Plant Archives Vol. 14 No. 2, 2014 pp. 819-822 *ISSN 0972-5210*

EFFECT OF METHODS OF RAISING SEEDLINGS ON GROWTH AND SEED YIELD OF CHILLI (*CAPSICUM ANNUUM* L.)

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Abstract

A field investigation was carried out during *Kharif*, 2010-11 to study the effect of methods of raising seedlings on seed yield and quality of chilli Cv. Byadagi kaddi. The results revealed that plant height (95.67 cm), number of branch per plant (28.87), leaf area per plant (1528.31 dm^2), LAI (2.11), dry matter production (50.88 g $plant^{-1}$), stem girth (2.05 cm), fruit length (12.60 cm), fruit girth (2.17 cm), number fruits per plant (49.53), hundred dry fruit weight (156.90 g), fruit yield per plant (191.31 g $plant^{-1}$), fruit yield per hectare (17.84 q ha^{-1}) of chilli was significantly higher in seedlings raised with polythene bag in shade house. Polythene bag under shade house recorded significantly higher seed yield per plant (19.31 g), seed yield (695.76 kg ha^{-1}), test weight (6.43 g) than the other planting methods. Raised bed under shade recorded higher net returns (Rs. 1,93,669) and direct sowing recorded higher B:C ratio (3.60) over other treatment combinations.

Key words : Chilli, seedling raising methods, fruit yield, seed yield and economics.

Introduction

Chilli (*Capsicum annuum* L.) is one of the most important commercial spice crops of India cultivated on a large scale. It is an indispensable condiment of every Indian home. Economically, chilli is a good choice for generating higher income among the farming sector. At present, the crop is being grown even by local farmers using high yielding varieties or hybrids with high intensive management practices. They have introduced high production technologies through high yielding varieties/ hybrids with different planting methods such as raised bed, tray method and polythene bag for production of healthy seedlings and getting higher yield and the present study was conducted to evaluate the different seedling raised methods on seed yield in chilli.

Materials and Methods

A field experiment was conducted at Main Agricultural Research Station, Raichur, during *Kharif* season 2010-11. The experiment was laid out in randomized block design with three replications. There are seven treatments consisting of seven seedling raising methods. (T_1-Raised bed in open condition, T_2-Raised bed in shade house, T_3-Tray method in open condition, T_4- Tray method in shade house, T_5- Polythene bag in open condition, T_6-Polythene bag in shade house, T_7-Direct sowing). Soil was red sandy clay loam and slightly alkaline in reaction with a pH of 7.29 having normal EC (0.36 dsm^{-1}) and organic carbon (6.10%). The seedlings raised under different methods were transplanted in the main field using 40 days age seedlings. All the agronomic measures were taken as per recommendation and irrigations were provided whenever necessary to overcome the soil moisture stress chilli fruits were picked three times, as and when they matured deep red. Data on plant height (cm), number of branch per plant, leaf area per plant (dm^2), LAI, dry matter production (g $plant^{-1}$), stem girth (cm), fruit length (cm), fruit girth (cm), number fruits per plant, hundred dry fruit weight (g), fruit yield per plant (g $plant^{-1}$), fruit yield per hectare (q ha^{-1}), seed yield per plant (g), seed yield (kg ha^{-1}), test weight (g) were recorded after harvest of chilli. Economic analysis was done on the prevailing market price of inputs used and produce obtained during the year. Net profit per hectare and B:C ratio were worked out by using the following formula.

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Table 1 : Effect of methods of raising seedlings on plant growth parameters of chilli Cv. Byadagi kaddi.

Treatments	Plant height (cm)	Number of branches per plant	Leaf area per plant (dm^2)	Leaf area index (LAI)	Dry matter production (g $plant^{-1}$)	Stem girth (cm)
T_1 –Raised bed in open condition	78.08	19.87	475.81	0.22	40.04	1.55
T_2 –Raised bed in shade house	94.37	27.37	1233.03	1.94	47.64	1.84
T_3 –Tray method in open condition	80.91	21.30	729.26	0.31	41.20	1.63
T_4 –Tray method in shade house	90.27	26.13	1059.70	1.66	44.56	1.75
T_5 –Polythene bag in open condition	84.04	22.40	811.17	0.33	41.27	1.65
T_6 –Plythene bag in shade house	95.67	28.87	1528.31	2.11	50.88	2.05
T_7 –Direct sowing	84.87	23.53	907.62	0.54	41.74	1.68
Mean	86.89	24.21	963.56	1.02	43.91	1.74
S.Em±	2.56	0.78	97.81	0.138	1.34	0.088
C. D. at (5%)	7.91	2.40	301.40	0.42	4.14	0.27

Net profit (Rs. ha^{-1}) = Gross income (Rs ha^{-1}) – Total cost of cultivation (Rs. ha^{-1})

Benefit cost ratio (B: C ratio) =

$$\frac{\text{Gross income (Rs. ha}^{-1}\text{)}}{\text{Total cost of cultivation (Rs. ha}^{-1}\text{)}}$$

Results and Discussion

Different seedling raising methods influenced the growth characters significantly (table 1). The higher plant height (90.67, 94.00 and 95.67 cm) and number of branches (3.79, 21.87 and 28.87) at 40, 80 and 120 DAS respectively were observed in polythene bag under shade house method followed by raised bed in shade house method, tray method in shade house and direct sowing due to lesser/no root damage during transplanting of seedlings raised in polythene bag and tray methods as compared to raised bed system. And also showed that container grown plants in general have different root morphology than field seeded and raised bed crops. During transplanting, loss of primary roots and an increase in the number of lateral roots. When root are confined in the container, that restrict their growth and roots compete for essential resources. Increased root mass and decreased rooting space leads to competition for available oxygen resulting in the higher uptake of essential material along with water resulting in higher plant height and number of branches. These result are in agreement with the findings of Peterson (1991).

