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Role of nitrogen, phosphorus and potassium on quality of onion seed cv. Akola Safed

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Abstract
The research work was carried out at Main Garden, Department of Horticulture, Dr. PDKV, Akola, and Maharashtra in 2015-16 and 2016-17 to study the role of nitrogen, phosphorus and potassium on quality of onion seed cv. Akola Safed. Three different factors were considered, in which first factor (N) nitrogen with levels (0, 100, 150kg/ha), (P) phosphorus with levels (0, 50, 75kg/ha) and (K) potassium with levels (0, 50, 75kg/ha). The experiment consisting of 27 treatments combination was laid out in factorial randomized block design (FRBD) with three replications. The results showed that, the quality of seed of onion in respect to test weight (g), germination per cent (%) and graded seed yield were significantly influenced by different treatment combination. The quality of onion seed increased with increased levels (i.e. NPK at 150:75:75kg/ha) of different treatment combinations. Whereas, the seed yield per hectare was increased with combine application of nitrogen at 150kg/ha, phosphorus at 75kg/ha and potassium at 50kg/ha.

Keywords: Nitrogen, phosphorus, potassium *Allium cepa* L.

1. Introduction
Onion *(Allium cepa* L.) is the important vegetable crop. Nutritionally, it contains vitamins B and C with traces of iron and calcium, it is low in calories and high in ascorbic acid. It has both glucose (reducing sugar) and sucrose (non-reducing sugar). It also contains an essential volatile oil chiefly constituting "Allyl-propyl-disulphide" which imparts characteristic pungency as reported by Simandi *et al.* (2000) [16]. Area under onion in India is 12.03 lakh ha with the production of 194.02 lakh MT and productivity of 16.13 metric tonnes per hectare (Dhatt, 2017). Maharashtra, Tamil Nadu, Andhra Pradesh, Bihar, Karnataka, Rajasthan and Punjab are the most important onion producing states in India. In Maharashtra, districts leading in onion production includes Nashik, Jalgaon, Buldhana and Pune. Onion being extensively cultivated crop, there is a heavy demand for fresh seeds every year. Seed is the most important input component for productive agriculture. The success of green revolution has been mainly due to the availability of high yielding varieties of seed only. The annual onion seed requirement of the India is about 9600 tonnes, beside 20 per cent additional stock required to cover poor germination, storage losses and as buffer stock. In this, 8 per cent is supplied by the public sector organizations, 9 per cent by the private seed companies, 13 per cent by private traders and rest 70 per cent by the farmers from their own saved seed (Dhatt, 2017) [4]. Seed is considered to be one of the most crucial input in agriculture. In case of onion viability of seed is less therefore, every year it is highly essential to produce seed as per requirement. Most commonly used method of seed production is bulb to seed method which permits a grower to easily discard off types, diseased or otherwise undesirable bulbs.
Plant nutrition also play an important role in quality seed production in which nitrogen is one of the most important determinant in seed yield of onion which favour greater synthesis of carbohydrate in plants resulting in higher flower and fruit set and ultimately higher seed yield. Phosphorus is a component of nucleic acids (DNA and RNA) and essential for energy transfer within the plant, thus it has a direct effect on yield and quality of onion seed. While, potassium regulates water condition within the plant cell and water loss from the plant by maintain the balance between anabolism, respiration and transpiration. Similarly it improves keeping quality of seed. 'Akola Safed' onion variety released by Dr. PDKV Akola. In view to know and study the primary nutrient requirement for the quality seed production of released variety of white onion. The experiment was conducted on the quality parameters of onion seed cv. Akola Safed along with seed yield.

2. Materials and Methods

The research work was conducted at Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during *Rabi* seasons of the years 2015-16 and 2016-17. The experiment were conducted in factorial randomized block design with three replication and twenty seven treatment combinations. The treatments consisted of factorial combinations of three levels of each, nitrogen (0, 100, 150kg ha^{-1}), phosphorus (0, 50, 75kg ha^{-1}) and potassium (0, 50, 75kg ha^{-1}). The half dose of nitrogen in the form of urea and full dose of phosphorus and potassium (Single super phosphate and muraite of potash, respectively) were applied at the time of planting. Remaining half dose of nitrogen is applied 30 DAP. The bulbs of 4-6cm diameter and having 60-80 g weight were planted along one side of the ridge at a spacing of 60cmX30cm. All the required cultural practices such as irrigation, weeding, etc. were given uniformly and when necessary. About 10 percent of the umbels were exposed black seed, harvesting was undertaken by cutting or snapping of them with a quick turn of the hand, leaving a short piece of stem attached. For graded seed, 1000 seeds were taken out and pass through 12X12 BSS (British Standard Sieve) sieve. The seeds those passed through mesh were rejected and bold seeds which remains in sieve were counted and considered as graded seed. Then on the basis of counted graded number of seeds out of 1000 seeds the per cent graded seed yield was calculated and recorded accordingly in per cent (Geetharani *et al.*, 2008) [8]. The data obtained on various parameters was statistically analyzed as per the methods suggested by Panse and Sukhatme (1967) [14].

