Middle-East Journal of Scientific Research 17 (3): 280-286, 2013
ISSN 1990-9233

DOI: 10.5829/idosi.mejsr.2013.17.03.12139

Effect of Different Steckling Size and Phosphorous Levels on Seed Production in Carrot (*Daucus carota*).

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Abstract: An experiment was carried out at Agriculture Research Institute (ARI) Tarnab Peshawar, during winter 2011-12 to know the "Effect of different Steckling size and Phosphorous levels on seed production in carrot (*Daucus carota*) cv 'Shan'. The experiment was laid out in Randomized Complete Block Design (RCBD) with split plot arrangement and replicated three times. Phosphorous levels (0, 50, 75, 100 kgha^{-1}) were assigned to main plots, while Steckling sizes (5, 10, 15, 20 cm) were allotted to subplots. The basal dose of potassium (125 kg ha^{-1}) and half dose of nitrogen (50 kg^{-1}) were applied at the time of transplanting, while the remaining dose of nitrogen (50 kg^{-1}) was applied after 30 days of transplanting. Phosphorous was applied in different levels before transplanting.Among different Stecklings, Steckling of size 20 cm showed significantly increase in number of umbellateumbel^{-1} (68.26), early flowering (75.00 days), Seed yield umbel^{-1} (6.85 gm), Seed yield plant^{-1} (83.63 gm), Seed yield plot^{-1} (834.03 gm) and Seed yield (2.09 t ha^{-1}). Phosphorous levels also significantly affected growth and yield components. Among different levels of phosphorous 100 kg ha^{-1} showed significant increased in plant height (138.81 cm), number of umbels plant $^{-1}$ (63.77), number of umbellate umbel^{-1} (59.42) number of productive stems plant^{-1} (12.87), Seed yield umbel^{-1} (6.23 gm), Seed yield plant^{-1} (80.60 gm), Seed yield plot^{-1} (802.93 gm) and Seed yield (1.99 t ha^{-1}). Based on the above results it is recommended that Steckling of size 20cm with application of phosphorous @ 100 kg ha^{-1} should be used for best growth and maximum seed production in carrot in Peshawar valley.

Key words: *Daucus carota* · Phosphorous · Seed production

INTRODUCTION

Carrot (*Daucus carota*) belonging to family Umbelliferae is a very common winter season vegetable cultivated throughout Pakistan. The species is likely native to Asia and is now under cultivation in many countries. Carrot is originated in Mediterranean area and was in use over 2000 years ago. Pakistan is one of the countries in the world, which is enjoying all seasons due to which it is considered as an ideal region for producing vegetable seeds. Due to increase in yield unit^{-1} area and by using as human food it is an important vegetable. Carrot is orange-yellow in color, which adds attractiveness to food on plate. It is rich in carotene (a precursor to vitamin A), appropriate amount of thiamine and riboflavin and has also more sugar content. It is used as raw as well as cooked in curries and also a part for pickles and sweet meats. It is known as poor men apple because of presence of more amounts of different nutrients and also of high economic market value [1]. Carrots can be grown well in the tropics where high elevation give cool night temperature and in temperate regions of the world. Carrot can be grow well at relevant temperature of 15°C to 20°C and can withstands low temperature up to 5°C and high up to 24°C.This there fore favors cool season conditions. Temperature above or below this range can minimize seed germination. Low temperature up to (1.5°C) badly affect leaves of Carrot however roots are not usually affect by this much low temperature. Freezing temperature for about 24 hours

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causing the injury of crowns which affect the growth quality of carrot [2]. Phosphorus has important role in building of energy rich compounds, like AMP, ADT, ATP which are necessary for photosynthesis and respiration. It is a basic part of nucleic acids and phospholipids and some co enzyme. It has an important role in transferring energy with in plant cells, cell division and formation of meristem tissue; promote root growth, flowering and development of seed and fruit. Deficiency of Phosphorus result in stunted growth, purple or reddish leaves, stems and branches, less yield and low quality of crops [3]. In carrot seed can be produce by using two methods. i.e. seed to seed and root to seed method. Root to seed method is the best one in Pakistan for obtaining good quality seed because in this method healthy, disease free and good colour of Steckling can be selected for replantation which result in true to type and good quality of seed. The basic problem of low yield in Pakistan is the lack and unavailability of high quality of seed in the required quantity by the farmers. More work has been carried out on production side, while no attention has been given on seed production in carrot. The present research was, therefore conducted to find out the effect of Steckling/ root size and phosphorous level on carrot (*Daucus carota* cultivar. Shan) seed yield under the local climate of Peshawar.

