



Studies on seedling production methods in vegetable crops

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Abstract : The trials were conducted at farmers' fields for three years 2000-01 to 2002-03 during both *Kharif* and *Rabi* season under National Agricultural Technology Project. Six treatment combinations of crops (tomato, brinjal, chilli during *Kharif* and onion, cabbage, cauliflower during *Rabi*) and two methods (farmers' practice and improved method) were tested in factorial Randomized Block Design at four locations. Results revealed that during both seasons, nursery raising method and crops exerted significant effect on seedling emergence, total seedlings, mortality (%) and healthy seedlings. Improved method of nursery raising recorded higher emergence of seedlings (%), total seedlings, healthy seedlings, plant height and less mortality as compared to farmers' practice. Among the crops during *Kharif* season, tomato showed maximum percentage of seedling emergence, least mortality, maximum total as well as healthy seedlings per unit area. During *Rabi* season highest emergence, total number of seedlings, number of healthy seedlings, plant height and mortality were observed in onion. Higher mortality in onion as compared to cabbage and cauliflower indicated that onion is more vulnerable to adverse conditions.

Key Words : Vegetable, Seedling raising, Methods

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INTRODUCTION

Raising of seedlings is a foremost important aspect of vegetable production. Nursery is the place where young seedlings are raised and nurtured before planting them in the main field. For raising a good crop, it is utmost essential that seedling should be healthy, vigorous and disease-free. Seedlings are susceptible to a number of diseases due to its delicate, succulent and highly tender nature. To ensure high productivity and high quality of the produce, raising of high quality seedlings through use of good quality seeds at right time and at a appropriate place is one of the important aspects of vegetable farming. Vegetable seedlings raised in open field conditions are generally inferior in quality due to virus infection, especially during rainy and post rainy season. On one side soil borne fungus create sever problem for raising the seedlings in soil media in open fields during hot summer and rainy season, and on the other hand the high cost of hybrid seeds also warranted the growers to improve or change their traditional nursery raising method to increase the

productivity and quality of vegetables. Higher cost and susceptibility of high yielding varieties to adverse conditions specifically at initial growth stage compels to search for new techniques for seedling raising so that each and every seed shall result in a healthy plant. It is also a well known fact that productivity of a crop plant is affected to the great extent with the care taken at its initial growth (Nicola and Basoccu, 1994). Raising of nursery under polyhouse or greenhouse and sowing the individual seed of hybrid in potting plug with artificial culture media is a well-established practice in developed countries. However, in our country raising of nursery under controlled conditions is not possible at large and there is lack of other facilities like potting plug, rooting media, etc. Farmers grow seedlings at the places near to the transplanting field so that transportation is not required. In such situations, proper attention to the selection of nursery site and treatment of seed and nursery soil may be a good approach. Soil solarisation has been proved as cheapest and eco-friendly approach for soil disinfection of nursery beds (Sudha *et al.*, 1999). Following this simple practice, population of soil-borne pathogen, pests

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and weeds can be reduced to a substantial level. Keeping these facts in view, present experiment was carried out to compare the method being practiced by the local farmers and improved method.

MATERIALS AND METHODS

The trials were conducted at farmers' fields for three years 2000-01 to 2002-03 during both *Kharif* and *Rabi* season under National Agricultural Technology Project. Six treatment combinations of crops (tomato, brinjal, chilli during *Kharif* and onion, cabbage, cauliflower during *Rabi*) and two methods (farmers' practice and improved method) were laid in factorial Randomized Block Design at four locations. In case of farmers' practice seeds were broadcasted in flat beds without soil and seed treatment. Each bed of 1×3m² was supplied with 5kg FYM. No insecticide and fungicides were applied on seedlings. Whereas, in improved method, vegetable seeds treated with thiram @ 2.5gkg⁻¹ seed were sown in lines spaced at 5cm in 10-12 cm raised beds. Nursery beds were treated with soil solarisation method during first fortnight of June for *Kharif* season and second fortnight of September for *Rabi* season. During *Kharif* season tomato (JT-99), brinjal (JB64) and chilli (JM-283) seeds were sown @ 5g/m², 5g/m² and 8g/m². After sowing seed beds were covered with mulching material (dry grass) till the emergence started. During *Rabi* season onion (Agrifound Light Red), cabbage (Pride of India) and cauliflower (Pusi) seeds were sown @ 20g/m², 5g/m² and 5g/m², respectively. Each bed of 1×3m² was supplied with 5kg FYM, 250g urea, 150g single super phosphate and 100g muriate of potash. Mancozeb and endosulfan 35 EC @ 2.5g and 1.5 ml per liter of water, respectively were sprayed twice at 10 and 20 days after sowing. Observations were recorded on height of seedlings, seedling emergence percentage, total number of seedlings m², mortality percentage and number of healthy seedlings m². The data recorded were subjected to statistical analysis as per standard procedure.

