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Vegetable Soybean: A Crop with Immense Potential to Improve Human Nutrition and Diversify Cropping Systems In Eastern India- A Review

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ABSTRACT

Vegetable soybean was introduced into Jharkhand state in India to provide local communities with an alternative protein source as well as to diversify the cropping system. The paper covers the introduction of the crop, testing of different lines in farmers' fields, a taste survey, the release of a vegetable soybean cultivar and its popularization, and seed production by the community. The acceptance of the crop by the local community has led to seed production of the cultivar 'Swarna Vasundhara' by farmers. A major challenge is to expand beyond household level consumption and local Jharkhand markets to create awareness among other consumers and establish a larger market throughout India for the crop. Infrastructure such as cold storage facilities will be required to support a viable value chain for vegetable soybean. The good progress made in Jharkhand has given greater hope of expanding vegetable soybean production and consumption across India, particularly in the major grain soybean growing states.

Keywords: Cropping system, legume, nutrition, vegetable soybean

Jharkhand is located in the eastern plateau and hill region of India (agro-climatic zone VII). In its population of 33 million people, about one-quarter (26.3 %) are tribal (http://www.census2011.co.in/census/state/jharkhand.html.). About 76 per cent of the population resides in rural areas (30 % of the tribal population) and more than 80 per cent of the total labor force depends on agriculture (http://rkvy.nic.in/sap/jh.pdf). About 90 per cent of the 795,000 ha of cropped area is used to produce food grains under rain-fed conditions. About 80 per cent of this area remains under mono-cropped rice. Cash crops account for only 4-6 per cent of production. The majority (83 %) of the land holdings belongs to small - scale and marginal farmers and most agriculture is for subsistence. Jharkhand has an average yearly rainfall of 1300-1400 mm and 80 per cent of this is received during the four monsoon months of June to September with dry periods in between. Assured irrigation is available to only 8-9 per cent of the

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cropping area during the *kharif* (monsoon season), 6 per cent during the *rabi* (winter/spring season) and 1-2 per cent during the summer season (Jharkhand Economic Survey, 2012).

According to the National Family Health Survey (NFSH-III, 2006), about half of the children (47.2 %) under three years in Jharkhand are stunted—an indication of undernourishment. One-third (35.8 %) of children are too thin for their height, which may result from inadequate recent food intake or a recent illness (NFHS-III, 2006). Anaemia is found in over 70 per cent of individuals in Jharkhand. About two in five adults (43 % of women and 39 % of men) in Jharkhand are underweight. Under-nutrition is particularly prevalent in rural areas and in the lower wealth quintiles (NFHS- III, 2009). The prevalence of anaemia among adults in Jharkhand is higher than in almost all other states in India. Seventy per cent of women in Jharkhand have anaemia, including 50 per cent with mild anaemia, 19 per cent with moderate anaemia, and 1 per cent with severe anaemia (NFHS-III, 2009).

The crops under cultivation in Jharkhand are dominated by cereals such as paddy rice in lowlands and medium uplands, and vegetable legumes such as green pea (*Pisum sativum)*, chickpea (*Cicer arietinum)*, pigeon pea (*Cajanus cajan)*, cowpea (*Vigna ungiculata),* French bean (*Phaseolus vulgaris*), and Dolichos bean (*Lablab purpureus*). Most of these legumes are available during the *rabi* season only. Diversifying the cropping system with a suitable crop that requires less water due to unexpected dry periods during the *kharif* season under rain-fed conditions would provide economic as well as nutritional benefits. To fulfill this role, vegetable soybean—a special type of soybean for fresh consumption—was introduced into the region. Vegetable soybean is an alternative legume crop that fits into existing cropping systems. Local communities in the target areas (Ranchi and Khunti districts) know about grain soybean, but never have cultivated it. Vegetable soybean production is similar to that of traditional grain soybean, although different planting techniques and equipment are needed to accommodate the larger seed (Ernst, 2001).