3. Results and Discussion

3.1 Test weight (g) and germination per cent (%)

3.1.1 Effect of nitrogen levels

The data presented in Table 1 revealed that, the different levels of nitrogen on test weight and germination per cent of onion seed were found to be significant, during both the years of experiments. In the year 2015-16, the treatment N_2 recorded significantly the maximum test weight and germination per cent (3.80g and 82.02%, respectively). However, significantly the minimum test weight and germination per cent (3.23g and 69.35%, respectively) were observed in treatment N_0.

During the year 2016-17, significantly the maximum test weight and germination per cent (3.86g and 84.58%, respectively) were found in treatment N_2. Whereas, the treatment N_0 recorded significantly the minimum test weight and germination per cent (3.28g and 70.59%, respectively). More the dose of nitrogen application, it might favours enlargement of onion seeds, which could be resulted into maximum test weight of seed and an additional application of nutrients which would be effective in breaking the dormancy and as nitrogen is the integral part of the process like amino acid and protein synthesis, might have enhanced the process of protein synthesis, and ultimately would have helped to increase the germination percentage of onion seed. The results of present investigation are in close agreement with the findings of Singh *et al*. (1998) [18], Khewle (2009) [11], Khadse *et al.* (2015) [10] and El-Damarany *et al*. (2016) [7] in onion.

3.1.2 Effect of phosphorus levels

The data furnished in Table 1 revealed that, treatment P_2 recorded maximum test weight and germination per cent (3.59 g and 78.12%, respectively). Whereas, the treatment P_0 recorded minimum test weight and germination per cent (3.43 g and 74.39, respectively), during the year 2015-16.

In the year 2016-17, the treatment P_2 recorded maximum test weight and germination per cent (3.65g and 79.46%, respectively). However, the treatment P_0 recorded significantly the minimum test weight and germination per cent (3.50g and 75.76%, respectively). This might be due to the fact that, an application of higher dose of phosphorus would results in the overall development of seed in the umbel and would get more weight than ordinary seed produced without or less phosphorus treated onion plants. This could be the reason of maximum test weight of onion seed in this treatment, in the present study. Whereas, phosphorus is also an integral part of phosphate compounds, energy obtained from photosynthesis and metabolism of carbohydrates is stored in these compounds, naturally it would be stored in onion seed, and ultimately influenced the germination per cent.. Similar results have been recorded by an earlier workers Chauhan (1974) [3], Sedera (1999) [15] and Ali *et al*. (2008) [2] in onion.

3.1.3 Effect of potassium levels

During the year 2015-16, maximum test weight and germination per cent (3.58g and 77.58%, respectively) were noted in treatment K_2. Whereas, the treatment K_0 produce significantly the minimum test weight (3.46g and 75.03%, respectively).

In the year 2016-17, the treatment K_2 was recorded maximum test weight and germination per cent (3.64g and 78.98%, respectively). However, significantly the minimum test weight and germination per cent (3.53g and 76.32%, respectively) were recorded in treatment K_0 (Table 1). An application of potassium might be helpful to accelerate the translocation of photosynthates of onion crop and which in turn reflects into enlargement of onion seed, which might increase the test weight of it. However, potassium fertilizer accelerate the various enzymes, which might help in more of protein synthesis, and ultimately it would have helped to increase the germination percentage of onion seed. Similar results have been recorded by earlier workers Singh and Singh (2003) [17], Khewle (2009) [11] and Khadse *et al*. (2015) [10] in onion.

3.1.4 Interaction effect

Test weight and germination per cent of onion seed during the years 2015-16 and 2016-17 as influenced by all interactions were found to be non-significant except three way interaction between nitrogen, phosphorus and potassium.

