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Assessment of high yielding varieties of dolichos bean (*Lablab purpureus* L.) in Gariaband district, Chhattisgarh

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Abstract
Dolichos bean is being grown in an area of about 78 ha in Gariaband district. Mostly local varieties of dolichos bean 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 38 % was recorded. To address these problems improved varieties of Doilchos bean were assessed for their performance in Gariaband district. The Farmers practice (T_1) was local variety, technology recommended practice (T_2) was Indira Sem-1 released by IGKV, Raipur and recommended practice (T_3) was Indira Sem-2 also released by IGKV, Raipur. The trials were conducted in five locations of Gariaband district farmers' field during Kharif 2021. The results of the on farm trials showed that Indira Sem-1 performed better than Indira Sem-2 and local variety. The yield of Indira Sem-1 recorded higher yield (110.34 qtl ha^{-1}) where as Indira Sem-2 recorded 103.83 qtl ha^{-1}. The Number of pod per inflorescence was higher in Indira Sem-1 (21.41) where as it was 16.94 in Indira Sem-2 and 12.44 in local variety. 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 Indira Sem-1 Indira Sem-2 and local variety. The yield parameters such as yield per plant, pod length and pod width are recorded to be better in the improved varieties than the local variety. The number of harvests was higher in Indira Sem-1 than Indira Sem-2 and local varieties. All the yield related parameters indicated that the variety Indira Sem-1 was better than Indira Sem-2 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 T_2 i.e. Indira Sem -1 and hence the net returns.

Keywords: Dolichos bean, Indira Sem-1, Indira Sem-2, on farm trial, net returns

Introduction
One of the most popular native legume vegetables is dolichos bean (Lablab purpureus), which is grown for its soft green pods. It is a perennial plant with bushy, upright, or climbing habits, yet it is planted as an annual. Its cultivation is influenced significantly by regional preferences. It is a multipurpose crop used as vegetable, pulse, fodder, green manure with medicinal and ornamental uses (Ayyangar and Nambiar, 1935) [1]. South India prefers green pods, while eastern India prefers white pods and northern India prefers green fleshy pods. It's a multi-purpose crop that can be eaten as a pulse, a vegetable, or fodder. Young immature pods are cooked and eaten like green beans. Dry seeds should be well cooked in two changes of water before eating. Dolichos beans are an excellent source of protein, minerals, and vitamins (Golani *et al*., 2007) [3]. Due to their medicinal properties, lentils are employed in both traditional and modern healthcare systems (Morris 2009) [8]. The dolichos bean has proven challenging to raise because of its low production, photosensitive nature, unpredictable growth habit, flowering habit, and consumer trends based on color, size, pod form, and aroma (Mishra *et al*., 2019) [7]. Dolichos bean is an important vegetable in Chhattisgarh. 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 78 ha in Gariaband 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 35 % 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 Doilchos bean were assessed for their performance in Gariaband district.

Materials and Methods

The on farm trials were conducted in five farmers' field in Gariaband district during kharif of 2021. The improved varieties of Indira Sem-1 and Indira Sem-2 were compared with the local variety. Indira Sem-1 is released by Indira Gandhi Krishi Vishwavidyalaya, Raipur. It is an medium, erect and high yielding variety. It matures in 5-7 month as vegetable crop. It has recorded an average yield of 12-15 t ha^{-1} of tender pods. It. Indira Sem-2 also released by Indira Gandhi Krishi Vishwavidyalaya, Raipur has high yielding variety of average duration 5-7 months, pods are greenish purple in colour, average yield of 10-12 t ha^{-1}. 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 tilth. 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 treatments. Sowing was done at a spacing of 1.5 x 1 m. Necessary top dressing, staking, irrigation and plant protection was carried out. Five plants were randomly selected to record the yield parameters with three replications in each location. The observations recorded were days to number of pod inflorescence-^{1}, pod length (cm), pod width (cm), yield kg $plant^{-1}$ and yield qtl ha^{-1}. The obtained yield data was analyzed by statistical procedure given by Gomez and Gomez, 1984. Randomized Block Design used in this trial. The economic analyses of the varieties were calculated to find out the benefit cost ratio of the respective treatments.

