

Vegetable Soybean — A Promising New Introduction in Jharkhand for Nutritional Security

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ABSTRACT

Ten nutritionally rich vegetable soybean lines were introduced from AVRDC, Taiwan and evaluated under rainfed conditions during *kharif* 2000 in rainfed uplands. The line AGS 334 recorded high graded green pod (2- and 3-seeded) yield (16 t/ha), high recovery of shelled green beans (54%), high 100-green seed weight (43 g) and very good eating quality of shelled large sized boiled green seeds. Hence, this short duration (81 days) vegetable soybean line could be promoted for cultivation as a profitable rainfed vegetable crop. By virtue of its high nutritional value, it will ensure nutritional security to the people of this region.

Vegetable soybean (*Glycine max* (L.) Merrill) is defined as those which are harvested after the R-6 and before R-7 growth stage (Fehr *et al.*, 1971) while the pod is still green and the seeds have developed to fill 80-90% of the pod width. Vegetable soybean mainly differ from grain soybean in respect of their large sized seed (dry weight of 100 seeds \geq 30 g), higher level of sugars (12.1%; Anon., 1999), \geq 75% 2- or more-seeded pods, grey pubescence and bright green pod and seed coat colour. The shelled bold green seeds are rich in protein (11.4%), minerals/nutrients viz., calcium (70 mg/100 g), potassium (140 mg/100 g) and phosphorus (140 mg/100 g), vitamins A (carotene 100 mg/100 g), C (27 mg/100 g) and E (12 μ g/seed) and dietary fibers (15.6 g/100 g) (Masuda, 1991). These are mainly consumed as cooked vegetable alone or with other vegetables. The frozen vegetable soybean is very popular in Japan and USA. Now, the cultivation of vegetable soybean is spread over Japan, Taiwan, USA, Philippines, Korea, Vietnam, Malaysia, Mauritius, Switzerland, Nepal, Hawaii, etc. Considering the nutritional value of this important vegetable legume in human diet, improved vegetable soybean lines were introduced from Asian Vegetable Research and Development Centre (AVRDC, Taiwan) and evaluated in the tribal inhabited plateau region of Jharkhand for selection and popularisation of the horticulturally desirable high yielding genotypes among the vegetable growers and consumers with the ultimate objective of providing nutritional security to the people of this region.

MATERIALS AND METHODS

Ten vegetable soybean lines were grown during *kharif* season (last week of June to middle of September), 2000 at Research Farm I of Horticulture and

Agro-Forestry Research Programme, Ranchi (620 m.asl) in randomised block design with 3 replications. A spacing of 45 cm (row-to-row) × 30 cm (plant-to-plant) was maintained. Uniform cultural practices viz., weeding, hoeing, application of manures and fertilizers, plant protection measures were followed for healthy crop growth. Observations on a set of agro-morphological and yield components of green pods were obtained from 5 competitive plants in each replication. The data were analysed statistically as per method suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Highly significant differences were observed among the 10 vegetable soybean lines for days to flowering, days to green pod maturity, plant height and number of pods per plant whereas non-significant differences were observed for 100-green seed weight, total green pod yield, graded green pod yield and shelling percentage (Table 1). The number of days taken for flowering ranged from 36-67 in AGS 338 to 45 in AGS 332 i.e., within 8 days after initiation of flowering in the earlier line, all

