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Effects of seed treatments with botanical, chemical, on seed yield and quality traits in groundnut (*Arachis hypogea* L.)

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Abstract

The present investigation was conducted to examine the 8 treatments along with control to study about their effects on the yield and yield attributing traits of groundnut. The experiment was conducted at Field Experimentation Center, Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad during *Kharif*, 2016 in a Randomized Block Design with three replications. Analysis of variance showed highly significant differences from the control plot were studied. Highest per plant yield was also recorded from individual application the Neem leaf extract solution (5%) with soaking duration six hours and calcium chloride (CaCl₂) 2% solution on soaking duration 12 hours were gave best performance respectively in decreasing order. All of the treatment found were significantly increased the yield and yield attributing traits of groundnut under field condition as compared to control plot. These results emphasize the need for the use of botanical and chemical for ensuring sustainable production, better growth and improved productivity of this important oil yielding plant.

Keywords: botanical, chemical, *Arachis hypogea* L.

1. Introduction

Groundnut (*Arachis hypogea* L.), family, Leguminosae an important crop among oilseeds, is a self pollinated, chromosome no. (2n=40) grown in tropical and a sub-tropical regions of the world. Groundnut is believed to be the native of Brazil. Groundnut has other anonymous each peanut, earthnut, monkey nut, goober, pinda and manila nut. Groundnut is the also known as "The king of oilseeds. The chemical substance induce the protection against insect and pathogens hence the good viability and vigour of crop will be obtained. In recent years, some encouraging results with pre-sowing treatment on the yield and oil content of groundnut. Subbaraman and Selvaraj (1989) [24] reported the positive effect of ground nut seed yield and quality with pre-sowing treatment of calcium chloride in India. Akbari *et al* (1998) [1] and Petel *et al* (1990) [23] observed that application of phosphorus fertilizer increased the pod yield significantly and oil content of groundnut. Neem (*Azadirachta indica* A. Juss; Meliaceae), is one plant source of botanical pesticide that can be used for pest control. Based on the content of active ingredient, neem seeds and leaves contained *azadirachtins* the main active compound, meliantriol, salanin, and Nimbin, which are the result of secondary metabolites from the neem tree, which are concentrated more in the seed and the bark. The active compounds of neem tree do not kill pests quickly, but the effect on feeding, growth, reproduction power, molting process, disrupt mating, and sexual communication. These active compounds of neem had been reported effect on approximately 400 insects. Reported that 5% neem leaf extract had strong antifeedant effect against *S. litura* on groundnut. Available reports suggest that exploiting botanicals with antifungal activity offers an economic, safe and easily available alternative method for the management of leaf spot of groundnut (Rahman and Hossain, 1996) [22].

Essential oil obtained from neem leaf has fungi toxicity. The Botanical treating agent and use for seed treatment. The chemical substance or active principle present in this neem leaf extract induce the protection against insect and pathogens hence the good viability and vigour of crop will be obtained.

2. Material and Methods

The field experiment for the present investigation entitled "Effect of seed treatments with botanical and chemical and its duration on seed yield and quality traits in groundnut (*Arachis hypogea* L.) For yield and yield contributing traits" was conducted during Kharif-2016 at field

experimentation centre of Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, (U.P.). The field experimental setup was laid out in randomized block design (RBD) with 3 replications during the 2016 growing season. Standard agronomic practices and plant protection measures were adopted as per schedule. Observations were recorded on five randomly selected plants per replications for field emergence plant height primary branches/plant, pod/plant, mature kernel, hundred kernel weight shelling, kernel yield, kernel uniformity and observation on days to 50% flowering and days to maturity were recorded on plot basis and 4 quality character pod length, pod width kernel length, kernel width. The field data were analyzed statistically as per randomized block design (RBD) as suggested by.