Rationale for introduction of vegetable soybean in upland and medium uplands of Jharkhand

The seeds of vegetable soybean are larger (> 30g/100 seeds dry weight), sweeter and more tender than grain soybean (Shanmugasundaram and Yan, 2010). Fresh vegetable soybean is delicious and nutritious, and is an excellent source of protein (35 % to 38 % protein, dry weight basis) which can help alleviate protein malnutrition in Jharkhand, particularly among children. Proximate analysis of seed nutritional composition of vegetable soybean in Colorado, USA (Johnson *et al.,* 1999), and Japan (Masuda, 1991) indicated that the nutritional content of vegetable soybean is superior (Table 1) to that of green peas (Carter and Shanmugasundaram, 1993), which are commonly consumed in Jharkhand. Soybean also has potential for cancer

Table 1. Nutrient composition (values per 100 g) of vegetable soybean compared to other legume crops in Jharkhand

Nutrient composition	Vegetable soybean		Vegetable pigeon pea		Green pea	
	Raw	Cooked	Raw	Cooked	Raw	Cooked
Energy (kcal)	147a	141	136	111	81	84
Moisture (g)	67.5	68.8	65.9	71.8	78.9	77.9
Protein (g)	12.9	12.4	7.2	5.9	5.4	5.4
Fat (g)	6.8	6.4	1.6	1.4	0.4	0.2
Total carbohydrate (g)	11	11	23.9	19.5	14.4	15.6
Crude fiber (g)	4.2	4.2	5.1	6.2	5.1	5.5
Ash (g)	1.7	1.6	1.4	1.4	0.8	0.9
P (mg)	194	158	127	118	108	117
Ca (mg)	197	145	42	41	25	27
Fe (mg)	3.5	2.5	1.6	1.6	1.5	1.5
Vitamin A (mg RAE)	9	8	3	2	38	40
Vitamin B_1 (mg)	0.4	0.2	0.4	0.3	0.2	0.2
Vitamin B_2 (mg)	0.17	0.15	0.17	0.16	0.13	0.15
Vitamin C (mg)	29	17	39	28	40	14
Vitamin E (mg)	(1476)[b]	–	0.39	0.32	0.13	0.14
Folate (mg)	165	111	173	100	65	63
Isoflavones (mg)	20.4[a]	13.8	–	–	–	–

[a]*Value of Isoflavonesobtained from United States Department of Agriculture (USDA)-Iowa State University Database on the Isoflavone Content of Foods (1999); Other value obtained from USDA National Nutrient Database for Standard Reference, Release 24(2011); - data not available in USDA database;* [b]*Value in parenthesis is total tocopherol content (µg/g lipid) at 40 days after flowering (Masuda,1991)*
Source: Shanmugasundaramet al. (2015)

prevention and suppression owing to its high isoflavone content (Kucuk, 2004; Messina, 2004).

Crop diversification utilizing a new crop option such as vegetable soybean is driven by following several factors that motivate famers (Connor, 2001).

Low conventional crop prices: On the uplands and medium uplands, yield of conventional crops such as broadcasted rice, oilseeds, and other pulses is very low; cultivation is only for subsistence farming and not for profit. Therefore, any higher-yielding crop that also can be consumed at home would be an attractive replacement or addition to the cropping system. The overall goal of crop diversification is to increase food availability and farm profitability.

Environmental protection: The inclusion of nitrogen-fixing legumes in cropping systems can reduce the need to apply inorganic fertilizers for vegetable soybean, as well as provide benefits to the succeeding crop on the same land.

Biodiversity: As the number of crops increases, the enhanced biodiversity can reduce pest and diseases problems, as well as create new opportunities for innovative crop management through extended crop rotations.

Development of new production systems: Vegetable soybean fits well into crop rotations or other cropping systems, such as intercropping with cereals. In South and Southeast Asia, legumes are commonly included in cereal-based cropping systems. For example, soybean is cultivated in a rice-based cropping system or on bunds and dikes in lowland rice fields (Shanmugasundaram and Yan, 2010).

Due to its nutritional value, vegetable soybean can contribute to reducing malnutrition. Vegetable soybean can be consumed as a highly nutritious vegetable or grain and is well suited to smallholder production under adverse climatic conditions (Keatinge *et al*., 2011).

Vegetable soybean is harvested during October, which coincides with festivals in the eastern part of India. During this time vegetable prices are high, and there are few other legume vegetables such as green peas or chickpea available. Farmers are attracted to vegetable soybean because of the potential local market at that time of the year. Because vegetable soybean is harvested when green, growers also can avoid many of the late-season problems that occur with grain soybeans (Ernst, 2001).

Vegetable soybean can yield up to 10 t per ha of high value seed. The crop adds value to the soil by fixing atmospheric nitrogen, boosting the yield of following cereals, and providing up to 30 t per ha of highly nutritious stover or green manure (Shanmugsundaram and Yan, 1999).

