



ASSESSMENT OF HIGH YIELDING VARIETIES OF DOLICHOS BEAN (*LABLAB PURPURIUS* VAR. *TYPICUS*) IN DHARMAPURI, DISTRICT, TAMILNADU, INDIA

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Abstract

Dolichos bean is being grown in an area of about 700 ha in Dharmapuri district. Mostly local varieties of lablab were cultivated. Though Dolichos bean fetches good price in market, the productivity was lesser due to lesser yield potential of the local varieties. Heavy yield loss even upto 40 % was recorded. To address these problems improved varieties of Dolichos bean were assessed for their performance in Dharmapuri district. The technology option 1 (TO₁) was local variety, technology option 2 (TO₂) was CO GB 14 released by TNAU, Coimbatore and technology option 3 (TO₃) was Arka Sambhram released by IHR, Bengaluru. The trials were conducted in five locations of Dharmapuri district farmers' field during *Kharif* 2017. The results of the on farm trials showed that CO (GB) 14 performed better than Arka Sambhram and local variety. The yield of CO (GB)14 recorded higher yield (6.81 t/ha) where as Arka Sambhram recorded 4.98 t/ha. The plant height was higher in CO (GB) 14 (49.03 cm) where as it was 37.32 cm in Arka Sambhram and 40.96 cm in local variety. Arka Sambhram started flowering early, from the 38.40 DAS and it was on 44.66 and 47.14 DAS in CO (GB) 14 and local variety respectively. There was no significant difference in the incidence of pod borer and aphids among the assessed varieties (22.6 %), but it was significantly higher in the local variety (35.20 %). The tenderness and quality of pods was good in both the improved varieties than the local variety. The time taken for maturity was higher in CO (GB) 14 than Arka Sambhram and local variety. The yield parameters such as number of branches per plant, number of pods per cluster, per plant are recorded to be better in the improved varieties than the local variety. The number of harvests was higher in CO (GB) 14 than Arka Sambhram and local varieties. All the growth and yield related parameters indicated that the variety CO (GB) 14 was better than Arka Sambhram and local variety. There was no significant difference among the cost of cultivation among the assessed varieties as the plant protection sprays were similar. But, difference was felt in the higher productivity in technology option 2 *i.e.* CO (GB) 14 and hence the net returns.

Keywords: Dolichos bean, Arka Sambhram, CO (GB)14, On farm trial, Productivity, Net returns.

Introduction

Dolichos bean (*Lablab purpureus* L.) is an important vegetable belonging to the family Fabaceae. It is a multipurpose crop used as vegetable, pulse, fodder, green manure with medicinal and ornamental uses (Ayyangar and Nambiar, 1935). It is a good source of protein in South Indian diet grown in various states (Raghu *et al.*, 2018). It is an excellent nitrogen fixer and is sometimes grown as a cover crop or for livestock fodder. Young immature pods are cooked and eaten like green beans. Dry seeds should be well cooked in two changes of water before eating. (www.lablab.org). Dolichos bean is an important vegetable in Tamilnadu especially in the northern districts. Dolichos is comparatively a drought tolerant vegetable and hence is a good livelihood crop for marginal and small farmers. It is being grown in an area of about 700 ha in Dharmapuri district. Mostly local varieties of lablab were cultivated. Though Dolichos bean fetches good price in market, the productivity was lesser due to lesser yield potential of the local varieties. Heavy yield loss even upto 40 % was recorded. The reasons behind the less productivity were adaption of local varieties which are photosensitive, improper nutrient management and indiscriminate plant protection. The choice of varieties is a key factor in improving the productivity. In case of Dolichos bean the photosensitivity of the varieties is an important factor as the farmers go for Dolichos bean cultivation when the irrigation water source is shrunk which coincides with summer months during which the photosensitive local varieties performance

is poor. To address these problems improved varieties of Dolichos bean were assessed for their performance in Dharmapuri district.