3.1.4.1 Interaction effect between nitrogen, phosphorus and potassium

The data presented in Table 2 (a) exhibited that, the interaction effect due to nitrogen, phosphorus and potassium levels regarding the test weight, during the years 2015-16 and 2016-17 were found to be statistically significant.

During the years 2015-16 and 2016-17, the treatment combination $N_2P_2K_2$ recorded significantly the maximum test weight (3.93g and 4.00 g, respectively) and germination per cent (86.06% and 87.63%, respectively). Whereas, the treatment combination $N_0P_0K_0$ recorded minimum test weight (3.04 g and 3.13g, respectively) and germination per cent (65.78% and 66.96%, respectively). Similar results have been recorded by the earlier workers Dudhat *et al*. (2010) [6] and Dingre *et al*. (2016) [5] in onion.

4. Seed yield per hectare (q)

4.1 Effect of nitrogen levels

The pooled data furnished in Table 1 found that, significantly the maximum (12.94q) seed yield per hectare was obtained in treatment N_2. However, the treatment N_0 recorded significantly the minimum (9.44q) seed yield per hectare. This might be due to the more number of graded seeds per primary and secondary umbel, which would have recorded maximum weight of the seeds per umbel and maximum seed weight per plot. Similar results have been recorded by the earlier workers Chavan (1975), Ahemed and Abdalla (1984) [1] and Khewle (2009) [11] in onion.

4.2 Effect of phosphorus levels

The pooled data indicated that, the treatment P_2 observed significantly the maximum (12.25q) seed yield per hectare. Whereas, the treatment P_0 noticed significantly the minimum (10.68q) seed yield per hectare (Table 1). In bulbous crop like onion, the enhanced vigorous growth and development of reproductive parts of onion plant like umbel number and size, seed number and size might be achieved through higher application of phosphorus, which might be resulted into maximum seed yield hectare. Similar results have been recorded by the earlier workers like Sedera (1999) [15] and Ali *et al*. (2008) [2] in onion.

4.3 Effect of potassium levels

The pooled data directed that, the treatment K_1 measured significantly the maximum (12.06q) seed yield per hectare. However, the treatment K_0 recorded significantly the minimum (11.04q) seed yield per hectare (Table 1). An application of optimum dose of potassium might help to produce large size of umbel, its early emergence and thereby produced large number of seeds per umbel and ultimately maximum seed yield per hectare. The results of present investigation are in close agreement with the findings of Khewle (2009) [11] and El-Damarany *et al*. (2016) [7] in onion.

4.4 Interaction effects

4.4.1 Interaction effects between nitrogen and phosphorus

The pooled results in respect of seed yield per hectare was presented in Table 2(b). The treatment combination N_2P_2 produced maximum (13.41q) seed yield per hectare. Whereas, minimum (8.09q) seed yield per hectare was recorded in the treatment combination N_0P_0. Production of higher seed yield per hectare with higher level of nitrogen and phosphorus in the present investigation might be justified with the fact that, increased root mass due to application of nitrogen is largely responsible for increased plant uptake of phosphorus. At the same time higher availability of phosphorus might responsible for early root growth and proliferation, which might resulted into desired nitrogen uptake. Hence, application of nitrogen and phosphorus in conjugation might resulted into maximum number of seeds per umbel, seed weight per plant and ultimately the seed yield per hectare. The results of the present investigation are in harmony with findings of Ahmed and Abdalla (1984) [1] in onion.

4.4.2 Interaction effects between nitrogen and potassium

The pooled results in respect of seed yield per plot was exhibited significant influence due to the interaction effect of nitrogen and potassium levels treatment and presented in Table 2(b). However, the treatment combination N_2K_1 produced maximum (13.35q) seed yield per hectare. However, minimum (8.53q) seed yield per hectare was recorded in the treatment combination N_0K_0.This might be due to the fact that, optimum level of potassium application might increases nitrogen uptake with an assimilation in plant. Hence, combined efficient use of nitrogen and potassium might resulted into better plant growth and ultimately maximum seed yield per hectare. The results obtained in the present investigation are in close agreement with the findings of El-Damarany *et al.* (2016) [7] in onion.