Testing vegetable soybean

During the late 1990s vegetable soybean lines were imported from the World Vegetable Center's gene bank by the Research Center of the Indian Council of Agricultural Research (ICAR-RC) at Ranchi. The lines were evaluated for adaptability and time of sowing and it was found that vegetable soybean sown during the *kharif* season provided a good yield with high biomass production similar to grain soybean (Pan *et al*., 2015). Following this, experiments were conducted during the *kharif* seasons (June to September) in2000, 2001 and 2002 at ICAR-RC, Ranchi. Stability parameters, *viz.* regression coefficient (bi) and mean square deviations (S^2di) from linear regression along with *per-se* performance of 11 lines of vegetable soybean for 11 yield-related characters were studied. Line EC 384907 (15 t/ha) performed the best for graded (2-seeded, 3-seeded) green pod yield and was stable across diverse environmental conditions. EC 384905 was the most stable and suitable for favorable environments for graded green pod yield (14.2 t/ha),

100-green seed weight (49.9 g) and shelling percentage (56.3 %). Also, the line was very promising for early flowering (36 days after sowing) and early maturity (73 days) and responsive in unfavorable environments (Pan *et al*., 2007). Based on the evaluations, the elite line EC 384907 was recommended for release and cultivation in Jharkhand and Bihar states of India in the *kharif* season and was released in 2008 by the Central Variety Release Committee (CVRC) of the Government of India as "Swarna Vasundhara" (http://smis.dacnet.nic.in/(S(kxrrlhsi3lzvj0xr4011kjy2))/report/ssrsVarietyDetail.aspx?varietycd=A041009).
'Swarna Vasundhara' is distinguished by a bushy growth habit, producing 1-, 2- or 3-seeded bright green pods with grey pubescence and 50-55 per cent recovery of shelled bright green seeds. The variety showed resistance to rust and was least affected by pod borer infestation with an average yield of 15 t per ha.

Taking it to farmers

Although 'Swarna Vasundhara' performed well, as a new crop it was not yet popular with farmers. In 2008, the Sir Ratan Tata Trust sponsored a project; "Improving Vegetable Production and Consumption for Sustainable Rural Livelihoods in Jharkhand" led by World Vegetable Center in Jharkhand and implemented through the trust's non-governmental organization (NGO) CInI (Collectives for Integrated Livelihood Initiatives). The project popularized this new crop across the region, especially in the tribal areas of Ranchi and Khunti districts.

Because these communities already were consuming fresh legumes (green pea, chickpea, cowpea, and French beans) and had developed a taste for these vegetables, it was anticipated that vegetable soybean would not face any difficulty in acceptance. In 2008, the local NGO Indian Grameen Services (IGS) was convinced of the economic and nutritional potential of vegetable soybean. After discussions the seed of 'Swarna Vasundhara' was distributed to the farmers in the Oraontribein villages in the Karra block of Khunti district for sowing in the *kharif* season. Training was provided on a package of practicesWith discussions on yield, income and nutritional potential, and using vegetable soybean as an alternative crop to green pea. The farmers (60) sowed the seeds in ridges to avoid water logging and seedling death during heavy rain in the rain-fed uplands. The crops germinated well, started flowering after 40 days, podded after 60 days and were ready for harvest in 70-75 days. About 80 per cent of the farmers who followed the proper package of practices (particularly ridge sowing, weeding, and earthing-up with a top dressing of fertilizer) were able to get a good crop. The farmers had not yet started harvesting and consuming the cooked fresh pods when a field day was organized in late September at the ICAR Research Center in Ranchi. These 60 farmers along with new farmers were invited to join in discussions about the crop and its benefits. Cooked vegetable soybean was served during lunch and recipes were demonstrated. The farmers appreciated the taste and women farmers

in particular compared it to green peas. After this field day, awareness among the farmers increased and they started harvesting green pods and consuming vegetable soybean either boiled or prepared with other vegetables such as potato. The children liked it very much and their mothers were happy to serve it to them for its nutritional benefits. The farmers started saving the mature seeds for sowing in the next *kharif* season. Seed demand was also raised by other stakeholders, NGOs, and farmers after the field day.

