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Impact of Management Practices on Field pea (*Pisum sativum* L.) Cultivation in Baksa district of Assam

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ABSTRACT

Field pea (*Pisum sativum* L.) is one of the highly cultivated crops in Assam due to its high profitability. Baksa district is situated at the Lower Brahmaputra valley zone of Assam, having cool and humid climatic condition and the average annual rainfall received is 2097.6 mm. The district has 115735 ha area of cultivated land where 10760 ha area is occupied under *rabi* pulses. Field Pea is one of the well grown crops in the rice fellow areas of the entire district. However, it is difficult to achieve maximum yields as the most of the farmers are not following scientific cultivation practices. Under such circumstances, Krishi Vigyan Kendra, Baksa has introduced a high yielding variety of field pea Aman through demonstration programmes during the year 2019-2020 and 2020-21at different locations in the district. The productivity and economic returns under improved technologies were calculated and compared with the prevailing farmers' practice. Results revealed that Aman variety under improved practices recorded higher yield of 37.80 and 33.92 per cent during 2019-20 and 2020-21 and the recommended practice gave higher net returns of Rs 26500 and 28300 per ha with B:C ratio of 1.81:1and 1.82:1, respectively as compared to farmers' practice.

Key Words: Lower Brahmaputra valley zone, Rabi pulse, Baksa, HYV, Aman

INTRODUCTION

Field Pea (*Pisum sativum* L.) is a very reach food for human as well as livestock because it contains approximately 23 to 35 percent protein. Moreover, some important minerals such as calcium, phosphorus and iron are present in abundant quantities which are lacking in cereals (Haque *et al,* 2015). Peas contain high levels of carbohydrates, are low in fiber and contain 86 to 87 percent total digestible nutrients, which makes them an excellent livestock feed. Legumes are critical in organic systems, as they fix and efficiently use their own N, and supply it back to the soil from biomass after harvest at a rate of 40 million tons per year (Udvardi and Poole, 2013). Field pea can be grownin a wide range of soil types with sandy loam to heavy clays but it could not tolerate in water logged soil conditions and required good drainage facilities with optimum soil pH is 5.5-6.5.

Baksa is one of the districts situated at the lower Brahmaputra valley zone of Assam. The district shares its boarder to hill steps of Bhutan and thereby, it receives ampoule of rainfall throughout the year. Thus, the entire district is highly suitable for cultivation of horticultural as well as field crops also. The field pea has been widely cultivated in the district covering the rice fellow areas and the crop covers an area of 850 ha with an average productivity of 855 kg/ha in Baksa district. The average annual rainfall of the district is 2097 mm with a temperature range of 10-35 °C.

Pulses are important and excellent crops for natural resource management, environment security, crop diversification and consequently for viable agriculture (Kumer *et al,* 2013). The scientific cultivation practices of pea crop like proper time of sowing, proper irrigation facilities, weeding, appropriate plant protection, manuring and fertilization *etc.* has become an integral part in increasing the productivity. The crop is cultivated

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Table 1: Package of practices followed during the demonstration in both the plots.

Particular	Technology Demonstration plot	Farmers' practice
Variety	Aman	Local variety (Farmer's own source)
Time of Sowing	Mid October-Mid November	Mid November- Mid December
Seed rate	70 Kg/ha	90 kg/ha
Method of sowing	Broadcasting	Broadcasting
Seed treatment	*Rhizobium* culture @ 50g/kg seed, Bavistin @ 2g/kg seed.	Not practiced
Fertilizer dose	20-46-0/ha (N-P_2O_5-K_2O)	Indiscriminate application
Irrigations	Need based irrigation provided	Rainfed
Plant protection	Integrated pest management	Indiscriminate use of pesticide

widely in the district without following the scientific cultivation practices and improved varieties. Therefore, Krishi Vigyan Kendra, Baksa conducted demonstrations on field Pea using the HYV Aman with an aim to increasing the production as well as productivity during the year 2019-2020 and 2020-21at different locations in the district.