4.4.3 Interaction effects between phosphorus and potassium

The pooled results in respect of seed yield per hectare was significantly influenced due to the interaction effect of phosphorus and potassium levels (Table 2(b)). However, the treatment combination P_2K_1 produced maximum seed yield per hectare (12.88q). Whereas, minimum seed yield per hectare (10.13q) was recorded in the treatment combination P_0K_0. The maximum seed yield of onion with this treatment combination could be ascertained with phosphorus uptake and its full utilization in plant, which was governed by osmatic and water balance maintained by optimum potassium supply. Hence, there would be the possibility of combined use of phosphorus and potassium, which might be responsible for greater physiological activities of plant and thus resulted into maximum seed yield of onion. These findings are in harmony with the results of Majumder (2011) [12] and Howlader *et al*. (2012) [9] in onion.

4.4.4 Interaction effects between nitrogen, phosphorus and potassium

The pooled data presented in Table 2(a) revealed that, significantly the maximum seed yield per hectare (14.12q) in onion was recorded in treatment combination $N_2P_2K_1$. Whereas, the treatment combination $N_0P_0K_0$ had recorded minimum seed yield per hectare (7.18q). These results are in line with the findings of earlier workers like Dingre *et al*. (2016) [5] in onion.

5. Graded seed yield (%)

5.1 Effect of nitrogen levels

The data furnished in Table 1 noticed that, the treatment N_2 recorded significantly the maximum graded seed yield (96.73%). However, the treatment N_0 recorded significantly the minimum graded seed yield (95.77%) in the year 2015-16. During the year 2016-17, the treatment N_2 recorded significantly the maximum (97.20%) graded seed yield. Whereas, the treatment N_0 recorded minimum graded seed yield (95.90%). The nitrogen is an integral part of the process like amino acid and protein synthesis, which would have helped to improve the quality of seed and thereby increasing the per cent graded seed yield of onion. The results of the present investigation are supported by the findings of Khewle (2009) [11] and Khadse *et al.* (2015) [10] in onion.

5.2 Effect of phosphorus levels

The treatment P_2 recorded significantly the maximum graded seed yield (96.60%). However, P_0 recorded minimum graded seed yield (96.02%), during the year 2015-16.

In subsequent year, maximum graded seed yield (96.98%) was observed in treatment P_2 and treatment P_0 which was recorded minimum graded seed yield (96.27%) Table 1. The applied phosphorus is an integral part of phosphate compounds, such as Adenosine diphosphate and Adenosine triphosphate, energy obtained from photosynthesis and metabolism of carbohydrates is stored in these compounds,

which subsequently used in growth and reproductive process of plant that ultimately positively influenced the quality of seed and might be reflected in higher percentage of graded seed yield of onion. The results of the present investigation are supported by the finding of Naval (2015) [13] in onion.

5.3 Effect of potassium levels

During the years 2015-16 and 2016-17, the treatment K_2 was recorded maximum graded seed yield (96.84 and 97.16%, respectively) and it was recorded minimum graded seed yield (95.56 and 95.88%, respectively) in the treatment K_0 (Table 1). The potassium is an important primary element for many crop quality characteristics, due to its involvement in synthesis and transfer of photosynthates to the reproductive part like umbel and thereby increase the graded seed yield of onion in the present study. The results of the present investigation are supported by the finding of Khadse *et al.* (2015) [10] in onion.

5.4 Interaction effect

All interaction effects of nitrogen, phosphorus and potassium on the graded seed yield, during both the years of experimentation 2015-16 and 2016-17 were found to be non-significant, except interaction between nitrogen and potassium.

5.4.1 Interaction effect between nitrogen and potassium

In the year 2015-16, the treatment combination N_2K_2 recorded maximum (97.30%) graded seed yield. However, significantly the minimum (94.53%) graded seed yield was found in treatment combination N_0K_0.

During the year 2016-17, significantly the maximum (97.82%) graded seed yield was observed in treatment combination N_2K_2. Whereas, the treatment combination N_0K_0 recorded significantly the minimum (94.66%) graded seed yield (Table 3). This might be due to the fact that, maximum utilization and functioning of potassium in plant is governed by optimum nitrogen supply. Hence, combined use of nitrogen and potassium might be resulted into higher seed setting with graded seed yield of seed in crop like onion. The results of the present investigation are supported by the findings of Khewle (2009) [11] and Khadse *et al.* (2015) [10] in onion.