In 2009, the demand for seed grew, but the seeds were distributed to only 470 farmers as seed availability was limited at the ICAR research center, which was the only source of seed. The year had dry spells during the monsoon, which was detrimental for most crops, particularly paddy rice, which occupies 80 per cent of the land. Farmers were unable to transplant their paddy rice and vegetables. In this erratic monsoon season, the vegetable soybean crop performed very well with good yields even in marginal soils. Soybean plants gave up to 120 pods with more than 230 seeds.

Due to a price rise in agricultural commodities, especially pulses, farmers were forced to leave their crops to mature to produce dry soybeans. At the same time, due to a lack of other vegetables, farmers harvested 10-20 per cent of the fresh green pods in their crops (Fig. 1). After the season, farmers used the dry grains to prepare *dhal* (a legume stew commonly made with other pulses like black gram and mung bean) and also kept seed for sowing in the following year. Field days were also organized in the villages. This helped to create awareness and promote vegetable soybean in neighboring villages and made it easy to introduce the crop. Farmers accepted this new vegetable soybean variety for growing as a rain- fed *kharif* crop in the uplands of eastern India. The shelled fresh green beans were found to have a good taste when cooked as a vegetable alone or in combination with other vegetables such as potato (Pan *et al.*, 2010). Farmers tried various recipes and integrated it with their normal food preparation habits, such as using oil-fried soybean mixed with vegetables.

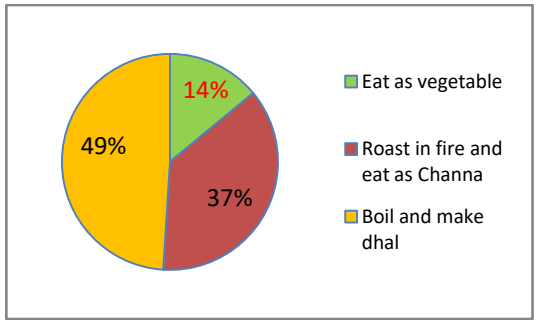

Fig. 1. Method of consumption (in %) of vegetable soybean in Jharkhand (Channa is Chickpea in Hindi)

In 2010, the seed demand from farmers greatly outstripped available supplies. The self-pollinated nature of the crop and the fact that the farmers didn't grow any other grain soybean made seed production easy in farmers' fields.

Training was provided through NGO partners in seed production and storage. Farmers started saving seeds for their sowing, and also shared seed with their fellow farmers and neighboring villages. There was no major pest or disease outbreak observed in this crop apart from a few polyphagous leaf-eating caterpillars and minor viral diseases of pulses. Now the farmers were familiar with the vegetable soybean and they named it "*sabji soya been,*" which means" vegetable soybean". In 2011, more than 20 per cent of the farmers planted their crops using their own seeds.

Sustainability

Farmers started selling the harvested fresh pods in the local market and were able to get INR 20-30 per kg of fresh pods. Although vegetable soybean was well accepted by farmers, seed supply was a major constraint to production. To counter this problem, farmers received training in seed production and saving seeds. Local NGO partner KGVK, which had its own farm, started producing seed and selling it to farmers. To avoid the problem of relying on one released variety, ICAR obtained more lines from the World Vegetable Center and on evaluation found a few promising new lines, some had a basmati flavor.

In the fifth year (2012), after introduction of the crop, a cluster approach was initiated to improve the sustainability of the seed supply. Extension materials and four kilograms of vegetable soybean seed were distributed to each participating farmer to cultivate on 400 m^2 of land. Farmers agreed to follow the package of practices recommended by the World Vegetable Center and to provide back eight kilograms of seed to a farmers' cooperative so that this seed could be used to promote the crop in new areas. Market days were organized in the villages to create awareness among consumers about vegetable soybean, stimulate demand, and test the acceptability of recipes.

Women from the Self Help Group of Iti village prepared a delicious vegetable soybean recipe with tomato, potato and other spices with the aim of promoting it in the market. About 350 consumers tasted the recipe and responses from 39 were taken. All of the respondents accepted the soybean recipe and rated it 4.97 out of a possible 5.00 in terms of taste. More than half of the respondents were excited after tasting the recipe and interested to see the whole crop plants that were on display. The recipe is being used successfully in other villages where vegetable soybean has been promoted. The farmers from Iti village duly deposited their seed with the farmer's cooperative at the end of the season and this seed was then distributed to new villages. Some also sold excess seed to other interested famers, but were still not able to meet the growing demand for the crop.