MATERIALS AND METHODS

The experiment was conducted at Agriculture Research Institute Tarnab Peshawar Khyber Pakhtunkhwa during winter 2011-12 with the aim to determine the best Steckling size and phosphorus level for maximum seed production in carrot. For the experiment Steckling of the cultivar' Shan' were produced and the roots were harvested in the last week of December and transplanted immediately. True to type roots based on color, shape and uniform size were selected. The carrot roots weighing 200g alone were selected for planting after subjecting them to various treatments like removed 5 cm, 10 cm, 15 cm and 20 cm portion from the root tip and got Steckling of 5 cm, 10 cm, 15 cm and 20 cm respectively. The experiment was conducted in Randomized Complete Block Design (RCBD) with split plot arrangement having two factors i.e. Steckling size and phosphorus levels. There were sixteen treatments combination which were replicated three times each. Phosphorus level was kept in main plot while Steckling size was in sub plots. There were forty eight sub plots. The plot size was kept $2\times2=4m^2$. Plant to plant distance was 45cm and row to row distance was 70 cm. Planting was done on raised beds about 30 cm high. Farm yard manure was applied @ 10t/ha 15 days before transplanting and inorganic fertilizer was applied at the time of transplanting @100 kg Nha^{-1} in split doses and potassium @125 kg ha^{-1}. Phosphorus was applied @ 0, 50, 75 and 100 kg ha^{-1} in the form of Di ammonium phosphate. All cultural practices like hoeing, weeding etc were carried out equally at proper time.

RESULTS AND DISCUSSION

Days to Sprouting: The data about days to sprouting is presented in Table 1,

Statistical analysis of the data about days to sprouting showed that Steckling size, phosphorous levels and their interaction had non-significant effect.

Sprouting Percentage: The data concerning sprouting percentage is presented in Table 2.

Table 1: Days to sprouting of carrot cultivar as affected by Steckling size and phosphorus levels.

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	9.70	9.68	9. 62	9. 67	9.67
10 cm	9.82	9.75	9.75	9.75	9.77
15 cm	9.63	9.62	9.57	9.58	9.60
20 cm	9.62	9.60	9.55	9.60	9.59
Means	9.69	9.66	9.62	9.65	

Table 2: Sprouting percentage of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	90.00	93.33	93.33	90.00	91.67
10 cm	93.33	90.00	96.67	100.00	95.00
15 cm	96.67	96.67	93.33	96.67	95.83
20 cm	96.67	100.00	96.67	96.67	97.50
Means	94.17	95.00	95.00	95.00	

Table 3: Days to flowering of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	88.27	84.00	76.70	69.48	79.61 a
10 cm	85.93	81.69	75.45	68.63	77.93 b
15 cm	82.33	81.97	72.35	68.33	76.85 c
20 cm	81.72	97.51	70.92	67.87	75.00 d
Means	84.56 a	81.79 b	73.85 c	68.58 d	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test

Table 4: Number of umbel plant^{-1} of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	48.83	49.10	55.36	53.78	52.27 d
10 cm	52.68	52.85	65.12	65.78	59.11 c
15 cm	55.16	55.76	67.03	67.00	61.24 a
20 cm	55.37	53.49	66.49	66.52	59.97 b
Means	52.51 b	52.80 b	63.50 a	63.77 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

Statistical analysis showed that Steckling size, phosphorous levels and their interaction had no significant effect on sprouting percentage. Such results were also revealed by [4]. Who reported that mother root size has no significant effect on sprouting percentage.