3. Results and Discussion

The mean sum of squares value for 11 quantitative characters and 4 quality characters studied. The highest field emergence % 60 DAS (73.17) reported in treatment second T₂ 5% neem leaf extract with soaking duration 12 hours, followed by T₆ (72.25) 1% Calcium chloride (CaCl₂) with soaking duration 12 hours and lowest field emergence % recorded by T₈ (65.67) 2% Calcium chloride (CaCl₂) with soaking duration 6 hours. Earliest days to 50% flowering (26.00) reported in treatments third T₃ 10% neem leaf extract with soaking duration 6 hours, followed by T₆ (26.00) 1% Calcium chloride (CaCl₂) with soaking duration 12 hours and latest day to 50% flowering recorded by T₁ (31.00) 5% neem leaf extract with soaking duration 6 hours. The highest plant height (64.53) reported in Treatments first T₁ 5% neem leaf extract with soaking duration 6 hours, followed by T₄ (59.67) 10% neem leaf extract with soaking duration 12 hours and lowest plant height recorded by T₇ 2% Calcium chloride (CaCl₂) with soaking duration 6 hours. The highest Primary branches per plant (6.77) reported in Treatments second T₂ 5% neem leaf extract with soaking duration 12 hours, followed by T₃ (6.17) 10% neem leaf extract with soaking duration 6 hours and lowest Primary branches/plant recorded by T₄ (5.20) 10% neem leaf extract with soaking duration 12 hours. Earliest days to maturity (120.31) reported in Treatments third T₃ 10% neem leaf extract with soaking duration 6 hours, followed by T₆ (121.49) 1% Calcium chloride (CaCl₂) with soaking duration 12 hours and late days to maturity recorded by T₃

(122.88) 10% neem leaf extract with soaking duration 6 hours. The highest Hundred kernel weight (gm.) (47.30) reported in Treatments first T₁ 5% neem leaf extract with soaking duration 6 hours, followed by T₇ (45.43) 2% Calcium chloride (CaCl₂) and lowest hundred kernel weight recorded by T₅ (36.66) 1% Calcium chloride (CaCl₂) with soaking duration 6 hours. Highest mature kernel % (72.43) reported in Treatments first T₁ 5% neem leaf extract with soaking duration 6 hours, followed by T₂ (70.44) 5% neem leaf extract with soaking duration 12 hours and lowest mature kernel % recorded by T₆ (64.62) 1% Calcium chloride (CaCl₂) with soaking duration 12 hours. Highest Kernel uniformity % (89.93) reported in Treatments sixth T₆ 1% Calcium chloride (CaCl₂) with soaking duration 12 hours, followed by T₅ (88.33) 1% Calcium chloride (CaCl₂) with soaking duration 6 hours and lowest kernel uniformity % recorded by T₃ (79.08) 10% neem leaf extract with soaking duration 6 hours. Highest shelling % (86.46) reported in Treatment seventh T₇ 2% Calcium chloride (CaCl₂) with soaking duration 6 hours, followed by T₅ (71.40) 1% Calcium chloride (CaCl₂) with soaking duration 6 hours and lowest shelling % recorded by T₁ (69.46) 5% neem leaf extract with soaking duration 6 hours. Maximum pod length (32.70 mm) reported in Treatment seventh T₇ 2% Calcium chloride (CaCl₂) with soaking duration 6 hours, followed by T₁ (32.27 mm) 5% neem leaf extract with soaking duration 6 hours and lowest pod length recorded by T₄ (22.50 mm) 10% neem leaf extract with soaking duration 12 hours. Maximum pod width (14.80 mm) reported in Treatments first T₁ 5% neem leaf extract with soaking duration 6 hours, followed by T₄ (14.00 mm) 10% neem leaf extract with soaking duration 12 hours and lowest pod width recorded by T₆ (10.60 mm) 1% Calcium chloride (CaCl₂) with soaking duration 12 hours. Maximum seed length (18.20 mm) reported in Treatment fifth T₅ 1% Calcium chloride (CaCl₂), followed by T₂ 5% neem leaf extract with soaking duration 12 hours and lowest seed length recorded by T₃ 10% neem leaf extract with soaking duration 6 hours. Maximum seed width (10.40 mm) reported in Treatment fifth T₅ 1% Calcium chloride (CaCl₂) with soaking duration 6 hours, followed by T₇ 2% Calcium chloride (CaCl₂) with soaking duration 6 hours and lowest seed width recorded by T₄ (6.63 mm) 10% neem leaf extract with soaking duration 12 hours.

Table 1 (a): Mean performance of 9 Treatments of groundnut variety amber for 5 quantitative characters

S. No.	Treatments	Field Emergence	Plant Height (cm)	Days to 50% Flowering	Primary Branches/Plant	Days to Maturity
1	T ₁	72.80	64.53	31.00	6.03	120.48
2	T ₂	73.17	46.87	27.67	6.77	118.41
3	T ₃	71.75	49.93	26.00	6.17	122.88
4	T ₄	70.08	59.67	27.33	5.20	120.31
5	T ₅	71.70	53.67	28.33	5.63	120.47
6	T ₆	72.25	56.13	26.00	5.90	121.49
7	T ₇	68.77	44.33	29.00	5.96	121.53
8	T ₈	65.67	45.93	27.67	6.20	122.20
9	T ₀	68.47	46.53	26.00	6.13	121.91
Grand Mean		70.51	51.95	27.66	5.90	121.07
C.V.		2.44	0.66	5.75	6.21	1.12
S.E.		1.41	0.28	1.30	0.30	1.10
C.D.5%		2.98	0.60	2.75	0.64	2.34
Range	Min.	65.67	44.33	26.00	5.20	120.31
	Max.	73.17	64.53	31.00	6.77	122.88

