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Sustainable Yard Long Bean Production through Introduction of High Yielding New Variety Arka Managala

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Yard long bean is one of the important vegetable crop rich in proteins and fibers, grown for fresh vegetable market majorly in south India and which plays a vital role in supplementing the income of small and marginal farmers of Mysuru district of Karnataka. One of the major constrain of traditional Yard long bean farming in Mysore district is low productivity due to non-adaption of advanced technologies like use of improved varieties. The present study Sustainable Yard Long Bean production through introduction of high yielding new variety Arka Managala was carried out at Hunsur Taluk of Mysore district during *Kharif* 2023. The improved technologies such as introduction of high yielding variety (Arka Mangala), balanced manures, fertilizers application and integrated pest and disease management etc. The present study revealed that introduced variety Arka managla gave highest yield per ha (14.1 t/ha) compared to farmers practice (8.9 t/ha) i.e. traditional varieties used by the farmers. The Arka mangala registered 36.87 per cent increased yield over the farmer's practice variety. The introduced variety Arka Mangala gave higher B:C ratio 1:3.10 with beneficial/market preference characters like long pods (80 cm), light green, stringless, round, tender with crisp texture and early maturity in 60 days along with minimum pest and disease incidence. Present study clearly showed that the yield and economics of Yard long bean can be improved by adapting high yielding variety with recommended scientific technologies.

Key Words: Arka Mangala, Crisp, Stringless, Texture, Yard long bean.

INTRODUCTION

IYard long bean (*Vigna unguiculata* sp. *sesquipedalis*) is a climbing member of the family Fabaceaeand sub family – Papilionaceae. The Yard long bean is one of the most significant leguminous vegetables in Asia, it is also known as the asparagus bean, string bean, snake bean, or snake pea. The ideal growing temperature for Yard long bean ranges between 27° to 30°C, and it is better able to withstand heat and dryness than other common beans (Quamruzzaman *et al,* 2022). Usually, the Yard long bean is harvested while still young and consumed as a green vegetable. Yard long beans, as the name suggests, the crop is differed from other leguminous vegetables in their very slender long green beans, indeterminate in growth habit, leaves are trifoliate and green in color. Flowers are of papilionaceous type with violet color. Pods are long, slender and pendent with sparely arranged bold seeds.

The Yard long bean is frequently known as poor man's meat as the pods are high not only in protein but also in lysine, tryptophan and a significant number of critical vitamins and minerals including folic acid and vitamin B (Chinma *et al,* 2008). Fresh Yard long beans are very high in folates which are necessary for pregnant women to prevent neural tube defects in babies. To optimize the health benefits associated with yard-long beans, consumption of about 1.5 cups of beans weekly is recommended (Peyrano *et al,* 2016). Yard long bean can be grown with an optimum average temperature of 20ºC to 30ºC. It prefers full sunshine during growth and development, whereas cloudy and rainy weather cause low yield due to poor fruit set and dropping of young pods. It can be grown in various soil types from sandy loam to clay, but loam and sandy loam with pH 6.2-7.0 are the best for yard long bean production. Although it is a highly nutritive legume vegetable, commercial cultivation of yard

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Table 1. Technology gap between two practices

Sr. No.	Package of practices (Technology demonstrated)	Introduction of new variety (Recommended package of practices)	Farmers practice (Local/check)	Technology Gap
01.	Varietal selection	Improved variety (Arka Mangala)	Local old variety	Partial gap
02.	Testing of soil	Have been done in all the demonstrated plot	Not followed	Full gap
03.	Seed treatment	Rhizobium treated	Not treated	Full gap
04.	Spacing followed	60 cm x 45 cm	70 cm x 20 cm	Partial gap
05.	Nutrient management	93 kg N + 75 kg P_2O5 + 105 kg K_2O per ha (50% N+ 100% P K at the time of planting and remaining 50% N applied at 30 days and 60 days after sowing)	Imbalance and inadequate	Partial gap
06.	Correction of deficiency by using micronutrients	2 times Foliar spray of vegetable special 2g/ltr + 1lemon + 1 shampoo sachet	Not used micronutrient	Full gap
07.	Irrigation	Drip irrigation depend upon soil condition	Flood irrigation twice in a week	Partial gap
08.	Weed control	Post emergent herbicide Imajamox @ 40 gram /ha, followed by hand weeding depend upon weed intensity.	Weeding is not common and did by hand weeding	Partial gap
9.	Plant protection measures for control of insect pest and diseases	Followed IPDM: practices and need based spray	Not properly done by using IPDM	Partial gap
10.	Harvesting	Manual	Manual	No gap

long bean for vegetable purpose is relatively low in India. The production and productivity of yard long bean is mainly constrained by due to low yield, use of local varieties and non-adoption of advanced technologies (Noorjehan *et al,* 2023 and Sarutayophat *et al,* 2007). To achieve this, selection of suitable varieties is an important step for successful and profitable cultivation of the