Days to Flowering: It is evident from Table 3 that maximum days to flowering (84.56) were recorded in plants with control (0 kg ha-1) while least days to flowering (68.58) were recorded in plants supplied with phosphorous @ 100 kg ha^{-1} followed by (81.79) and (73.85) in plants supplied with phosphorous @ 50 kg ha^{-1} and 75 kg ha^{-1}. Mean data of days to flowering showed that maximum days to flowering (79.61) were noted in plants of Steckling size 5 cm, where as least number of days to flowering (75.00) were recorded in plants of Steckling size 20 cm followed by (76.25) and (77.93) in plants of Steckling size 15 cm and 10 cm respectively. In response to the interaction of phosphorous levels and different Steckling size maximum days to flowering (88.27) were noted in phosphorous level (0 kg ha^{-1}) with Steckling size 5 cm, while minimum days to flowering (67.87) were noted in phosphorous level (100 kg ha^{-1}) with Steckling size 20 cm. The findings are closely related with that of [5] who reported that maximum phosphorous levels caused early flowering in raddish cv. Japanese. The results of [6, 7] are in harmony who reported that days to flowering were affected by root size.

Number of Umbel Plant^{-1}: The data in Table 4 showed that maximum number of umbel plant^{-1} (63.77) and (63.50) were recorded in plants supplied with phosphorous @ 100 kg ha^{-1} and 75 kg ha^{-1} respectively while least number of umbel plant^{-1} (52.51) and (52.80) were recorded in plants supplied with phosphorous @0 kg ha^{-1} and 50 kg ha^{-1} respectively. Mean values of the data showed that Steckling size significantly affected number of umbel plant^{-1}. Maximum number of umbel plant^{-1} (61.24) were recorded in plants of Steckling size 15 cm, where as least number of umbel plant^{-1} (52.27) were recorded in plants of Steckling size 5 cm followed by (59.11) and (61.24) in plants of Steckling size 10 cm and 20 cm respectively. Concerning the interaction of phosphorous levels and different Steckling size maximum number of umbel plant^{-1} (67.00) were noted in phosphorous level (100 kg ha^{-1}) of Steckling size 15 cm, while minimum number of umbel plant^{-1} (48.83) were noted in phosphorous level (0 kg ha^{-1}) of Steckling size 5 cm. Results of [8] are closely related who reported that basal doze of nitrogen with maximum doze of phosphorous resulted in increased the number of umbels plant^{-1} (30.96) in carrot cv. Sel 21. Number of umbel increased due to Steckling size may be due to root size. Large Steckling contains more store food which might be used as a source for vigor plant growth. The results are in match with that of [9] who stated that large size roots produce maximum number of umbel plant^{-1}.

Number of Umbellate Umbel^{-1}: Among various levels of phosphorus maximum number of umbellate umbel^{-1} (59.42) and (59.25) were recorded in plants supplied with phosphorous @ 100 kg ha^{-1} and 75 kg ha^{-1}, while least number of umbellate umbel^{-1}(53.34) were recorded in plants supplied with phosphorous @ 0 kg ha^{-1}. Mean data in Table 4 showed that Steckling size significantly

Table 5: Number of umbellate umbel^{-1} of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	40.53	42.42	44.40	41.89	42.31 d
10 cm	50.67	55.25	57.92	60.68	56.13 c
15 cm	58.20	60.29	63.15	65.32	61.74 b
20 cm	63.95	67.75	71.52	69.80	68.26 a
Means	53.34 c	56.43 b	59.25 a	59.42 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test

Table 6: Number of productive stems plant^{-1} of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	10.93	11.53	12.05	12.15	11.67 c
10 cm	11.00	11.87	12.22	12.83	11.98 bc
15 cm	11.27	12.70	13.45	13.50	12.73 a
20 cm	11.05	12.13	13.00	12.98	12.29 ab
Means	11.06 b	12.06 a	12.68 a	12.87 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