RESULTS AND DISCUSSION

The findings (Table 1) revealed that during *Kharif*, nursery raising method crops exerted significant effect on seedling emergence, total seedlings, mortality (%) and healthy seedlings. Improved method of nursery raising recorded higher emergence of seedlings (%), total seedlings, healthy seedlings, plant height and less mortality as compared to farmers' practice. Seed treatment, line sowing and covering the seed with mulch material might have provided favourable conditions for germination and resulted in better emergence of seedlings under improved method. Further, sowing in lines at uniform spacing on raised beds and care of seedlings

Table 1: Nursery management of tomato, brinjal and chilli

Treatments Methods	Height of seedlings (cm)			Emergence (%) at 10 days after sowing			Total no. of seedlings / m ²			Mortality (%)			No. of healthy seedlings / m ²		
	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03
Methods															
NM ₁	17.000	16.29	16.08	72.70	73.23	74.03	892.6	926.7	926.0	25.44	14.08	13.91	780.2	833.4	812.4
NM ₂	15.00	14.76	14.26	50.683	61.71	61.38	596.00	563.0	549.2	40.37	37.76	38.38	334.7	527.7	507.4
S.E.±	0.649	0.38	0.31	0.639	0.59	0.61	24.10	19.52	18.55	0.98	1.14	1.08	17.6	16.3	15.4
C.D. (P=0.05)	1.958	1.15	0.914	1.926	1.74	1.795	72.62	57.58	54.72	2.95	3.37	3.19	53.2	48.2	45.5
Crops															
Tomato	19.875	19.18	18.76	70.75	70.39	70.93	745.90	842.1	835.5	32.56	25.28	25.66	557.5	746.4	723.5
Brinjal	14.625	14.51	14.03	67.4	68.54	69.05	595.30	707.1	700.9	31.39	24.45	24.71	440.5	557.6	648.3
Chilli	13.500	12.90	12.73	51.925	63.38	63.15	370.65	685.3	676.3	34.17	28.03	28.07	266.1	537.7	607.8
S.E. ±	0.796	0.76	0.67	0.783	0.72	0.69	29.52	23.91	24.52	1.19	1.40	1.42	21.6	20.0	21.7
C.D. (P=0.05)	2.399	2.25	1.976	2.359	2.12	2.035	88.94	70.52	71.32	NS	NS	NS	65.1	59.0	60.9
Combined effect															
NM ₁ Tomat	21.75	20.43	20.58	77.00	76.21	77.53	892.6	1043.3	1051.0	24.96	13.36	13.10	780.2	915.9	903.2
NM ₁ Brinjal	15.00	14.18	14.32	73.50	74.15	75.12	720.20	877.6	870.7	24.52	12.64	12.85	605.8	796.1	781.6
NM ₁ Chilli	14.25	13.65	13.25	67.60	69.34	69.45	445.70	859.2	856.3	26.74	16.25	15.78	326.5	788.4	752.4
NM ₂ Tomat	18.00	17.94	16.33	64.50	64.58	64.32	596.00	640.9	619.9	40.36	37.19	38.22	334.7	576.8	543.8
NM ₂ Brinjal	14.25	14.20	13.75	61.30	63.13	62.97	470.40	536.6	511.2	39.16	36.27	36.57	275.2	519.1	515.1
NM ₂ Chilli	12.75	12.15	12.20	56.25	57.42	56.84	295.60	511.5	496.4	41.50	39.81	40.35	205.6	487.0	463.3
S.E. ±	1.125	1.08	1.26	1.107	1.02	1.16	41.74	33.8	34.68	1.69	1.98	2.05	30.6	28.3	28.4
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	92.1	83.5	83.8

NS= Non-significant

with plant protection measures resulted in more number of total and healthy seedlings with more height and less mortality of emerged seedlings. Whereas, in case of farmers' practice, there was less emergence, high mortality and weak, unhealthy, defective and damaged seedlings due to more fluctuation in soil moisture, improper spacing caused weak and lanky seedlings during all the three years of investigation. These findings were corroborated by those of Mini and Joseph (1998) in chilli and Tiwari and Vishunavat (2011) in tomato.

Significant differences were observed in crops for all these parameters except mortality percentage. Among the three crops tested during *Kharif* season, tomato showed maximum percentage of seedling emergence, least mortality, maximum total as well as healthy seedlings per unit area. Height of seedlings noted at 35 days after sowing was also highest in case of tomato whereas lowest values of seedling emergence, total seedlings, number of healthy seedlings and height of seedlings were found with chilli.

Combined effect of nursery raising methods and crops did not showed any significant impact on seedling emergence, mortality percentage, number of total seedlings and plant height. Though, number of healthy seedlings revealed significant differences with different combinations. All the three crops recorded significantly higher number of healthy seedlings when raised with improved method over their performance under farmers' practice.