Materials and Methods

The on farm trials were conducted in five farmers' field in Dharmapuri district during *kharif* of 2017. The improved varieties of Dolichos bean CO (GB) 4 and Arka Sambhram were compared with the local variety. CO (GB) 4 is released by Tamil Nadu Agricultural University. It is an extra early, dwarf, erect and high yielding variety. It matures in 70-75 days as vegetable crop and 80-85 days as seed crop. It has recorded an average yield of 7984 kg ha⁻¹ of tender pods. It is tolerant to spotted pod borer and has compact pods. Arka Sambhram released by IHR, Bengaluru has medium size plants, 50 % flowering in 40 days and pods are ready for harvest in 55 days. Pods are flat, light green, medium long (13-15 cm), medium width (1.5 cm) with a yield of 19-20 t/ha. The cultural practices were from field preparation to plant protection measures were uniform in the three technology options except for the varieties. The field was brought to fine tith. FYM was applied @ 25 t/ha during last ploughing and the recommended basal dose of fertilizers were incorporated. In each location the plots were separated into three and allocated for the three technology options. Sowing was done at a spacing of 60 x 30 cm. Necessary top dressing, irrigation and plant protection was carried out. Five plants were randomly selected to record the yield and growth parameters with three replications in each location. The observations recorded were days to 50 per cent flowering,

plant height, number of branches per plant, number of racemes per cluster, number of pod per cluster, pod length, pod width, number of seeds per pod, pod yield per plant and pod yield per hectare. The obtained growth and yield data was analyzed by statistical procedure given by Gomez and Gomez, 1984. The economic analyses of the varieties were calculated to find out the benefit cost ratio of the respective technology options.

TO ₁	Farmers' practice	Local variety
TO ₂	CO GB 14	Duration 70 – 75 days, tolerant to spotted pod borer, compact pods, Yield 7.50 t/ha
TO ₃	Arka Sambhram	Duration 75 – 80 days, tender green pods, Yield 19 – 20 t/ha

Results and Discussion

The varieties CO (GB) 14 and Arka Sambhram are assessed with the local varieties in five locations. The results of the on farm trials showed that CO (GB) 14 performed better than Arka Sambhram and local variety.

The results of the on farm trial showed that the varieties varied significantly among themselves for various yield attributing characters and yield. Pod yield per plant and pod yield per hectare was significantly higher in CO (GB) 14 (1.4 kg and 6.81 t/ha respectively) followed by Arka Sambhram (0.79 kg and 4.98 t/ha respectively) (Table 1). The local variety showed the lowest value for both yield per plant and hectare (0.5 kg and 3.52 t/ha respectively). The present investigation is in line with the results of Choudhry *et al.* (2016). The reports confirm that there was positive and significant correlation of green pod yield per plant with green pod yield.

The plant height during 30 DAS and 45 DAS was significantly different among the varieties. CO (GB) 14 produced taller plants followed by Arka Sambhram and local variety (Table 1). The number of branches was not significantly different among the high yielding varieties but significantly higher than the local variety. Arka Sambhram started flowering early which is indicated by the days taken for 50 % flowering (38.40 days) which is significantly earlier than CO (GB) 14 (44.66 days) and local variety (47.14 days) (Fig 1). This result was in accordance with the findings of Shete and Deshmuk (2018).

The number of racemes per plant was significantly higher in CO (GB) 14 (4.75) which was followed by Arka Sambhram (4.29). The local variety showed lowest number of racemes per cluster (4.06). Number of pods per cluster was higher in CO (GB) 14 (8.04) and local variety (7.90) (Fig 2). Arka Sambhram recorded significantly low number of pods per cluster (6.77). Pod length was not significantly different among the varieties. But the pod width was higher in local variety (2.19 cm) followed by CO (GB) 14 (2.07 cm). The pods were more slender in Arka Sambhram (1.66 cm) than the other two compared varieties. There is no significant difference among the varieties for number of seeds per pod. The pod weight was significantly higher in CO (GB) 14 (8.04 g) followed by Arka Sambhram (7.24 g). The local variety recorded lowest pod weight (6.82 g) than the other two varieties. number of harvests was high in CO (GB) 14

followed by Arka Sambhram (5.81) and local varieties (5.69).

Ravinaik *et al.* (2015) had reported that the difference in yield among Dolichos genotypes may be attributed mainly to the difference in their plant height, number of branches per plant, pod length, number of pods per plant, pod weight, number of seeds per pod. In the present investigation the local variety recorded higher number of pods per cluster than Arka Sambhram. But the yield was comparatively lesser in local variety than Arka Sambhram. Similar trend was observed in the other yield attributing characters such as plant height and pod length and width. This difference can be attributed to the incidence of pod borer incidence which reduced the harvestable pods in local variety than Arka Sambhram.