The economic analyses of the varieties were calculated to find out the benefit cost ratio of the respective treatments

T_1	Farmers Practice	Local verities (Deshi, Batrali Sem)
T_2	Indira Sem-1	High yielding variety of average duration 5-7 months, pods are purple coloured, yield 12-15 t ha^{-1}
T_3	Indira Sem-2	High yielding variety of average duration 5-7 months, pods are greenish purple in colour, yield 10-12 t ha^{-1}

Results and Discussion

The varieties Indira Sem-1 and Indira Sem-2 are assessed with the local varieties in five locations. The results of the on farm trials showed that Indira Sem-1 performed better than Indira Sem-2 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 Indira Sem-1 (1.72 kg $plant^{-1}$ and 110.34 qtl ha^{-1} respectively) followed by Indira Sem-2 (1.60 kg $plant^{-1}$ and 103.83 qtl ha^{-1} respectively) (Table 1). The local variety showed the lowest value for both yield per plant and hectare (1.19 kg $plant^{-1}$ and 79.58 qtl ha^{-1} respectively). The present investigation is in line with the results of Choudhry *et al*. (2016) [2]. The reports confirm that there was positive and significant correlation of green pod yield per plant with green pod yield.

The number of pods inflorescence $^{-1}$ was higher in Indira Sem-1 (21.41) and Indira Sem-2 (16.94) (Fig 1). Local variety recorded significantly low number of pods inflorescence $^{-1}$ (12.44). Pod length was not significantly different among the varieties. But the pod width was higher in local variety (2.40 cm) followed by Indira Sem-1 (2.20 cm). The pods were more slender in Indira Sem-2 (1.95 cm) than the other two compared varieties. Ravinaik *et al*. (2015) [10] had reported that the difference in yield among Dolichos genotypes may be attributed mainly to the difference in their number of pod per inflorescence, pod length, yield of pod. Similar trend was observed in the other yield attributing characters such as plant height and pod length and width.

Though the 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 Indira Sem-1. Controversial reports were found in the reports of Noorjahan *et al*. (2019) [9]. The correlation studies concluded that number of pod inflorescence^{-1}; pod length and mean pod weight have significant positive association with the marketable pod yield per plant.

Being grown predominantly with irrigation source, dolichos bean was prone to water stress during end of the season and medium duration varieties support for reducing the production losses **(**Laksmi *et al*., 2016) [6]. The productivity of the varieties in the present investigation did not relect 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 overall 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). Similar results reported by Indumathi *et al*., 2020 [5]. 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 significant difference the cost of cultivation of local variety than Indira Sem-1 and Indira Sem-2. Difference is felt in the higher productivity in Treatment 2 ie. Indira Sem-1 and hence the gross returns is higher (Rs. 165510). This reflects in the higher net returns and BC Ratio of Indira Sem-1 (Rs. 120285 and 3.65) followed by Indira Sem-2 (Rs. 110520 and 3.44). The local variety showed the lowest productivity and hence the economic returns (Rs. 78820 and 2.94) was also lesser than the improved varieties. The on farm trails concluded that Dolichos bean variety Indira Sem-1 can be further taken for front line demonstrations in Gariaband district of Chhattisgarh. Similar recommendations were presented by Shanmugam *et al*. (2018) and Samant *et al*. (2015) [11, 12].

Table 1: Performance of the Dolichos bean varieties with respect to yield parameters

Treatments	No of pod inflorescence $^{-1}$	pod length (cm)	pod width (cm)	yield per plant (kg plant^{-1})	Marketable yield (qtl ha^{-1})
Farmers Practice (T_1)	12.44	12.07	2.40	1.19	79.58
Indira Sem-1 (T_2)	21.41	14.06	2.20	1.72	110.34
Indira Sem-2 (T_3)	16.94	13.13	1.95	1.60	103.83
Mean	16.93	13.08	2.18	1.50	97.92
SE (±)	1.23	0.79	0.26	0.21	2.71
CD (5%)	4.08	1.11	0.36	0.30	9.00

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

Treatments	Total cost(Rs.)	Gross Returns (Rs.)	Net Returns (Rs.)	BC Ratio
Farmers Practice (T_1)	40550	119370	78820	2.94
Indira Sem-1 (T_2)	45225	165510	120285	3.65
Indira Sem-2 (T_3)	45225	155745	110520	3.44