MATERIALS AND METHODS

Krishi Vigyan Kendra, Baksa conducted demonstrations to spread the technology of scientific cultivation practices of field pea var. Aman to the farmers of Baksa district. The demonstrations were conducted in farmer's field as cluster mode during the period 2019-20 and 2020-21 covering an area of 8 ha and 10 ha involving 15 and 35 numbers of farmers, respectively. The villages selected for the demonstration were Bunbari, Khatpara, Barimakha, Nizdafeli, Dwarkuchi, Bhulukamuri and Santipur. The demonstrations were started in the month of mid October to mid November after harvesting of rice. Under the technology demonstration plot, the land selected was with deeply worked soils and ploughed 2-3 times to obtain a good tilth. The package of practices followed in the demonstration plots and the plot under farmers' practice are depicted in the Table 1. The parameters like plant height, pod length, number of pods per plant, number of seeds per pod, grain yield, gross return, net return and B:C ratio were duly recorded. The technology gap, extension gap and technology index were calculated by using the following formula as given below (Samui *et al,* 2000).

RESULTS AND DISCUSSION

After 125 days of sowing the crop was almost ready for harvesting. The data (Table 1) revealed that the plant height in both the year was found higher in the improved practice (116.5 cm) than the farmers' practice (95.5 cm). This may be due to the favorable climatic and soil status prevailing in this district. The result was in conformity with Dixit *et al* (2014). The result showed that the variety Aman produced the maximum number of pods/plant (14.20 pods) as compared to local check (11.55 pods). Singh *et al* (2018) also found the same result. Togay *et al* (2008) showed that the number of pods per plant had the highest moderate indirect positive effects on seed yield. The branches per plant were also higher in case of Aman variety (13.3) as compared to farmer's practice (11.8). The increasing number of branches in case of technology may be due to the adequate utilization of nutrients. The variation has been found in case of pod length. Aman has found higher length (8.0 cm) as compared to local check (6.47 cm). The demonstrated variety was ready for harvest after 125 days of sowing but the local variety was taken more than 135 days to mature the grain. These results were in conformity with findings of Singha *et al* (2020) that the average grain yield of field pea (var. Aman) under technology was 12.07q/ha as

Table 2. Yield and yield contributing factors under improved and farmers' practice in Pea.

Sr. No.	Parameter	Improved practice	Farmer's practice
A.	**Plant height (cm)**		
	2019-20	152	135
	2020-21	158	140
	Mean	155	137
B.	**Number of pods/plant**		
	2019-20	13.2	11.4
	2020-21	15.1	11.7
	Mean	14.2	11.5
C.	**Pod length (cm)**		
	2019-20	7.9	6.4
	2020-21	8.0	6.5
	Mean	8.0	6.4
D.	**Pod weight (g)**		
	2019-20	3.6	3.0
	2020-21	3.8	3.1
	Mean	3.7	3.0
E.	**Number of seeds/pod**		
	2019-20	7.3	6.0
	2020-21	7.5	6.2
	Mean	7.4	6.1
F.	**Grain yield (q/ha)**		
	2019-20	11.9	8.6
	2020-21	12.2	8.9
	Mean	12.0	8.8

compared to 8.81 q/ha under farmers' practice. The Aman variety was comparatively resistance against powdery mildew as compared to local check. This was in agreement with results reported by Dixit *et al* (2014).

Yield parameters

It was evident that the scientific cultivation practices had higher number of pods per plant (14.2) in comparison to the farmers' practice (11.5). From the earlier discussions it can be understood that maximum growth was found in the scientific cultivation practices than the farmers practice during the crop establishment period and this might be the reason of higher number of pods in the former one (Muehlbauer and McPhee, 1997). Pertaining to the pod length, it has been observed that there was not much difference between the two cultivation methods. However, the pod length was slightly found higher in case of improved practice (8.0) than the practice followed by the farmers (6.4). A similar observation was also reported by Wasseem *et al* (2008), who stated that the application of balance nutrients promotes vigorous growth of the plant which ultimately increases the size of pod as well as seed. Khichi *et al* (2017) reported that, this

Table 3: Economics of field pea variety Aman under scientific cultivation practices and Farmer's practices.

