improve vegetable production and consumption in Jharkhand and Punjab. Vegetable soybean is included as one of the crops.
- 2008: ICAR and AVRDC promote vegetable soybean to field executives of local nongovernmental organizations, including Krishi Gram Vikas Kendra (KGVK) and Indian Grameen Services (BASIX). These organizations distribute seed to about 60 farmers.
- 2008: Field days introduce vegetable soybean to more than 100 farmers and extension staff. Self-help groups and community service providers begin promoting the crop with handouts in local languages.
- 2009: Other stakeholders, including Professional Assistance for Development Action (PRADAN), Nav Bharat Jagriti Kendra (NBJK), and Network for Enterprise Enhancement and Development Support (NEEDS), become involved in distributing vegetable soybean seed, reaching more than 470 farmers.
- 2010: A Vegetable Soybean Field Day on 27 September organized by AVRDC and ICAR in Ranchi draws more than 450 participants, including 350 farmers.
- 2011: More than new 850 farmers receive seed. About 20% of farmers who grew vegetable soybean in the previous year saved some seed for replanting.
- 2012: Demand for seed from 50,000 farmers outstrips available supply.
- 2012: Open field trials on 16 new lines of vegetable soybean ongoing at AVRDC South Asia and ICAR's Regional Centre for Eastern Region, Research Centre, Plandu, Ranchi, Jharkhand.

Photo credits

AVRDC – The World Vegetable Center.

For high resolution images, contact Chen Ming-Che (ming-che.chen@worldveg.org) or Maureen Mecozzi (maureen.mecozzi@worldveg.org)

Links

AVRDC: www.avrdc.org

Media

Indian Express

<http://www.indianexpress.com/news/soyabean-is-new-money-plant-for-jharkhand-farmers/319148/>

Fresh, the AVRDC newsletter

3 October 2012

http://203.64.245.61/web_docs/media/newsletter/2012/Oct-03-2012.pdf

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Contacts for further information

Warwick Easdown

Regional Director, South Asia
AVRDC – The World Vegetable Center
ICRISAT Campus
Patancheru 502 324
Hyderabad, Andhra Pradesh
India

Tel: 91-40-30713071

Email: warwick.easdown@worldveg.org

Maureen Mecozzi

Communications and Information
AVRDC – The World Vegetable Center
P.O. Box 42
Shanhua, Tainan 74199
Taiwan

Tel: 886-6-583-7801, ext. 572

Email: maureen.mecozzi@worldveg.org

IMAGES

01_Farmer Khudiram Munda in the field.jpg

02_Khudiram Munda.jpg

03_Rakesh Munda, 26, produced 100 kg of seed from 2 kg provided.jpg

04_Sandeep Topo, 29, produced 120 kg of seed from 2 kg provided.jpg

05_well-grown vegetable soybean plant.jpg

06_logo.jpg (AVRDC – The World Vegetable Center logo)

07_Rutu Purty (right) examines fresh vegetable soybean pods during a field day.jpg

08_Women's self-help group *Jeevanba mahila mandal* join in vegetable soybean field day activities.jpg

09_A good harvest of fresh vegetable soybean.jpg

10_Mariom Purthy, a tribal woman from Iti village.jpg

11_Sateng Samad, a young farmer from Iti village.jpg