Table 1: Effect of nitrogen, phosphorus and potassium levels on quality and yield characters of onion seed

Treatments	Test weight (g)	Germination per cent (%)		Graded seed yield (%)		Seed yield per hectare (q)
	2015-16	2016-17	2015-16	2016-17	2015-16	2016-17	Pooled
Nitrogen (N)							
N_0 - 0 Kg ha^{-1}	3.23	3.28	69.35 (56.40)	70.59 (57.18)	95.77 (78.25)	95.90 (78.44)	9.44
N_1 - 100 Kg ha^{-1}	3.57	3.63	77.65 (61.81)	78.99 (62.74)	96.50 (79.23)	96.78 (79.68)	12.57
N_2 - 150 Kg ha^{-1}	3.80	3.86	83.02 (65.71)	84.58 (66.92)	96.73 (79.63)	97.20 (80.45)	12.94
'F' test	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE(m) ±	0.01	0.01	0.08	0.10	0.15	0.13	0.03
CD at 5%	0.03	0.02	0.22	0.27	0.43	0.37	0.08
Phosphorus (P)							
P_0 - 0 Kg ha^{-1}	3.43	3.50	74.39 (59.74)	75.76 (60.67)	96.02 (78.59)	96.27 (78.99)	10.68
P_1 - 50 Kg ha^{-1}	3.57	3.63	77.51 (61.86)	78.93 (62.88)	96.39 (79.09)	96.63 (79.49)	12.03
P_2 - 75 Kg ha^{-1}	3.59	3.65	78.12 (62.31)	79.46 (63.29)	96.60 (79.43)	96.98 (80.09)	12.25
'F' test	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE(m) ±	0.01	0.01	0.08	0.10	0.15	0.13	0.03
CD at 5%	0.03	0.02	0.22	0.27	0.43	0.37	0.08
Potassium (K)							
K_0 - 0 Kg ha^{-1}	3.46	3.53	75.03 (60.18)	76.32 (61.05)	95.56 (77.92)	95.88 (78.40)	11.04
K_1 - 50 Kg ha^{-1}	3.55	3.62	77.40 (61.82)	78.86 (62.87)	96.60 (79.39)	96.84 (79.77)	12.06
K_2 - 75 Kg ha^{-1}	3.58	3.64	77.58 (61.91)	78.98 (62.91)	96.84 (79.80)	97.16 (80.39)	11.86
'F' test	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE(m) ±	0.01	0.01	0.08	0.10	0.15	0.13	0.03
CD at 5%	0.03	0.02	0.22	0.27	0.43	0.37	0.08
Interaction (N X P)							
'F' test	NS	NS	NS	NS	NS	NS	Sig
SE(m) ±	0.02	0.02	0.13	0.17	0.26	0.23	0.05
CD at 5%	-	-	-	-	-	-	0.14
Interaction (N X K)							
'F' test	NS	NS	NS	NS	Sig	Sig	Sig
SE(m) ±	0.02	0.02	0.13	0.17	0.26	0.23	0.05
CD at 5%	-	-	-	-	0.75	0.65	0.14
Interaction (P X K)							
'F' test	NS	NS	NS	NS	NS	NS	Sig
SE(m) ±	0.02	0.02	0.13	0.17	0.26	0.23	0.05

CD at 5%	-	-	-	-	-	-	0.14
Interaction (N X P X K)							
'F' test	Sig	Sig	Sig	Sig	NS	NS	Sig
SE(m) ±	0.03	0.03	0.23	0.29	0.46	0.40	0.09
CD at 5%	0.08	0.07	0.65	0.81	-	-	0.25

(Figures in parentheses are arc sin value transformation)

Table 2a: Interaction effect between nitrogen, phosphorus and potassium levels on test weight (g), germination per cent (%) and seed yield per hectare (q)