Table 2. Yield characteristics and economics of introduction of Yard long bean high yielding variety Arka Mangala in Mysore District

Particulars	Days taken for first harvest	Pods per plant (No.)	Pod length (cm)	Pod girth (cm)	Pods yield per plant (gm)	Yield (t/ha)	Cost of Cultivation (Rs./ha)	Gross Return (Rs./ha)	Net Return (Rs./ha)	B:C Ratio
Arka Mangala	56	42	76	3.20	790	14.1	181500	564000	382500	3.1
Local variety	71	32	62	2.60	570	8.9	186800	356000	169200	1.9

Table 3. Yield technology gap and technology index of introduction of new high yielding variety of Yard long bean Arka Mangala in Mysore District

Variables	Yield (t/ha)	Yield Increase (%) over farmers Practice	Technology gap (t/ha)	Extension gap (t/ha)	Technology index (%)
Arka Mangala	14.1	36.87	10.9	5.2	43.60
Local variety	8.9	-	-	-	-


ಮೀಟರ್ ಅಲಸಂದೆ ಬೆಳೆಯ
ಹೊಸ ತಳಿ ಅರ್ಕ ಮಂಗಳ

Fig.1 Farmers training programme and Arka Mangala seed distribution

Fig.2 General view of the Arka Mangala plot at farmers field

Fig.3 Farmers with high quality Arka Mangala pods

Fig.4 Organized field day to spread the technology

crop. In view of its nutritive value and being consumed as legume vegetable plays key role in sustainable crop management programme (Nagarajappa *et al,* 2018). At this juncture, identification and promotion of highyielding varieties in Yard long bean will play an essential role in crop improvement. Arka Mangala is an improved variety of Yard long bean with higher yield and better pod quality has released by Indian Institute of Horticultural Research, Bengaluru. Yard long is an important vegetable crop of the district and has been considered as productively potential region of Yard long bean due to assured irrigation facilities and favorable soil and climate conditions. Hence, promotion of this variety in Mysuru district of Karnataka will certainly improve the soil fertility, nutritive status and also increase the farmer's economy.

MATERIALS AND METHODS

Introduction of high yielding variety Arka Mangala was applied approach to dissemination of proven technologies at farmer's fields along with the package of practice and new technologies with better use of locally available resources to increase the productivity, production and income and also construct the bridge between gap in the productivity (Sarada and Hari Prasad, 2020). The variety Arka Mangala which was released from ICAR- Indian Institute of Horticulture Research (ICAR-IIHR), Bangalore was taken for study. To mitigate the problems faced by farmers in cultivation of Yard long bean crop, integrated crop production approach could be followed in Yard long bean and was conducted by ICAR JSS KVK, Mysuru during Kharif 2023, in ten farmer's field of Mysuru district. The variety was grown in 0.5 ha area each farmer with integrated management practices and the farmers practices i.e. traditionally grown in 0.5 ha area for comparison. The integrated management practices consisting ofseed treatment with *Rhizobium*, use of FYM 25 t/ha along with recommended fertilizers 93:75:105 NPK Kg/ha and foliar spray of Arka vegetable special micronutrient formulation (5 g/L) along with one shampoo sachet and two medium sized lemons, was sprayed uniformly on entire crop canopy at 30 and 60 days after sowing (*Anonymous*. 2022).The details of the experiments are given in Table 1. The experiment was evaluated by considering the parameters like days taken to first harvest from sowing, pod length, pod girth, number of pods per plant, pod yield per plant, yield per hector and cost incurred in the production.