Table 1 (b): Mean performance of 9 Treatments of groundnut variety amber for 6 quantitative characters

Sr. No	Treatments	Pod/ Plant	Pod Yield/Plant	Shelling (%)	100 Kernel Weight	Mature Kernel	K. U.%
1	T ₁	11.37	68.60	69.43	47.30	72.43	87.34
2	T ₂	9.03	54.57	71.10	43.67	70.44	83.45
3	T ₃	10.73	49.70	70.07	41.57	66.80	79.08
4	T ₄	10.13	51.43	70.43	41.43	68.80	78.60
5	T ₅	11.60	55.70	71.40	41.43	68.68	88.33
6	T ₆	8.70	54.33	72.63	42.87	64.62	89.93
7	T ₇	9.73	56.30	70.40	45.43	68.78	86.46
8	T ₈	8.80	51.83	73.03	42.53	66.86	85.33
9	T ₀	9.30	50.67	70.60	43.80	65.47	81.59
Grand Mean		9.93	54.79	71.01	43.33	68.09	84.45
C.V		8.66	5.91	1.41	2.88	2.04	1.72
S.E.		0.70	2.65	0.82	1.02	1.13	1.18
C.D.5%		1.49	5.61	1.74	2.16	2.40	2.50
Range	Min.	8.70	51.43	69.43	41.43	64.62	78.60
	Max.	11.60	68.60	73.03	47.30	72.43	88.93

Table 2: Mean performance of 9 Treatments of groundnut variety amber for 4 quality characters

Sr. No	Treatments	Pod width (mm)	Pod Length (mm)	Kernel length (mm)	Kernel width (mm)
1	T ₁	15.27	32.27	17.40	8.13
2	T ₂	13.80	27.50	17.47	7.80
3	T ₃	14.80	29.00	11.73	8.53
4	T ₄	14.00	22.50	14.43	6.63
5	T ₅	13.87	32.23	18.20	10.40
6	T ₆	10.60	26.23	14.43	8.67
7	T ₇	12.37	32.70	16.37	9.60
8	T ₈	12.10	30.13	13.73	8.47
9	T ₀	11.90	28.50	15.57	7.53
Grand Mean		13.19	29.00	15.48	8.41
C.V.		2.36	4.52	3.32	2.76
S.E.		0.25	1.07	0.42	0.19
C.D.5%		0.54	2.27	0.89	0.40
Range	Min	11.90	22.50	11.43	6.63
	Max	15.27	32.70	17.47	10.40

The growth, yield and quality of seed were governed by soil and weather condition besides management practices. Crop performance under given environmental condition is also depends on methods of cultivation and variety used in vogue. Therefore there is a need for study the variation for growth, yield and quality traits. Annals of West University of Timisoara, Ser. Biology, 2015, vol. XVIII (2), pp.139-144. The result was obtained from the experiment conducted during Kharif 2016 to study the yield performance and quality parameters among the groundnut variety amber. The variation in growth parameters among the variety can be attributed due to the response of different treatment to environment and genetic makeup of the variety. Among the studied variety early days to 15% flowering was found in T₁ (31.00 days). Treatments first T₁ (64.53) had highest for plant height. Treatments second T₂ (6.77) had highest Primary branches per plant. Treatments third T₃ (120.31), had earliest days to maturity. Such variation with respect to field performance of different treatment was also reported by. The variety with more number of pods per plant was observed in Treatment T₅ (11.60). Similar findings were reported by. The selling percent is significantly highest in Treatment seven T₇ (86.46). The kernel uniformity was significantly higher in Treatment sixth T₆ (89.93). The similar findings were reported by.

4. Conclusion

Present study concluded that the treatment T₁ (Neem leaf extract 5% with soaking duration 6 hours) exhibited high mean value for growth and yield attributing characters like field emergence percentage (72.80), plant height (64.53cm) at

25 and 50 days after sowing (DAS), respectively, number of pods per plant (11.37), pod with (15.27) and pod yield per plant (68.60gm) in compared with other treatments and also with pod length (32.27) day to 50% flowering (31.00), Hundred kernel weight (47.30 gm), mature seed per kernel (72.43%).

Significant differences were observed for almost all the different quantitative and seed quality characters studied.

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