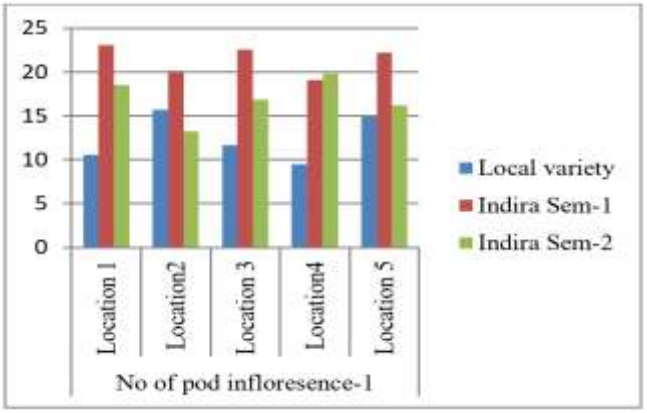

Fig 1: Number of pods inflorescence -1 of the Dolichos bean varieties in different locations

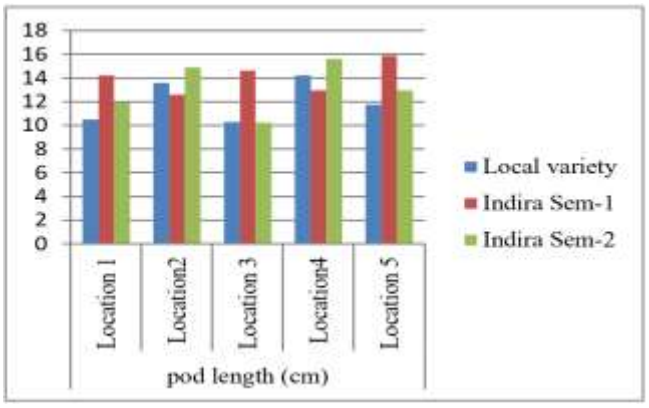

Fig 2: Pod length (cm) of the Dolichos bean varieties in different locations

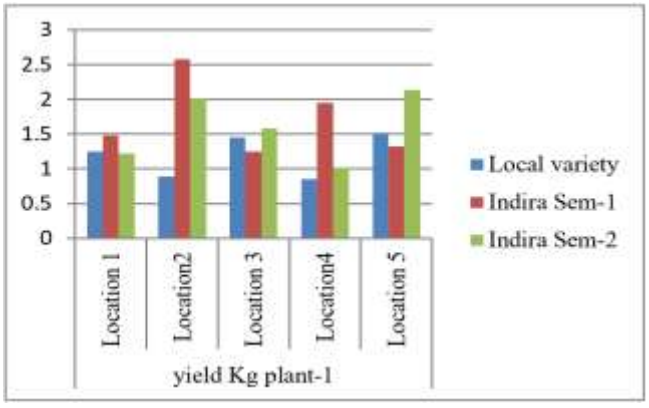

Fig 3: Yield kg plant^{-1} of the Dolichos bean varieties in different locations

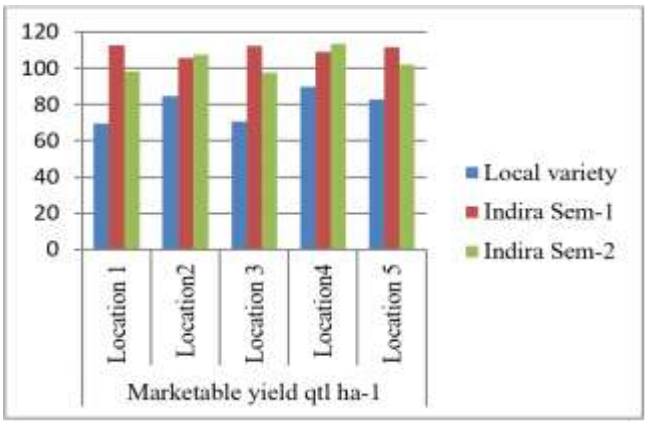

Fig 4: Marketable yield qtl ha^{-1} of the Dolichos bean varieties in different locations

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