Though the pod length and width were higher in the local variety it did not reflect in the pod weight and hence the yield of the local variety was lesser than Arka Sambhram. Controversial reports were found in the reports of Noorjahan *et al.* (2019). The correlation studies concluded that number of pod per inflorescence, pod length and mean pod weight have significant positive association with the marketable pod yield per plant. The difference may be attributed to the fact that the present investigation was on farm situation and there may be over all variation in pest and disease incidence. Pod borer infestation was high in local variety (35.20 %) than CO (GB) 14 (22.60 %) and Arka Sambhram (22.40%) (Fig 5). The aphid infestation showed a different trend because the local variety showed lesser infestation (9.8 %) than Arka Sambhram (10.4 %).

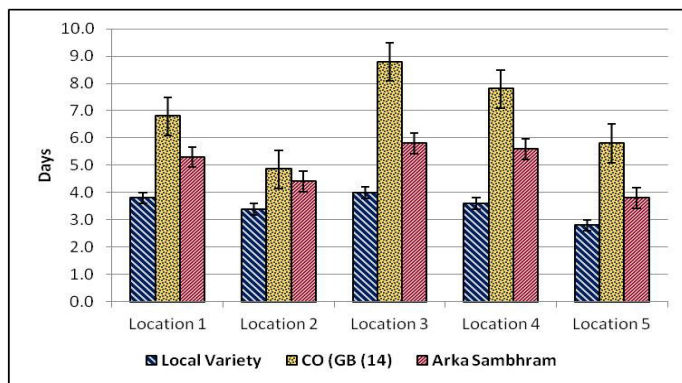
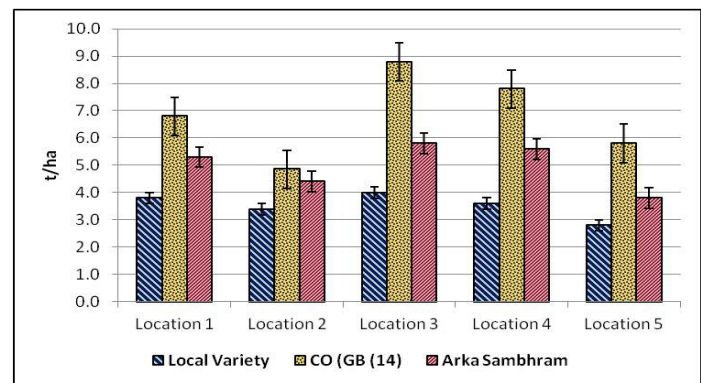
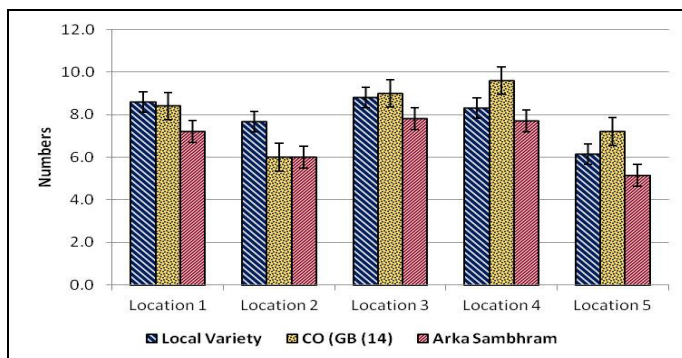
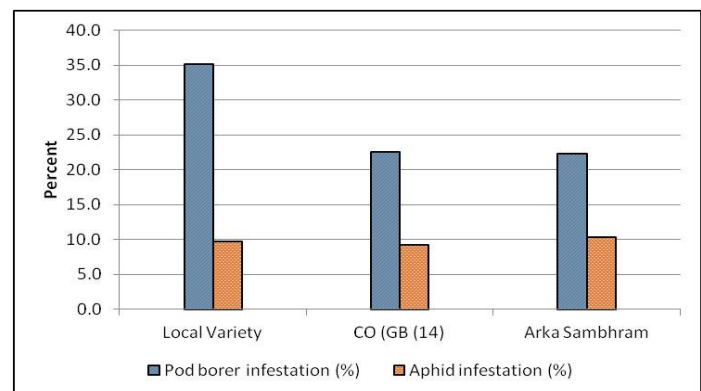
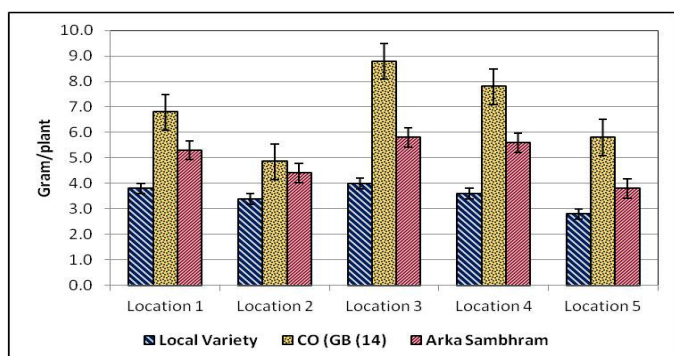
Being grown predominantly with irrigation source, dolichos bean was prone to water stress during end of the season and short duration varieties support for reducing the production losses (Lakshmi *et al.*, 2016). The productivity of the varieties in the present investigation did not reflect their potential yield because of the on farm production scenario. Various factors such as pest and disease incidence, nutrient management strategies and soil conditions related to the socio economic status of the farmers attribute to the over all productivity of the particular variety. These reasons may attribute to the difference observed in the productivity of the improved varieties taken for the present on farm trail (Fig 3 and Fig 4). The on farm trials aim at the economic performance of a particular variety reflected by the Benefit Cost Ratio as the major criteria for further adaption of the particular variety. There is no significant difference among the cost of cultivation among the assessed varieties as the plant protection sparys are similar for all the technology options (Table 2). But, difference is felt in the higher productivity in technology option 2 *ie.* CO (GB) 14 and hence the gross returns is higher (Rs. 169320). This reflects in the higher net returns and BCR of CO (GB) 14 (Rs. 119195 and 3.4) followed by Arka Sambhram (Rs. 81670 and 2.6). The local variety showed the lowest productivity and hence the economic returns (Rs. 45345 and 1.9) was also lesser than the improved varieties. The on farm trails concluded that Dolichos bean variety CO (GB) 14 can be further taken for front line demonstrations in Dharmapuri district of Tamilnadu. Similar recommendations were presented by Shanmugam *et al.* (2018) and Samant *et al.* (2015).

