

RESEARCH NOTE

Performance and Preference of Broccoli Varieties Grown under Low Hill Conditions of Himachal Pradesh

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ABSTRACT

The present investigation was conducted at Krishi Vigyan Kendra Bilaspur as well as at the farmers' fields in district Bilaspur during rabi seasons of 2007-08 and 2008-09. Fifty six demonstrations were conducted on four different broccoli varieties having different coloured heads (i.e. Palam Samridhi (green head), Palam Kanchan (yellowish green head), Palam Vichitra (purple head) and Palam Haritika (green head) for their performance and also their preference in the markets (mandis). The broccoli varieties Palam Vichitra yielded the highest (210.7 q/ha) followed by Palam Kanchan (206.9 q/ha). An average weight of terminal head of Palam Kanchan was the highest i.e. 357.5 g, whereas, Palam Samridhi produced the earliest head under low hill conditions of Himachal Pradesh. As far as preference of head colour is concerned, only green head varieties were preferred in the local market, whereas, green and purple coloured varieties were preferred in larger mandis' of cities like New Delhi, Shimla, Chandigarh etc. There is least preference for yellow coloured broccoli varieties in the market. Green and purple coloured varieties were preferred in larger mandis' of cities like New Delhi, Shimla, Chandigarh etc.

Key words: Broccoli head colours; Performance; Market preference; Technology gap; Technology index;

Broccoli (*Brassica oleracea* var. *italica*) is a member of the *Brassicaceae* family and its wild form is found along the mediterranean region. It is a very delicious, nutritious and exotic vegetable grown and is preferred by cardiac patients. It can be easily distinguished from cauliflower by having a head composed of differentiated flower bud rather than curd. Its edible portion consists of immature, fully-differentiated flower buds and tender portions of the upper stem. The highly branched primary inflorescence forms at the terminus of the elongated unbranched stem. The floral buds at the terminus of each branch of inflorescence collectively produce a compact and somewhat hemispherical head. After the completion of the growth of primary inflorescence or its harvest, small secondary inflorescences develop in the axils of lower leaves (Kohli *et al.* 2006).

Broccoli is rich in vitamin A, containing about 2500 IU in a 100 g edible portion. In addition, it also contains 103 mg calcium, 78 mg phosphorous, 382 mg potassium and 113 mg vitamin C. It is also rich in sulphoraphane which is known to have anti-cancer properties.

Being a cool season crop, it requires 15-20°C optimum temperature for head production. Temperature above 25°C is not conducive for its growth and can cause loosening and bolting of heads. It prefers a well-drained, sandy loam soil with optimum pH of 5.5 to 6.8 (Kohli *et al.*, 2006). Keeping in mind its nutritive value, different head colours and to promote its cultivation in low hills of Himachal Pradesh, it was demonstrated at Krishi Vigyan Kendra farm as well as in farmers' field in Bilaspur district of Himachal Pradesh.

METHODOLOGY

In total, fifty six demonstrations were conducted in the demonstration farm of Krishi Vigyan Kendra Bilaspur, Himachal Pradesh as well as in farmers' fields during rabi season of 2007-08 and 2008-09. The elevation of the experimental site at KVK is 644 m msl, 31°24'46.2" N latitude and 76°38'59.2" E Longitude. The investigation consisted of four coloured broccoli varieties developed by the Department of Vegetable Science and Floriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur having different coloured

head namely, Palam Samridhi (green head), Palam Kanchan (yellowish green head), Palam Vichitra (purple head) and Palam Haritika (green head) (Anon., 2008). The recommended package of practices of Palampur were adopted to raise a healthy crop. The observations were recorded on all the four varieties in Krishi Vigyan Kendra farm as well as in farmers' field on average plant height, terminal head weight, days taken for marketable head formation and marketable head yield and value reported are averages of ten observations each. The estimation of technology gap, extension gap and technology index was done using following formula (Kadian et al., 1997 and Samui et al., 2000).

