

Performance of Vegetable Type Cactus under Indian Conditions

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ABSTRACT

The study was undertaken to find out the growth performance, cladode's yield and quality in vegetable type cactus (*Opuntia ficus indica* Mill.) under agro-climatic conditions of Agra. The variety-1308 was better in respect of size of cladodes, edible cladode's yield and quality of vegetable than the Nopalea type. The harvesting of cladodes for vegetable purpose was found to be suitable at 30 to 40 days after sprouting in both the seasons of planting.

INTRODUCTION

Cactus pear (*Opuntia ficus indica* (L.) Mill.) is an important crop of semi-arid and arid regions of the world. Cladodes are spineless, succulent, mucilagenous and erect growing in nature. Cactus stems or cladodes are also known as 'nopalitos'. *Opuntia* is a CAM (Crassulacean Acid Metabolism) plant which thrives well under water scarce and drought conditions. However, it is susceptible to very low temperature. The maximum area of its cultivation as "National Crop" is in Mexico where it has been utilized since ancient times (Pimienta, 1993). It is being grown for green vegetable for human consumption, nutritious fodder for milch animals besides other industrial uses in several countries (Mizrahi *et al.*, 1997; Singh and Felker, 1998). The nutritive value of cactus stems i.e. nopalitos is similar to that of leafy vegetables viz. spinach, lettuce etc. (Cantwell, 1995; Flores, 1995). Young, tender cladodes after removing spines and edges are used as vegetable, salad and preparation of many other cooked dishes (Rodriguez-Felix and Villegas-Ochoa, 1998). Consumption of nopalitos can reduce the blood sugar levels in diabetes (Hegwood, 1992) and it also reduces fats and cholesterol (Fratj *et al.*, 1983). Looking to its vast potential in dry land areas, the crop was introduced from Texas (USA) to India a few years back. The information on growth behaviour, production and utility of vegetable cactus type is limited in the literature. The scarcity of green vegetables in semi arid and arid regions often poses the problem either to introduce a new crop or to select an alternative food to fulfill the requirements.

MATERIAL AND METHODS

The present study was carried out in two seasons i.e. spring (Feb.-March) and monsoon (Sept.-Oct.) at Bichpuri, Agra (U.P.) during 1998 and 1999. The soil of experimental site was sandy loam and fair in nutrition. For the comparative study, two exotic vegetable type cactus were planted upright in flat bed in both the seasons. The cladodes i.e. planting material were procured from C.S.S.R.I., Karnal and C.I.A.H., Bikaner where these clones have been introduced from Texas (USA) and Israel. Four plants in six rows were planted at 3m x 1m for the vegetative growth study. At planting, the cladodes were treated with Bavistin (0.2%) for 5 minutes to check rotting in cladodes. The normal cultural practices viz. hoeing, irrigation, weeding, etc. were performed as and when required during the course of study.

Observation on sprouting, days taken for first harvesting of cladodes, size and yield of edible cladodes per plant were recorded. Further, another study on vegetable quality was conducted to find out its

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acceptability as well as taste among users. Young cladodes were harvested at 30, 40, 50 and 60 days after sprouting for preparation of vegetable. After removal of glochids and trimming of edges, the cladodes were washed and chopped into small pieces and boiled for 5 minutes. Thereafter, vegetable was cooked with spices, etc. as usual to normal green vegetable preparation of Indian taste. To standardize the harvesting of cladode for culinary purpose in this new crop, vegetable prepared from cladodes were tasted at four different stages for different characters viz. appearance, texture, taste, acceptability and flavour on the basis of score/marks (out of 10 maximum marks for each character) given by taste board.

RESULTS AND DISCUSSION

Data on sprouting, days taken to first harvest, size of cladode and yield of edible cladode (kg/plant) of vegetable type cactus were recorded. The pooled data are given in Table 1.