Opportunities

Vegetable soybean fits in with local farming systems, is liked by consumers, and accepted in local diets. There is great potential for expansion of this crop in Jharkhand as well as entire East Indian plateau with a similar

kind of environment and dominated by tribal communities.

Apart from these benefits, the crop residues also improve soil nutritional status. The incorporation of vegetable soybean biomass increased soil nitrogen by 129 kg per ha, potassium by 21 kg per ha and organic carbon by 0.09 per cent (Ravishankar *et al*., 2015).

There is an opportunity to create value-added products from vegetable soybean similar to the traditional roasted *mung dhal*. The ICAR research center has started working in this area. Dried vegetable soybean is a popular international snack food, and its quality has received considerable attention from processors and consumers (Huang *et al*., 2014).

Exporting frozen cooked vegetable soybean is possible if production quantities could be substantially increased. Vegetable soybean, or *edamame*, is a popular traditional snack food in Japan, the world's largest importer of the crop. However, good market prices depend on freshness and quality to meet the high standards of the Japanese market (Takahashi and Ohyama, 2011). Owing to its nutritional benefits the crop is also gaining popularity in Europe and the USA.

Challenges

Seed production and supply is a major challenge for the expansion of vegetable soybean. The current seed cost is about INR 150 per kg, which deters new farmers to take up this crop as it is too expensive compared to other pulses. Germination rates rapidly decline as seed ages, so enhancing the germination rate as well as increasing resistance to soil-borne pathogens would help improve crop establishment. Ensuring proper storage of seeds is also critical to maintain good germination rates. Greater awareness is needed among consumers to establish a market for this crop beyond household-level consumption and local Village markets. To ensure a year-round supply, local cold storage facilities must be established to store fresh pods for distribution based on market demand. Consumers should be made aware of the health benefits of consuming vegetable soybean. There is also a need to convince policy makers to promote this crop as part of programs to address malnutrition.

Potential expansion in other states in India

With the suitability of the soils in these regions for soybean cultivation and farmers' familiarity with the crop, there is enormous potential for the expansion of vegetable soybean in India. Field trials of 16 lines of vegetable soybean were conducted in Hyderabad and Jharkhand in 2012. A combined analysis of variance across the two environments was performed to test the significance of environment (E), lines (L) and environment x line (EL) interactions considering environment as random and line as fixed using the SAS MIXED procedure (SAS V9.4; SAS Institute Inc., 2015). Individual environment residuals were modeled into a combined analysis using the REML technique and variance components were estimated. BLUP's (Best Linear Unbiased Predictors) for lines for each environment were

estimated using combined analysis. Significant line x environment interaction was observed for all the traits. The data showed the need to develop lines suited to each environment (Table 2).

Table 2. Performance of vegetable soybean lines in Hyderabad and Jharkhand, India during 2012

Line	Days to flowering		Pods (No/ plant)		Pod yield (g/plant)		Seed yield (g/plant)		100 seed weight (g)	
	Hyd	Jhd	Hyd	Jhd	Hyd	Jhd	Hyd	Jhd	Hyd	Jhd
AGS 292	26.0	32.9	10.2	34.0	20.3	77.5	6.9	38.2	33.1	58.1
AGS 329	26.7	32.1	9.0	33.3	15.8	56.3	3.8	29.4	29.4	62.5
AGS 338	30.0	35.6	6.3	42.2	11.3	71.6	2.5	39.8	23.5	49.3
AGS 339	27.0	32.3	10.8	34.2	17.5	72.1	4.5	33.6	32.0	57.1
AGS 406	28.7	35.3	24.4	55.6	47.5	100.4	13.5	50.1	32.3	54.3
AGS 447	27.3	30.1	11.8	36.3	29.7	78.1	7.5	36.9	33.6	61.4
AGS 456	27.0	31.1	12.2	40.6	32.5	102.1	11.8	58.6	34.5	67.9
AGS 457	26.6	30.1	12.9	52.3	31.0	107.9	7.0	51.0	30.9	66.2
AGS 458	27.0	30.7	14.2	60.6	37.3	128.6	12.1	60.4	34.0	73.6
AGS 459	30.3	33.8	19.4	67.7	39.4	125.1	10.0	63.5	33.9	59.4
AGS 460	32.0	35.1	14.8	38.8	31.6	83.5	6.3	40.6	31.9	54.4
AGS 461	29.0	33.1	13.7	39.3	30.9	89.9	10.9	42.5	35.2	76.2
AGS 610	30.3	33.8	22.1	48.5	50.2	92.4	12.9	43.7	29.3	53.0
GC 84501-32-1	35.1	45.5	55.1	148.4	44.4	102.1	15.2	57.6	13.1	22.6
Harit Soya*	34.4	44.1	33.9	70.8	35.7	69.3	17.5	37.3	15.7	28.1
Swarna Vasundhara	36.1	48.4	25.1	78.7	52.9	143.4	12.5	73.6	31.2	46.3