Table 7: Plant height (cm) of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	99.33	103.78	119.95	136.58	114.91 c
10 cm	100.61	107.89	123.64	139.64	117.92 a
15 cm	100.12	106.97	122.90	139.53	117.37 a
20 cm	99.91	104.93	120.18	139.48	116.17 b
Means	100.00 d	105.89 c	121.67 b	138.81 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

affected number of umbellate umbel^{-1}. Maximum number of umbellate umbel^{-1} (68.26) were noted in plants of Steckling size 20 cm where as least number of umbellate umbel^{-1} (42.31) were recorded in plants of Steckling size 5 cm followed by (56.13) and (61.74) in plants of Steckling size 10 cm and 15 cm respectively. In response of interaction of phosphorous levels and different Steckling size maximum number of umbellate umbel^{-1} (69.80) were noted in phosphorous level (100 kg ha^{-1}) of Stecklingsize 20 cm, while minimum number of umbellate umbel^{-1} (40.53) were noted in phosphorous level (0 kg ha^{-1}) of Steckling size 5 cm. Increase in number of umbellate may be due to the vigor of plant and more nutrients availability. The findings of [10] who reported that application of high quantity of NPK ha^{-1} to coriander resulted more number of umbellate umbel^{-1} are very important [9]. Reported that large suckling produce maximum number of umbellate umbel^{-1}.

Number of Productive Stems Plant^{-1}: Maximum number of productive stems plant^{-1} (12.87),(12.68)and(12.06) were recorded in plants supplied with phosphorous @ 100 kg ha^{-1}, 75 kg ha^{-1} and 50 kg ha^{-1} respectively, while least number of productive stems plant^{-1} (11.06) were recorded in plants supplied with phosphorous @ 0 kg ha^{-1}. Among different Steckling size more number of productive stems plant^{-1} (12.73) were noted in plants of Steckling size 15 cm, where as least number of productive stems plant^{-1} (11.67) were recorded in plants of Steckling size 5 cm followed (11.98) and (12.29) in plants of Steckling size 10 cm and 20 cm respectively. Increase in number of productive stems by maximum phosphorous might be due to increased root growth which in turn increase area for nutrients and water absorption promote vigorous plant growth [11]. Reported that increasing the application of phosphorus resulted in maximum number of productive stems plant^{-1} as compared to control (no P) in case of radish. [12] also found that maximum Steckling size of 33.75 cm resulted maximum number 13.00 of flowering stalk in radish cultivar 'Mino White' as compared to small Steckling size of 22.50 cm which produce 08.3.

Plant Height (cm): It is obvious from (Table 7) that maximum plant height (138.81 cm) was recorded in plants supplied with phosphorous @ 100 kg ha^{-1} while least plant height (100.00 cm) was recorded in plants supplied

Table 8: Seed yield umbel^{-1} (g) of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	3.56	4.39	4.72	4.50	4.29 d
10 cm	5.04	5.44	6.20	6.40	5.77 c
15 cm	5.49	6.57	6.37	6.75	6.29 b
20 cm	6.25	6.61	7.22	7.28	6.85 a
Means	5.09 c	5.75 b	6.13 ab	6.23 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

Table 9: Seed yield plant^{-1} (g) of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	66.98	69.80	74.98	74.80	71.64 c
10 cm	72.02	74.50	77.30	80.86	76.17 b
15 cm	73.12	76.84	79.00	79.42	77.09 b
20 cm	80.25	83.03	83.48	87.75	83.63 a
Means	73.09 d	76.04 c	78.80 b	80.60 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

with phosphorous @ 0 kg ha^{-1} followed by (105.89 cm) and (121.67 cm) in the plants received 50 kg ha^{-1} and 75 kg ha^{-1}phosphrous.Steckling size significantly affected plant height. Maximum plant height (117.92 cm) and (117.37 cm) was noted in plants of Steckling size 10 cm and 15 cm respectively, where as least plant height (114.91 cm) was recorded in plants of Steckling size 5 cm. The results of (wood *et al*., 1994) are closely related in this regard who stated the phosphorous is essential for cell division and promote stalk strength and growth which in turn increase plant height. Also [13] obtained more plant height (170.0 cm) by fertilized with maximum amount of phosphorous as compared with low amount in radish crop cv. Pusa Rashmi. The results of [4] are in harmony who reported that large size root and wider space resulted in maximum plant height in carrot as compared to small size roots and small space.