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmer's yield

$$\text{Technology Index} = \frac{(P_i - D_i)}{P_i} \times 100$$

Where,

P_i = Potential yield of ith crop

D_i = Demonstration yield of ith crop

RESULTS AND DISCUSSION

Yield and yield attributes: It was observed from the Table 1 that the mean plant height was the highest in Palam Samridhi (58.4 cm) followed by Palam Kanchan (56.5 cm), whereas, terminal head weight was maximum in Palam Kanchan (357.5 g) followed by Palam Samridhi (342 g) as also reported earlier by Meena and Paliwal (2003). The minimum days taken after transplanting for marketable head formation by Palam Samridhi (103 days) followed by Palam Vichitra (110 days), whereas, maximum days were taken by Palam Kanchan (124 days). The highest marketable head yield in demonstration as well as in farmer practice was recorded in Palam Vichitra (210.7 and 166.2 q/ha) followed by Palam Kanchan (206.9 and 164.5 q/ha), respectively, under low hill conditions of Himachal Pradesh. Overall head yield was low due to scarcity of

water at critical stages of crop growth and less plant stand at some locations.

Table 1. Performance of broccoli varieties under low hill conditions of Himachal Pradesh (Mean)

Variety	Days (No.)	Demo. Head yield (q/ha)	FP* yield (q/ha)
Palam Kanchan	123.5	206.9	164.5
Palam Samridhi	102.5	195.6	157.8
Palam Vichitra	110.0	210.7	166.2
Palam Haritika	123.0	197.7	160.9

*Farmers' practice

Technology gap, extension gap and technology index: It was revealed from Table 2 that the percent increase in yield of demonstration plot over farmers' practice was the highest (25.8%) in Palam Kanchan followed by Palam Samridhi (24.0%) and the lowest in Palam Vichitra (19.6%). The technology gap was the highest in Palam Kanchan (18.1 q/ha) followed by Palam Vichitra (14.3 q/ha) and this may be due to scarcity of irrigation water during critical stages of crop growth and less plant stand. Being a new crop and, therefore, lack of awareness about its package of practices among most of the farmers justifies the extension gap range between demonstration and farmer practice from 36.8 to 44.5 q/ha.

Market preference: As far as broccoli head preference is concerned, green coloured immature fully differentiated flower buds are preferred in the local market (mandis) of low hill of Himachal Pradesh (80 to 85%), whereas, in metropolitan cities like Chandigarh, Shimla, Delhi etc., purple as well as green coloured head composed of immature differentiated flower buds are generally preferred (70 to 75%) and fetch better prices. There was least preference to yellowish head varieties in both the market places (Table 3).

Table 2. Per cent increase in broccoli yield over farmers practice, estimation of technology index, technology and extension gap

Variety	Head yield (q/ha)			% increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
	Potential	Demo.	FP				
Palam Kanchan	225	206.9	164.5	25.8	18.1	42.4	8.04
Palam Samridhi	200	195.6	157.8	24.0	4.4	37.8	2.20
Palam Vichitra	225	210.7	166.2	19.6	14.3	44.5	6.35
Palam Haritika	200	197.7	160.9	22.9	2.3	36.8	1.15

Table 3. Broccoli head colour preference in the local and distant markets (mandis) (%)*

Variety	Local market	Distant Market
Palam Kanchan	40	45
Palam Samridhi	85	75
Palam Vichitra	32	70
Palam Haritika	80	75

*Data based on survey from 42 consumers/retailers/traders.

CONCLUSION

Broccoli being a new crop for farmers of low hill conditions of Himachal Pradesh, it has the potential to

replace/supplement cauliflower due to its better nutritive character and market price, especially in mandis located in cities. The extension and technology gap are no doubt higher today but can be reduced by creating awareness. On per unit weight basis, the edible dry matter content in broccoli is higher than cauliflower which is beneficial from consumers' point of view. Keeping in mind the above, Palam Vichitra, Palam Haritika and Palam Samridhi has higher potential than Palam Kanchan.

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