Perusal of data presented in Table 2 indicated that during *Rabi* season method of nursery raising had significant effect on mortality (%), total number of seedlings, number of healthy seedlings and height of seedlings. Maximum number of total seedlings, healthy seedlings, plant height and least mortality was observed under improved method. Though the germination (%) not differed significantly, numerically higher germination was recorded under improved method. Well spaced sowing of fungicide treated seeds on disinfected beds (soil solarised beds) providing sufficient light, water and nutrient as well as protection from diseases and insect pests might have been the reasons for less mortality, higher total and healthy number of seedlings as well as vigorous seedlings.

Different crops varied significantly for all the parameters studied. Among the different crops highest germination, total number of seedlings, number of healthy seedlings, plant height and mortality were observed in onion. Higher mortality in onion as compared to cabbage and cauliflower

Table 2: Nursery management of onion, cabbage and cauliflower

Treatments	Height of seedlings (cm)			Emergence (%) at 10 days after sowing			Total no. of seedlings/ m ²			Mortality (%)			No. of healthy seedlings/ m ²		
	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03	2000-01	2001-02	2002-03
Methods															
NM ₁	10.58	10.33	10.63	72.80	72.75	72.77	1615.5	1622.6	1591.8	21.02	20.35	20.64	1411.5	1411.5	1350.3
NM ₂	8.67	8.40	8.23	70.83	69.90	69.65	1259.5	1164.9	1118.2	35.33	38.69	36.69	979.4	979.4	780.8
S.E. ±	0.37	0.48	0.46	1.09	1.11	1.19	72.9	76.6	75.4	1.37	1.45	1.42	46.5	46.5	35.8
C.D. (P=0.05)	1.10	1.43	1.36	NS	NS	NS	219.8	225.9	222.4	4.14	4.27	4.19	140.1	140.1	105.5
Crops															
Onion	12.88	12.37	12.19	75.45	74.06	73.86	2871.8	2724.4	2615.4	32.35	36.07	36.99	2537.6	2180.8	2075.5
Cabbage	8.38	8.14	8.32	73.65	73.29	72.89	744.0	753.8	746.0	25.24	24.83	25.50	54.6	523.6	598.8
Cauliflower	7.63	7.6	7.76	66.35	66.63	66.86	696.8	703.1	703.6	27.18	27.68	27.98	507.25	542.5	522.4
S.E.±	0.45	0.59	0.56	1.09	1.36	1.21	89.3	93.8	94.1	1.68	1.77	1.58	56.9	44.4	43.2
C.D. (P=0.05)	1.35	1.75	1.65	3.31	4.00	3.57	269.2	276.7	277.6	5.07	5.24	4.66	171.6	130.9	127.4
Combined effect															
NM ₁ On	14.25	13.98	14.16	76.70	75.2	75.42	3243.4	3210.6	3109.4	24.78	25.62	26.38	2942.7	2815.4	2685.2
NM ₁ Ca	9.25	8.92	9.25	74.50	74.89	74.63	815.5	851.6	851.2	18.92	16.69	16.75	675.6	745.4	712.3
NM ₁ Cu	8.25	8.10	8.48	67.20	68.15	68.26	785.7	805.7	814.9	19.36	18.75	18.78	616.3	582.6	653.5
NM ₂ On	11.5	10.76	10.23	74.2	72.91	72.31	2498.2	2238.2	2121.5	40.93	46.52	47.61	2132.5	1546.3	1465.9
NM ₂ Ca	7.50	7.35	7.40	72.8	71.69	71.16	672.5	655.9	640.9	31.57	32.97	34.26	407.6	501.8	485.3
NM ₂ Cu	7.00	7.10	7.05	65.50	65.10	65.47	607.9	600.5	592.2	35.00	36.60	37.19	398.2	402.3	391.2
S.E.±	0.63	0.84	0.92	1.89	1.92	2.01	126.3	132.7	138.5	2.37	2.51	2.54	80.6	62.7	61.6
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NM₁- Improved method of nursery management, NM₂- Farmers practice of nursery management

NS=Non-significant

indicate that onion is more vulnerable to adverse conditions.

Combined effect of nursery raising methods and crops showed significant effect on the number of healthy seedlings, which were recorded more in all the crops raised under improved method as compared to farmers practice. Less mortality combined with higher percentage of emergence might have lead to higher number of healthy seedlings (Pandey *et al.* , 2004 and Trottin Caudal, 1998).

Conclusion :

Hence, from the findings of three years trials it could be concluded that growing of vegetable seedlings with improved method produced more number of healthy seedlings as compared to farmers' practice. Besides it also resulted in improved vigour in seedlings as reflected through height of seedlings.

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