Table 1 — Comparative performance of vegetable soybean lines

Accession no.	Quality of cooked green seeds	Days to flowering	Days to maturity	Plant height (cm)	Pods/plant	100-green seed weight (g)	Green pod yield (q/ha)	Graded green pod yield (q/ha)	Shelling (%)
AGS-190	Good	43.67	81.00	39.50	114.00	45.65	143.60	121.12	49.12
AGS-331	Good	39.34	74.34	32.67	55.34	43.16	72.92	64.81	55.02
AGS-332	Very Good	45.00	77.34	29.17	54.00	42.56	63.52	55.62	51.97
AGS-333	Good	40.00	71.00	24.83	81.34	46.18	106.91	95.90	49.92
AGS-334	Very Good	42.67	80.67	39.00	127.00	43.04	176.78	158.77	53.61
AGS-335	Good	39.00	71.00	35.83	66.67	40.21	87.62	77.64	51.28
AGS-336	Good	43.00	71.00	23.00	62.34	41.53	90.59	83.93	56.87
AGS-337	Good	39.00	71.00	25.34	68.00	41.69	84.96	73.15	55.50
AGS-338	Good	36.67	71.00	38.17	50.67	38.12	62.54	53.08	48.69
GC-89009-1-1-2	Good	41.34	71.00	38.83	80.34	40.89	147.65	131.55	51.38
CV (%)	-	4.57	3.08	8.24	31.45	13.32	45.29	48.02	9.89
CD (at 5%)	-	3.20	3.89	4.59	40.84	-	-	-	-
CD (at 1%)	-	4.38	5.32	6.28	55.82	-	-	-	-

the other lines came to flowering. Vegetable soybean is usually harvested at about 33 to 38 days after flowering (Masuda, 1991). Similar trend was observed in the present experiment where days to green pod maturity ranged from 71 to 81 days after sowing i.e., 30 to 38 days after flowering. Except the lines AGS 190 (81 days), AGS 334 (80.67 days), AGS 332 (77.34 days) and AGS 331 (74.34 days), the other 6 lines took uniformly 71 days for reaching to harvest stage of green pod. Plant height ranged from 23 cm in AGS 336 to 39.50 cm in AGS 190. The maximum number of total green pods (1-, 2- and 3-seeded) was harvested in AGS 334 (127) followed by AGS 190 (114) and GC 89009-1-1-2 (80.34). AGS 333 (46.18 g) recorded the maximum value of 100-green seed weight followed by AGS 190 (45.65 g) and AGS 331 (43.16 g). The highest shelling percentage was obtained in AGS 336 (56.87%) followed by AGS 337 (55.50%) and AGS 331 (55.02%). The highest recovery of total (1-, 2- and 3-seeded) and graded (2- and 3-seeded) green pods was recorded in AGS 334 (total 18 t and graded 16 t/ha) followed by GC 89009-1-1-2 (total 15 t and graded 13 t/ha) and AGS 190 (total 14 t and graded 12 t/ha). Among the different vegetable soybean lines tested, the same AGS 334 recorded the highest graded green pod yield (6.81 t/ha) in 76 days in Vietnam during 1997 (Anon., 1997) and very high graded green pod yield (12.5 t/ha) in 66 days in Hawaii during 1999 (Anon., 1999). These informations and our experimental data proved the high yield potential of this particular line in different countries. Pan and Rai (1996) also reported higher yield in GC 89009-1-1-2 (total 13.5 t and graded 12 t/ha). An organoleptic test on boiled green seeds was also done in which different persons graded the lines on the basis of appearance, sweetness, taste, flavour and texture of boiled green seeds as Young *et al.* (2000) evaluated the vegetable soybean lines on the basis of same parameters in USA. AGS 334 earned very good score on the basis of the above mentioned quality parameters and was highly acceptable to the consumers. Additionally, AGS 334 recorded higher recovery (54%) of shelled beans which is also a highly desirable character from consumers' point of view.

It can be concluded that AGS 334 recorded high yield in 81 days, high shelling percentage, high green seed weight and very good overall eating quality. Hence, this high yielding vegetable soybean line can be popularised for cultivation among the farmers of Jharkhand and adjoining areas of West Bengal, Madhya Pradesh and Orissa as a short duration (81 days), rainfed, vegetable crop in uplands without irrigation during *kharif* season when other green vegetables are not available in plenty. The cultivation of this leguminous vegetable soybean line would thus ensure higher economic returns to the growers in short duration in addition to sustenance of soil productivity. Its consumption would complement cereal-based diet with enhanced protein, vitamin and mineral nutrition which would help in providing nutritional security to the people of this tribal inhabited region.

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