Table 1. Growth and yield performance of vegetable type cactus

Cactus types	Spring season					Monsoon season				
	Av. days to sprout	Av. days to first harvest	Size of cladodes (cm)		Edible cladodes yield (kg/plant)	Av. days to sprout	Av. days to first harvest	Size of cladodes (cm)		Edible cladode yield (kg/plant)
			Length	Width				Length	Width	
Var. 1308	23.6	86.67	13.66	6.84	0.556	53.3	94.00	13.05	5.80	0.430
Nopalea spp.	26.0	84.16	13.15	7.04	0.495	51.6	95.66	12.55	6.16	0.384

There was no difference in days taken to sprout in both the vegetable types. However, cladode planted spring season took less period as compared to monsoon season. Early sprouting during spring might be due to favourable climatic conditions of planting, besides activity of areoles which are solely responsible for sprouting and growth of cladodes. Felker *et al.* (1997) have reported that vegetable type sprouted earlier than fruiting type and took about 57 days to sprout under semi arid conditions of Karnataka, India. There was not much variation in days taken to first harvest in both the types for vegetable use. However, the harvestable maturity of cladodes was slightly earlier in spring planting as compared with monsoon. Early maturity of harvestable cladodes may possibly be due to season of planting.

The size of cladode at harvest was slightly higher in variety 1308 than Nopalea during both the seasons. However, length of cladodes did not differ but the width of cladode was comparatively wider in Nopalea type than variety 1308. The pattern of increment in size of cladode in both the types was more or less similar. This may possibly be due to inherent genetic characters of the genotypes. The data on yield of edible cladodes clearly indicated that the variety 1308 was superior to Nopalea type. However, more number of edible cladodes were harvested from spring planted crop within a span of six months than monsoon season. An average 80-90 t ha⁻¹ fresh green cladodes are harvested from full grown orchard (Flores, 1995; Singh and Felker, 1998), however, productivity varies on the age of plantations, plant density and agro climatic conditions (Rodriguez-Felix and Villegas-Ochoa, 1998). Though, the maximum vegetable (nopalea) yield could be obtained after establishment by adopting better management practices. The study reveals that low cladodes yield per plant might be due to young stage of plantations.

Quality test of vegetable prepared from cladodes (Nopalitos)

The average data on quality test of vegetable is based on ranking of 10 members of taste board who tasted the cooked vegetable at different stages of harvesting of cladodes (Table 2). The vegetable quality test for vegetable type cactus was conducted to standardise the harvesting period of cladodes for vegetable use. The data revealed that the mean score value was maximum (7.50) at 40 DAS followed by

7.12 in spring and 7.16 at 40 DAS in monsoon and 6.70 at 30 DAS during monsoon season in variety 1308. The score for cooked vegetable at 60 DAS was comparatively poor than 30 and 40 DAS stage of harvest in both the types. It indicated that the taste of cactus vegetable was liked by maximum tasters at 40 DAS stage of harvest. The finding of this study, in general revealed that the harvesting of cladodes for vegetable purpose at 30 to 40 days after sprouting was more suitable under Agra, India conditions. Many workers from abroad expressed more or less similar views regarding harvesting of cladodes i.e. nopalitos for vegetable purpose (Pimienta, 1993; Cantwell, 1995; Flores, 1995). It is interesting to note here that a large number of tasters pointed out that the cooked vegetable of cactus cladodes resembled more with vegetable of okra, aloe and beans. Felker *et al.* (1997) have also reported the similar views regarding mouth taste of vegetable prepared from cactus stems or cladodes.

Table 2. Quality test of vegetable prepared from cladodes harvested at different intervals

Characters	DAS	Spring season				Monsoon season			
		30	40	50	60	30	40	50	60
Var. 1308									
Appearance		7.6	7.3	7.0	7.6	6.6	7.6	7.4	8.0
Texture		5.7	6.8	6.5	5.5	6.0	6.0	6.2	5.0
Taste		8.1	8.0	7.0	7.2	8.1	8.0	7.0	7.2
Acceptability		7.7	8.2	7.8	5.7	6.0	8.0	7.6	6.6
Flavour		6.5	7.0	4.0	5.0	6.8	6.2	4.4	4.8
Mean		7.12	7.5	6.46	6.20	6.7	7.16	6.52	6.32
Nopalea spp.									
Appearance		7.5	7.4	6.8	7.5	6.5	7.4	7.0	7.0
Texture		5.8	6.7	6.5	5.4	5.1	6.2	6.8	5.0
Taste		8.2	8.2	7.3	7.0	8.0	7.8	6.8	7.0
Acceptability		7.6	8.1	7.5	5.5	6.2	8.0	7.4	6.0
Flavour		6.3	7.0	4.5	5.2	6.7	6.5	4.3	4.5
Mean		7.0	7.48	6.52	6.12	6.5	7.18	6.46	5.90

DAS = Days after sprouting

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