Growth indices like leaf area per plant (182.54, 1609.41 and 1528.31 dm^2) and LAI (0.19, 2.23 and 2.11) was higher in polythene bag under shade house at 40, 80 and 120 DAS, respectively followed by raised bed in shade house, tray method in shade house and direct sowing due to proper plant canopy development. Which reflect in increased dry matter production per plant in polythene bag under shade house condition.

Higher dry matter production (4.45, 19.20 and 50.88 g $plant^{-1}$) per plant at 40, 80 and 120 DAS, respectively was influenced by favorable growth interms of higher plant height, number of branches, leaf area and stem girth. These results are similar with the findings of Manchanda and Sing *et al*. (1988) reported that tall plants, more number of branches and higher leaf area in case of seedling raised in polythene bag under shade house method.

Higher number of fruits per plant (49.53), fruit weight per plant (191.31 g), 100 dry fruit weight (156.90 g), fruit yield (17.84 q ha^{-1}), test weight (6.43 g), seed yield per plant (19.31 g), seed yield (695.76 kg ha^{-1}) were observed in polythene bag under shade house method (table 2) due to the production of more photosynthates and better distribution in the plant. The synthesis, accumulation and translocation of photosynthates depending upon the efficient photosynthetic structure as well as extent of translocation into sink (fruit) and also plant growth and development during the early stages of crop growth. The plant establishment was better in seedlings raised in polythene under shade house compared to other treatments. However, it was on par with raised bed under shade house method, which was due to higher number of fruits per plant (49.27), fruit weight per plant (185.28 g), 100 dry fruit (153.49 g), fruit yield (17.67 q ha^{-1}), test weight (5.87 g), seed yield per plant (19.16 g), seed yield (689.00 kg ha^{-1}), in raised bed under shade condition. These result are in agreement with the findings of Tenoria

Table 2 : Effect of methods of raising seedlings on yield and yield component of chilli Cv. Byadagi kaddi.

Treatments	Fruit length (cm)	Fruit girth (cm)	Number of fruits per plant	Fruit weight per plant (g)	100 dry fruit weight (g)	Fruit yield (q ha^{-1})	Seed yield per plant (g)	Seed yield (kg ha^{-1})	Test weight (g)
T_1 –Raised bed in open condition	10.43	1.48	38.27	135.67	113.53	12.78	14.92	498.55	4.78
T_2 –Raised bed in shade house	11.39	2.16	49.27	185.28	153.49	17.67	19.16	689.00	5.87
T_3 –Tray method in open condition	10.58	1.69	44.20	152.65	120.21	13.36	17.24	521.17	4.95
T_4 –Tray method in shade house	11.20	2.15	47.53	176.84	150.20	16.95	18.54	661.05	5.35
T_5 –Polythene bag in open condition	10.94	1.90	45.53	161.32	126.85	15.22	17.76	605.28	5.09
T_6 –Polythene bag in shade house	12.60	2.17	49.53	191.31	156.90	17.84	19.31	695.76	6.43
T_7 –Direct sowing	11.12	1.91	46.53	175.99	143.56	16.55	18.02	645.58	5.22
Mean	11.06	1.93	45.84	168.44	137.82	15.81	17.85	616.63	5.38
S.Em±	0.326	0.094	1.350	4.866	4.501	0.483	0.525	18.873	0.224
C. D. at (5%)	1.004	0.289	4.161	14.994	13.869	1.491	1.618	58.154	0.691

Table 3 : Economic evaluation of seedling raising methods.

Treatment	Gross return (Rs ha^{-1})	Cost of cultivation (Rs ha^{-1})	Net returns (Rs ha^{-1})	B:C ratio
T_1 –Raised bed in open condition	1,99,420	66,599	1,32,820	2.99
T_2 –Raised bed in shade house	2,75,600	81,931	1,93,669	3.36
T_3 –Tray method in open condition	2,08,468	69,854	1,38,613	2.98
T_4 –Tray method in shade house	2,64,420	81,646	1,82,773	3.24
T_5 –Polythene bag in open condition	2,42,112	77,280	1,64,831	3.13
T_6 –Polythene bag in shade house	2,78,304	85,614	1,92,689	3.25
T_7 –Direct sowing	2,58,232	71,695	1,86,536	3.60

et al. (1962), Goday *et al.* (1965), Wang *et al.* (1988), Kembal *et al.* (1994) and Lee-Joweon *et al*. (1999).

Among different seedling raising methods, the highest net returns (Rs. 1,93,669 ha^{-1}) were recorded in raised bed in shade house due to moderate cost of cultivation (Rs. 81,931 ha^{-1}) to contribute for better net returns (table 3).

The highest (3.60) benefit cost ratio was obtained in direct sowing followed by raised bed in shade house (3.36). The benefit cost ratio of raised bed in open condition were generally lower because of lower gross returns due to lower yield. The results are in conformity with the earlier findings of Baramappa *et al*. (2008).

In the present investigation, the results suggested that maximum net returns from chilli production could be achieved through raised bed under shade house method followed by polythene bag under shade house. By adopting this technology it is not only possible to achieve highest net returns but also helps for better utilization of resources which are available on farm and cost was low as compared to polythene bag under shade house.

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