At the time of harvest, data were collected from both treatments and practices. At the end, cost of cultivation, net income and cost benefit ratio were calculated. An average of cost of cultivation, yield and net returns of different farmers was analyzed by below mentioned formula.

$$\text{Average} = \frac{(F1+F2+F3+F4+F5+F6+F7+F8+F9+F10)}{N}$$

Where,

F= Farmer

N= Number of farmers

In the present study, technology index was defined as the technical feasibility obtained due to introduction on high yielding Yard long bean variety. To calculate the technology gap, extension gap and technology index following formula used as given by Samui *et al* (2000); Kamal *et al* (2020).

RESULTS AND DISCUSSION

The results showed that there was a significant effect of introduction of new variety over the local variety in increasing the yield of Yard long bean in farmer fields. Adapting new variety, use of balanced fertilizers, proper irrigation methods, weeding and by following integrated pest and disease management farmers can easily get higher yield with good quality.

Days taken to maturity

Maturity days are one of the important criteria in acceptance and cultivation of vegetable crops. The days taken for first harvest from sowing was lower in Arka Mangala (56 days) compared to local variety (71 days), this due to the genetic character of the variety and the same results was found by Nagarajappa *et al* (2018), Ancy *et al* (2024) and Jessy *et al* (2022). This varietal character will help the farmers to get good return within a short period and hence this variety can be consider as early variety of Yard long bean which highly suitable for Mysore District (Table 2).

Pod characteristics

The data related to yield and its attributes were presented in Table 2. The pod quality attributes in relation to yield like pod length, pod girth and number of pods per plants were considered for the evaluation. With respect to pod length, the highest pod length (76 cm) was recorded in the variety Arka Mangala compare to local variety (62 cm). The maximum pod girth (3.2 cm) and highest number of pods per plant (42) were observed in Arka Mangala when compared with local variety 2.6 cm and 32 respectively. The similar results were recorded with respect to variation in pod length and girth was reported by Saurabh *et al* (2018), Sarada and HariPrasad (2020).

Yield characteristics

Varietal yield is the most important character to be considered for selection and cultivation of any crops specific to a particular region. In the present study, The maximum yield per plant (790 g) and per ha (14.1 t) were recorded in Arka Mangal compared to local variety 570 g/plant and 8.9 t/ha (Table 2). The maximum yield observed in Arka Mangala is may be due to more number of pods per plant, maximum length of the pod, pod girth and pod weight. The results are in agreed with the findings of Varghese and Celine (2015) and Sarada and Hari Prasad (2020). The percentage increase in the yield of introduced variety of Yard long bean was 36.87 % more than local variety due to adaption of improved cultivation practices and integrated pest and diseases management. Mean while, the cost of cultivation was found more under farmers practices i.e. Rs.1,86,800/ha when compared to Arka Mangala (Rs. 1,81,500/ha). The gross return, net return and benefit cost ratio was found the maximum in Arka Mangala Rs 5,64,000 /ha, Rs 3,82,500 /ha and 1:3.10 respectively, lower in gross return, net return and benefit cost ratio was found in farmers practice Rs 3,56,000 /ha, Rs 1,69,200 /ha and 1:1.90 respectively. The introduction of new technologies along with crop specific scientific package of practices will help to increase the yield and net returns of the farmers. The similar results with respect to superiority of package of practices under introduction of new variety over farmer's practice was reported by Rambabau *et al* (2016) and Saurabh *et al* (2018).

Technological gap

Further we evaluated the technology gap among the farmers in cultivation of yard long bean. The results in relation to technology gap were showed in table 3.Technology gap in the improved variety yield versus potential yield was10.9 t/ha. The technology gap observed in the results may be due to associated with dissimilarity in soil fertility status in farmers field and climatic conditions prevailing during the growing season. In the present experiment the extension gap related yield was5.20 t/ha that indicates there is need to educate the farmers for adaption of improved production technologies to mitigate or reduce the extension gap (Meena *et al,* 2016; Nagarajappa *et al,* 2018).

CONCLUSION

It can be concluded that use of improved method of Yard long bean cultivation can reduced the technology gap to a substantial extent thus leading to increased productivity of Yard long bean in the area.. Cultivation of Yard long bean by following improved technologies has been found more productive and yield might be average increased up to 36.87 per cent. Technology and extension gap extended which can be bridges by popularity package of practices with emphasis of improved variety. Replacement of variety with newly released improved variety will increase the production and net income. Recommended technology was found to be suitable since it fits well to the existing farming situation and also it had been appreciated by the farmers.

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