N x P x K	Test weight (g)						Germination per cent (%)						Seed yield per hectare (q)		
	2015-16			2016-17			2015-16			2016-17			Pooled		
	N_0	N_1	N_2	N_0	N_1	N_2	N_0	N_1	N_2	N_0	N_1	N_2	N_0	N_1	N_2
P_0K_0	3.04	3.43	3.63	3.13	3.49	3.69	65.78 (54.21)	74.22 (59.49)	78.77 (62.56)	66.96 (54.93)	75.68 (60.43)	80.23 (63.60)	7.18	11.32	11.89
P_0K_1	3.12	3.55	3.73	3.17	3.63	3.79	66.73 (54.77)	77.69 (61.81)	81.43 (64.47)	67.81 (55.43)	78.98 (62.70)	83.11 (65.70)	8.41	12.26	12.09
P_0K_2	3.18	3.46	3.75	3.23	3.52	3.81	68.07 (55.59)	74.99 (59.99)	81.87 (64.80)	69.20 (56.30)	76.37 (60.90)	83.48 (66.03)	8.69	11.77	12.52
P_1K_0	3.22	3.53	3.78	3.27	3.59	3.84	69.13 (56.25)	76.59 (61.07)	82.44 (65.23)	70.52 (57.10)	77.40 (61.60)	83.69 (66.20)	9.45	12.44	12.77
P_1K_1	3.26	3.65	3.84	3.38	3.71	3.95	71.70 (57.86)	79.46 (63.05)	84.47 (66.79)	72.86 (58.60)	80.92 (64.10)	86.29 (68.27)	9.94	13.42	13.83
P_1K_2	3.33	3.63	3.85	3.31	3.73	3.90	70.11 (56.86)	79.81 (63.30)	83.87 (66.33)	71.74 (57.90)	81.45 (64.50)	85.53 (67.63)	10.11	13.12	13.17
P_2K_0	3.19	3.55	3.81	3.24	3.60	3.87	68.22 (55.69)	76.95 (61.31)	83.18 (65.79)	69.36 (56.40)	78.29 (62.23)	84.72 (66.97)	8.95	12.43	12.91
P_2K_1	3.30	3.60	3.86	3.35	3.66	3.92	73.47 (59.00)	78.18 (62.15)	85.13 (67.32)	74.72 (59.80)	79.53 (63.10)	86.55 (68.50)	11.16	13.36	14.12
P_2K_2	3.40	3.71	3.93	3.46	3.77	4.00	70.91 (57.36)	80.94 (64.12)	86.06 (68.08)	72.10 (58.13)	82.26 (65.07)	87.63 (69.40)	11.09	13.04	13.20
'F' test	Sig			Sig			Sig			Sig			Sig		
SE(m) ±	0.03			0.03			0.23			0.29			0.09		
CD at 5%	0.08			0.07			0.65			0.81			0.25		

(Figures in parentheses are arc sin value transformation)

Table 2b: Effect of different interaction on seed yield per hectare (q) of onion

N x P	Seed yield per hectare (q)			N x K	Seed yield per hectare (q)			P x K	Seed yield per hectare (q)		
	Pooled				Pooled				Pooled		
	N_0	N_1	N_2		N_0	N_1	N_2		P_0	P_1	P_2
P_0	8.09	11.78	12.17	K_0	8.53	12.06	12.52	K_0	10.13	11.55	11.43
P_1	9.83	13.00	13.26	K_1	9.83	13.01	13.35	K_1	10.92	12.40	12.88
P_2	10.40	12.94	13.41	K_2	9.96	12.64	12.96	K_2	10.99	12.13	12.44
'F' test	Sig			'F' test	Sig			'F' test	Sig		
SE(m) ±	0.05			SE(m) ±	0.05			SE(m) ±	0.05		
CD at 5%	0.14			CD at 5%	0.14			CD at 5%	0.14		

Table 3: Interaction effect between nitrogen and potassium levels on graded seed yield (%)

N x K	Graded seed yield (%)					
	2015-16			2016-17		
	N_0	N_1	N_2	N_0	N_1	N_2
K_0	94.53 (76.62)	96.02 (78.50)	96.12 (78.64)	94.66 (76.77)	96.35 (79.00)	96.63 (79.43)
K_1	96.37 (79.04)	96.67 (79.49)	96.76 (79.64)	96.44 (79.12)	96.93 (79.91)	97.15 (80.29)
K_2	96.42 (79.09)	96.80 (79.70)	97.30 (80.60)	96.62 (79.43)	97.06 (80.13)	97.82 (81.62)
'F' test	Sig			Sig		
SE(m) ±	0.26			0.23		
CD at 5%	0.75			0.65		

(Figures in parentheses are arc sin value transformation)

6. Conclusion

It is inferred from the above result that, the quality of onion seed in general i.e. test weight (g), germination per cent (%) and graded seed yield (%) had exhibited significantly due to the application of higher levels of primary nutrients i.e. 150kg N, 75kg P_2O_5 and 75kg K_2O ($N_2P_2K_2$). As far as the onion seed yield per hectare production was concerned, significantly the maximum (14.12q/ha)quantum of it pertaining to all twenty seven treatment combinations, application of 150kg N, 75kg P_2O_5 along with 50kg K_2O ($N_2P_2K_1$) had been obtained in the present investigation.

7. Retrenches

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