**grain soybean line*

One of the strategies to promote the crop is to create awareness among grain soybean farmers in the major soybean growing states such as Madhya Pradesh, Maharashtra and Rajasthan to grow vegetable soybean as a niche crop. For example, in Maharashtra, the World Vegetable Center has initiated vegetable soybean production in collaboration with a progressive farmer in Latur district. The farmer has now formed a cooperative farmer group to expand vegetable soybean seed production to cover the whole state. The need for creating markets for the crop in India by linking famers to food chain outlets and diversifying food products developed from vegetable soybean will help increase demand. During 2012, a taste test survey was conducted in Hyderabad on the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) campus involving 25 participants. Friedman's non-parametric test (Friedman, 1937) was performed using chi-square statistics to test the significance of the rankings for each line (Table 3). 'Swarna Vasundhara' received the highest overall ranking

Table 3. Sum of ranks of vegetable soybean lines in a taste survey conducted in Hyderabad, India during 2012

Line	Pod appear-ance	Pod colour	Pod texture	Bean appear-ance	Bean colour	Bean aroma	Bean taste	Bean texture	Overall rank
AGS 292	183	200	226	230	290.5	218	187	261.5	233
AGS 329	194.5	251	224	220.5	239.5	216.5	220	216.5	208.5
AGS 338	137.5	214	233	176	192	200.5	195	170.5	162.5
AGS 339	175.5	158.5	189	234	190	196	198.5	198	202.5
AGS 406	292.5	279	210.5	251.5	270.5	157.5	226	219	277
AGS 447	192	140.5	172	100.5	88	121.5	130	111	93
AGS 456	232.5	232.5	205	198.5	218.5	240.5	227.5	249	251
AGS 457	212	225	180.5	173	143.5	182	187.5	204	148
AGS 458	211.5	157.5	178	187.5	172.5	188	207	199	189.5
AGS 459	226.5	208	219.5	192.5	193	203.5	226	195	203.5
AGS 460	191.5	211	209.5	228.5	186.5	195.5	217.5	221	239
AGS 461	199	195.5	203.5	205	185.5	241	218.5	278	220
AGS 610	255.5	261.5	240.5	250.5	271.5	256.5	250	210	244
GC 84501-32-1	171.5	191	212	221	249	232.5	190	175	194.5
Harit Soya	211.5	162	192	232.5	229	245	226.5	216.5	229
Swarna Vasundhara	313.5	313	289	298.5	280.5	305.5	293	276	305
χ2-Statistic	65.8	77.2	12.9	66.6	106.4	61.1	40.7	55.4	80.4
P	< .0001	<.0001	.604	<.0001	<.0001	<.0001	.0003	<.0001	<.0001

compared to other lines. Further on-farm demonstrations as well as targeted cooking classes would help improve consumer awareness of the crop. In 2015, a survey conducted by ITC Ltd through their hotel chain found that consumers would prefer glabrous pod types to hairy podded-types; the hairiness of pods in Swarna Vasundhara' is thus an undesirable trait. The availability of basmati-flavored vegetable soybean would be an attraction, particularly in the Indian sub-continent. Poornima *et al.* (2014) reported high taste-test scores for the basmati-flavored (World Vegetable Center bred lines)

AGS 447 and AGS 457 in a taste survey conducted in the state of Karnataka. Use of integrated pest management strategies would help position the crop as a healthy nutritious snack produced with fewer or no pesticides, as well as open stringent export markets.

Conclusion

The successful introduction of vegetable soybean in the Indian state of Jharkhand has highlighted the need for community involvement at the outset. Development of varieties suited to consumer needs is paramount for the successful inclusion of the crop in the diet, which would potentially lead to improvement in the nutritional status of the community. Ongoing effort to expand the crop in other states, particularly the major grain soybean growing regions, will help ensure enough volume is produced to encourage private companies to become involved in the vegetable soybean value chain.

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