

Performance of bittergourd raised through transplanting of polyhouse grown seedlings and direct seeding done on different dates

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Abstract

The investigation was carried out to compare the performance of transplanting of polyhouse grown seedlings of bittergourd with direct seeding done on 5 common dates *i.e.*, January 15, 29, February 12, 26 and March 12. The seeds directly sown in the field on January 15 and 29 failed to germinate due to prevailing low temperature. Among all the dates of transplanting/direct seeding, January 29 transplanting proved to be superior for many characters *viz.*, diameter of main shoots (1.74 cm), position of first pistillate flower (6.78), number of female flowers/plant upto 15th node (5.00), male/ female sex ratio (15.38), number (75.00) and weight of fruits/plant (3825 g), average per fruit weight (48.97 g) and yield per hectare (340 q/ha).

Key words: *Momordica charantia* L., bittergourd, direct seeding, transplanting, polyhouse

Introduction

In north Indian plains, for summer crop the seeds of cucurbits including bittergourd are normally sown in the month of February-March. But in riverbeds, the farmers sow the seeds in November-December to get an early crop. However, seed germination and rearing of plants in early growth stage is a difficult task faced by the riverbed cultivators. The problem could be eased if the seeds are sown in small polybags and seedlings are protected against low temperature by rearing them inside a low cost polyhouse. The seedlings thus produced, if transplanted in field in early spring may fetch bonus price to the farmers due to early cropping (Sirohi and Behera, 2000 and Srivastava, 2001). There is also considerable saving in seed quantity, nearly 50 to 60 per cent, in transplanting method as compared to *in situ* method (Seshadri, 1986). However, so far no systematic study has been done anywhere on the comparative performance of direct seeded and transplanted bittergourd crops and also it is not known which is ideal time for transplanting or direct seeding, hence the present study was undertaken.

Materials and methods

The experiment was conducted during spring-summer season of 2000 at Vegetable Research Centre, Patharchatta of G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar (Uttarakhand) with the bittergourd variety Jaunpuri Local. The trial was laid out in randomized block design with three replications having each bed of 3.00 x 3.75 m size. The treatments consisted of two methods of crop raising *i.e.*, direct seeding and transplanting with five common dates of transplanting and direct seeding *i.e.*, January 15, 29, February 12, 26 and March 12. However, due to failure of seeds to germinate in two early direct field sowings, the statistical analysis was done in simple randomized block design evaluating eight treatments. For

transplanting of seedlings on respective dates, the seeds were sown in polyethylene bags (1/2 kg capacity) 5 weeks in advance in a low cost polyhouse. Polyethylene bags were filled with a mixture of FYM and soil treated with 0.2% Thiram + 0.1 % Bavistin @ 2 g/ kg of potting mixture. Prior to sowing, the seeds were soaked in water for 24 hours. Three seeds were sown in each bag, which were covered with straw mulch till the start of germination. One day prior to transplanting seedlings were kept outside the polyhouse so that the plants could get hardened. The transplanting was done in hills made on the slope of ridges at the spacing of 150 x 75 cm. A basal dose of FYM @ 1/2 kg along with 8 g urea, 14.5 diammonium phosphate and 11.5 g muriate of potash was applied in each hill. Later 8 g urea was top dressed in each hill twice at monthly interval.

For direct seeding also, the seeds were first soaked in water for 24 hours and then sowing was done @ 4 seeds in each hill made on the slope of ridges at the same spacing. Later on, one healthy plant per hill was maintained in both transplanting and direct seeding methods. All the cultural operations were similar in all the treatments. Data were recorded on growth, sex expression, maturity, yield and its attributes.

Results and discussion

The seeds sown directly in open field on January 15 and 29 failed to germinate, hence no plant was available for recording observation. In remaining dates of sowing it took 15.0 to 19.3 days for seed germination. The failure of seed germination in above treatments occurred due to the prevailing low temperature. During the period from January 15 to February 25 the maximum temperature ranged between 19.5 to 28.3°C and the minimum between 7.1 to 5.8°C whereas the germination of bittergourd is reported to be optimum at temperature between 25°C and 35°C (Huyskens *et al.*, 1992).

Table 1. Effect of date of transplanting/ direct seeding on vegetative growth, maturity and yield in bittergourd

Date of sowing	Main shoot length (cm)		Diameter of main shoot (cm)	No. of primary branches/plant	Internodal length (cm) upto 15th node	Days to first harvest	No. of fruits/plant	Average fruit weight (g)	Yield/plant (g)	Fruit yield (q/ha)
	30 days	60 days								
Transplanting										
Jan., 15	13.13	38.05	1.89	9.50	4.38	108.00	67.00	48.59	3750	333.33
Jan., 29	13.33	45.33	1.74	9.67	4.64	94.00	75.00	48.97	3825	340.00
Feb., 12	33.89	107.43	1.58	10.56	4.75	65.00	52.00	50.03	2629	233.37
Feb., 26	47.00	111.50	1.50	11.17	5.08	59.00	37.61	56.28	1756	156.11
Mar., 12	57.22	120.67	1.40	11.83	5.29	58.30	31.50	42.53	1549	137.65
Direct seeding										
Jan., 15	-	-	-	-	-	-	-	-	-	-
Jan., 29	-	-	-	-	-	-	-	-	-	-
Feb., 12	4.44	40.67	1.45	9.06	4.58	92.30	27.38	41.62	1443	128.30
Feb., 26	6.22	64.58	1.36	9.67	4.75	78.30	26.06	49.94	1285	114.20
Mar., 12	10.78	71.94	1.12	11.22	4.83	67.70	13.46	47.95	646	57.44
SEm±	5.22	3.83	0.12	0.56	0.16	6.50	4.65	2.45	156	12.04
C.D. (p=0.05)	15.82	11.62	0.37	1.71	0.49	19.80	14.11	7.42	472	36.53