Table 1. Performance of the Dolichos bean varieties with respect to growth and yield parameters

Technology options	Plant height (30 DAS)	Plant height (30 DAS)	No. of branches per plant	Days to 50 % flowering	No. of racemes / plant	No. of pods per cluster	No. of pods per plant (Harvestable)	Average pod length (cm)	Average pod width (cm)	No. of seeds per pod	Pod weight (g)	Number of harvest	Yield per plant (kg)	Yield per ha (t)
Local variety	12.51	40.96	5.10	47.14	4.06	7.90	3.95	11.62	2.19	4.98	6.82	5.69	0.52	3.52
CO GB 14	15.20	49.03	6.88	44.66	4.75	8.04	6.43	13.06	2.07	5.25	8.04	7.54	1.40	6.81
Arka Sambhram	9.52	37.32	6.81	38.40	4.29	6.77	4.74	12.25	1.66	4.66	7.24	5.81	0.79	4.98
Mean	12.41	42.44	6.26	43.40	4.37	7.57	5.04	12.31	1.98	4.96	7.36	6.35	0.90	5.10
SE (\pm)	1.47	5.30	0.29	12.70	0.12	0.38	0.42	1.10	0.02	0.14	0.34	-	0.02	0.58
CD (5%)	1.77	5.45	0.79	5.20	0.52	0.90	1.14	-	0.22	-	0.80	-	0.21	1.11

Table 2: Economics of the Dolichos bean varieties under on farm trial

Technology options	Gross cost (Rs.)	Gross returns (Rs.)	Net returns (Rs.)	BCR
Local variety	50125	95470	45345	1.9
CO GB 14	50125	169320	119195	3.4
Arka Sambhram	51000	132670	81670	2.6

**Fig. 1:** Number of days taken for 50 % flowering of the Dolichos bean varieties in different locations**Fig. 4 :** Productivity of the Dolichos bean varieties in different locations**Fig. 2 :** Number of pods per cluster of the Dolichos bean varieties in different locations**Fig. 5 :** Productivity of the Dolichos bean varieties in different locations**Fig. 3 :** Yield per plant of the Dolichos bean varieties in different locations

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