Seed Yield Umbel^{-1} (g): Maximum seed yield umbel^{-1} (6.23 gm) was recorded in plants supplied with phosphorous @ 100 kg ha^{-1} while least seed yield umbel^{-1} (4.29 gm) was recorded in plants supplied with phosphorous @ 0 kg ha^{-1} followed by (5.75 gm) and (6.13 gm) in the plants received 50 kgha^{-1} and 75 kg ha^{-1} phosphorous. It is obvious from the mean data in Table 8 that maximum seed yield umbel^{-1} (6.85gm) was noted in plants of Steckling size 20 cm where as least seed yield umbel^{-1} (4.29 gm) was recorded in plants of Steckling size 5 cm followed by (5.77 gm) and (6.29 gm) in plants of Steckling size 10 cm and 20 cm respectively. Regarding the interaction of phosphorous levels and different Steckling size maximum seed yield umbel^{-1} (7.28 gm) was noted in phosphorous level (100 kg ha^{-1}) of Steckling size 20 cm, while minimum seed yield umbel^{-1} (3.56 gm) was noted in phosphorous level (100 kg ha^{-1}) of Steckling size 5 cm. Phosphorous is an important part of phytin storage form of phosphorous in seed which increase seed size and weight and ultimately seed yield. The results are closely related with that of [8] who reported that increasing Phosphorous levels increased 1000 seed weight. [4] reported that large size root and wider space resulted in maximum average seed weight per umbel in carrot as compared small size roots and small space.

Seed Yield Plant^{-1} (g): (Table 9) revealed that maximum seed yield plant^{-1} (80.60 gm) was recorded in plants supplied with phosphorous @ 100 kg ha^{-1} while least seed yield plant^{-1} (73.09 gm) was recorded in plants supplied with phosphorous @ 0 kg ha^{-1} followed by (76.04 gm) and (78.80 gm) in the plants supplied with phosphorous @ 50 kg ha^{-1} and 100 kg ha^{-1} phosphorous. Among different Steckling size maximum seed yield plant^{-1} (83.63 gm) was noted in plants of Steckling size 20 cm where as least seed yield plant^{-1} (71.64 gm) was recorded in plants of Steckling size 5 cm followed by (76.17 gm) and (77.09 gm) in plants of Steckling size 10 cm and 15 cm respectively. Regarding the interaction of phosphorous levels and different Steckling size maximum seed yield plant^{-1} (87.75 gm) was noted in phosphorous level (100 kg ha^{-1}) of Steckling size 20 cm, while minimum seed yield plant^{-1} (66.98 gm) was noted in phosphorous level (0 kg ha^{-1}) with Steckling size 5 cm.

Table 10: Seed yield plot^{-1} (g) of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	649.53	698.00	743.33	748.00	709.72 c
10 cm	716.37	745.00	769.70	786.60	759.93 b
15 cm	731.17	768.33	775.83	808.63	765.49 b
20 cm	802.53	830.33	834.77	872.30	834.03 a
Means	724.90 d	760.43 c	780.91 b	802.93 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test

Table 11: Seed yield (t ha^{-1}) of carrot cultivar as affected by Steckling size and phosphorus levels

	Phosphorous levels				
Steckling size	Control	50 Kg ha^{-1}	75 Kg ha^{-1}	100 Kg ha^{-1}	Means
5 cm	1.62	1.74	1.80	1.86	1.77 d
10 cm	1.79	1.86	1.88	1.91	1.86 c
15 cm	1.83	1.97	1.91	2.01	1.93 b
20 cm	2.01	2.07	2.09	2.17	2.09 a
Means	1.81 c	.91 b	1.92 b	1.99 a	

Means followed by same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

Increase in seed yield plant^{-1} depends on many yield contributing factors such number of umbel plant^{-1}, umbellate umbel^{-1} and seed yield umbel^{-1} which were maximum in large Steckling size and maximum phosphorous level which has more store food and phosphorous has important role in fertility and nutrients availability so resulted in vigor plant growth. The results are in harmony with that of [14] who reported that large Steckling produce maximum seed plant^{-1} as compared to small ones. Also [8] reported that seed yield plant^{-1} increased with maximum phosphorous application.