Table 2. Effect of date of transplanting/ direct seeding on sex expression of bittergourd

Date of sowing	Days to appearance of first male flower	Days to appearance of first female flower	Position of first male flower	Position of first female flower	No. of male flowers/plant upto 15th node	No. of female flowers/plant upto 15th node	Sex ratio (male/female) upto 15th node
Transplanting							
Jan., 15	69.6	85.0	7.33	8.33	69.75	5.50	12.76
Jan., 29	61.0	74.0	6.44	6.78	74.67	5.00	15.38
Feb., 12	36.9	48.2	6.00	7.33	81.33	4.52	17.66
Feb., 26	34.8	43.0	5.67	9.00	100.35	4.25	23.60
Mar., 12	35.6	45.0	5.22	10.78	111.87	3.45	32.63
Direct seeding							
Jan., 15	-	-	-	-	-	-	-
Jan., 29	-	-	-	-	-	-	-
Feb., 12	68.5	79.5	13.33	13.50	65.33	3.67	19.76
Feb., 26	61.5	67.5	10.50	13.00	80.00	3.57	22.59
Mar., 12	49.8	54.3	7.40	15.67	95.33	3.53	27.43
SEm±	3.9	5.0	0.65	0.64	5.68	0.33	1.39
C.D. (p=0.05)	12.0	15.1	1.97	1.94	17.22	1.01	4.21

The main shoot length at both 30 and 60 days stages was found maximum in March 12 transplanting which differed significantly from all the treatments except February 26 transplanting. The shoot length was much less in the plants from direct seeding compared to the transplanted ones in the corresponding dates. As the dates of direct seeding/ transplanting were advanced there was gradual decline in the main shoot length (Table 1). Similar findings were also reported by Nandpuri and Sahota (1970) that the transplanted plants produced more lengthy vines than direct sowing. Maximum growth observed in March 12 transplanting may be due to the fact that the plants of this treatment had already attained reasonable growth at transplanting and got early settled bearing minimum transplanting shock due to the prevailing most favourable atmospheric temperature.

Contrary to the above trends, the diameter of main shoot was found maximum with January 15 transplanting which declined with each delayed date of transplanting or direct seeding. The

possible reason may be that although at low temperature the increase in shoot length was slow but it was accompanied with an increase in the girth. On the other hand, the number of branches arising from the main shoot and also the internodal length were found maximum in March 12 transplanting which declined with advancement in dates of transplanting or direct seeding. It appears that faster growth resulting into longer main shoot was accompanied by larger internodal length and also accommodated more number of branches on the vine.

The earliest appearance of male as well as female flowers occurred in February 26 transplanting which was closely followed by March 12 and February 12 transplanting. The direct seeding always resulted in delayed flower appearance compared to the transplanting in any contemporary date (Table 2). Generally first pistillate flower appeared 5-15 days after the emergence of staminate flower. The January 29 transplanting resulted in lowest female flower position, whereas the lowest

male flower position was found in March 12 transplanting. The flowers of both the sexes appeared at the lower node in all the transplantings compared to the direct seeding treatments. Early appearance of flowers at the lower nodal position in February 12 and onward transplanting possibly occurred because of the prevailing favourable mild temperature to which plants were exposed. The maximum number of female flowers and comparatively lesser number of male flowers were observed in January 15 transplanting, hence it exhibited narrowest male to female sex ratio. However, the January 29 transplanting showed parity with it.

The days to first harvest, as indicated in Table 1, were minimum in March 12 transplanting, which was at par with February 26 and February 12 transplanting and March 12 direct seeding. This trend was obviously because of the early flowering displayed by the above treatments. These findings are in accordance with those reported by Nandpuri and Sahota (1970) in muskmelon and Olson (1991) in watermelon that transplanted plants had more earliness than directly sown ones. The number of fruits/plant and the yield were highly influenced by different dates of transplanting/ direct seeding. January 29 transplanting proved to be the most superior and direct seeding on March 12 proved to be the most inferior for both characters. The superiority of January 29 transplanting in giving highest yield was mainly because of the production of larger number of female flowers, lower male to female sex ratio, starting of fruiting from lower node and larger number and weight of fruits per plant. The significant superiority of transplanting over direct seeding corroborate the earlier findings of Brown et al. (1996) and Nandpuri and Sahota (1970) who reported that transplanted plants gave much higher yield compared to the directly sown plants in a number of cucurbits viz., watermelon, muskmelon,

cucumber and squash. The average fruit weight was found maximum in February 26 transplanting, which being at par with January 29 and February 12 transplanting and February 26 direct seeding proved significantly higher than any other dates of transplanting/ direct seeding.

The study revealed that transplanting of bittergourd on 29 January had favourable effect on diameter of main shoot, position of pistillate flower, number of female flowers/plant upto 15th node, number and weight of fruits/plant.

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