Treatment	Gross cost (Rs.)		Gross return (Rs.)		Net return (Rs.)		B:C ratio		B : C ratio
	2019-20	**2020-21**	**2019-20**	**2020-21**	**2019-20**	**2020-21**	**2019-20**	**2020-21**	**Mean**
Improved practice	32400	34100	58900	62400	26500	28300	1.81	1.82	1.82
Farmers' practice	28500	29500	41200	43500	12700	14000	1.44	1.47	1.46

might be due to the reason that the cultivars possess certain inherent potential and their interaction with soil and climatic conditions. Similarly, seed per pod was also found to follow the same trend in both the cultivation practices with higher in demonstration or improved practice (7.4) and lesser in check plot (6.1). It might be due to the varietal characteristics used in both the practices. Cousin (1997) stated that number of seeds per pod depends partially on the cultivar and on the environmental conditions but has also been documented to be affected by plant density. After harvesting of the crop, there is a huge difference observed in case of grain yield per hectare in both the cultivation practices. The higher yield was found in case of the demonstration plot (12.0 q/ha) as compared to the farmers' practice (8.0 q/ha). The results were in conformity with the results reported by Singha *et al* (2020). It might be because of better uptake and assimilation of available nutrients by the plants during the entire growth period therefore, meeting the demand of the crop for development and yield of field pea crop (Kumar *et al,* 2009 ;Valenciano *et al* 2010). Further, this might have resulted due to the greater number of branches per plant with higher numbers of pods per plant and inherent characters of the varieties which is prevailed favorable conditions of the locality. Additionally, enhanced yielding ability might also be due to its genetic potential and better adaptability to the soil and climatic conditions (Khichi *et al,* 2016).

The higher gross return was achieved under the scientific cultivation practices than the farmers' plot (Table 3). In addition to this, net return was also following the same with an average B: C ratio of 1.82 and 1.46 respectively under improved and farmer's practice.

Gap analysis

The perusal of the data (Table 4) revealed that the technology gap was lesser in both the years (10.08 q/ha and 9.78 q/ha) which reflects the devotion and hard work of the farmers of the locality in carrying out this demonstration. Probably, this gap might have occurred due to the varying soil fertility along with soil nutrient status and weather conditions. Extension gap was found to be similar in both the years (3.27 q/ha and 3.26 q/ha). An extension gap of 3.27 q/ha and 3.26 q/ha has been created which depicts that more extension methodologies need to be adopted for obtaining encouraging results of the technologies by the farmers. Technology gap exhibits the feasibility of the technology in the farmers' field conditions. It has been found that the demonstration plot has a technology index of 45.81 per cent in 2019-20 and 44.45 per cent in 2020-21 which thus explains the easy acceptability of the technology because lower the value of technology index, more the feasibility of the technology (Jeengar *et al,* 2006). Likewise, this emphasized the need of KVKs to educate the farmers more particularly those non-beneficiaries through various extension means for the adoption of scientific practices in cultivation of all the pulse crops (Singha *et al,* 2020).

Table 4. Technology gap, extension gap and technology index.

Year	Area (ha)	No. of farmers	% Increase over FP	Tech. Gap (q/ha)	Ext. gap (q/ha)	Tech. Index (%)	Pod yield (q/ha)	
							Demon.	Farmers' practice
2019-20	08	30	37.80	10.08	3.27	45.81	11.92	8.65
2020-21	10	35	33.92	9.78	3.26	44.45	12.22	8.96

CONCLUSION

The productivity gain under demonstration programme over existing practices of field pea cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of field pea in the district. This variety of field pea (*Aman*) gained a momentum in upscaling the field pea productivity, which created a positive impact on farming community.

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