Seed Yield Plot^{-1} (g): Mean data in Table 10 indicated that maximum seed yield plot^{-1} (802.93 gm) was recorded in plants received 100 kg ha^{-1} while least Seed yield plot^{-1} (724.90 gm) was recorded in plants supplied with phosphorous @ 0 kg ha^{-1} followed by (760.43 gm) and (780.91 gm) in the plants supplied with phosphorous @ 50 kg ha^{-1} and 75 kg ha^{-1} phosphorous. Regarding Steckling size maximum Seed yield plot^{-1} (834.03 gm) was obtained in plants of Steckling size 20 cm, where as least Seed yield plot^{-1} (709.72 gm) was recorded in plants of Steckling size 5 cm followed by (759.93 gm) and (765.49 gm) in plants of Steckling size 10 cm and 15 cm respectively. Regarding the interaction of phosphorous levels and different Steckling size maximum Seed yield plot^{-1} (872.30 gm) was recorded in phosphorous level (100 kg ha^{-1}) of Steckling size 20 cm, while minimum Seed yield plot^{-1} (649.53 gm) was noted in phosphorous level (0 kg ha^{-1}) of Steckling size 5 cm. The increase in seed yield might be due to variation in root size. Large Steckling contain more store food which might be used for the production of vigor plant body with maximum number of umbels, umbellate and number of seeds as compared to small Steckling size with less store food. The results are closely related with that of [15] who reported that seed yield increased by using large Steckling size in carrot. The increase in seed yield plot^{-1} by phosphorous might be due to the role of phosphorous in improving soil fertility and maximizes the nutrients availability, which in turn increase plant growth and seed weightplant^{-1}. Findings of [3] are very important in this regard who reported that phosphorous is very essential for seed production and increase seed weight.

Seed Yield (t ha^{-1}): (Table 11) presented that maximum seed yield (1.99 t ha^{-1})was recorded in plants supplied with phosphorous @ 100 kg ha^{-1} while least seed yield (1.81 t ha^{-1}) was recorded in plants supplied with phosphorous @ 0 kg ha^{-1}.Maximum seed yield (2.09) t ha^{-1} was noted in plants of Steckling size 20 cm, where as least seed yield (1.77 t ha^{-1}) was recorded in plants of Steckling size 5 cm followed by(1.86 t ha^{-1}) and (1.93 t ha^{-1}) in plants of Steckling size 10 cm and 15 cm respectively. Regarding the interaction of phosphorous levels and different Steckling size maximum seed yield (2.17 t ha^{-1}) was noted in phosphorous level (100 kg ha^{-1}) with Steckling size 20 cm, while minimum seed yield (1.62 t ha^{-1}) was noted in phosphorous level (0 kg ha^{-1}) with Steckling size of 5 cm. The increase in yield t ha^{-1} might be due to the difference in size of Steckling. Large Steckling size has more accumulated food as compared to small Steckling size which affects the morphological characteristics of carrot. Growth and yield parameters such as number of leaves, length of leaves and production of branches in plant depends upon on stored food materials in roots. These parameters will be maximum with more stored food [12]. The findings are closely related with that of [6, 15]. They reported that seed yield kg ha^{-1} increased by planting large size Steckling in carrot. The increase in yield of carrot by phosphorous application might be due to the role of phosphorous in improving soil fertility and increasing the nutrients availability which in result increase growth and yield parameters. The findings of [16] are very important in this regard who reported that maximum seed yield kg ha^{-1} was obtained with application of maximum amount of phosphorous 150 kg ha^{-1} as compared to less amount of phosphorous in combination of basal dose of Nitrogen [17-19].

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