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EFFECT OF NITROGEN AND PHOSPHORUS ON GROWTH AND SEED YIELD IN SALVIA *(Salvia Splendens)*

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Seed production of ornamental flowers is a lucrative business as the return per capita is much higher than other traditional crops. Seed production of seasonal annuals has been taken up commercially by farmers of Punjab, Haryana, Karnataka Maharastra and Himachal pradesh. However, the growers are facing problem in adjusting the cropping pattern for the rest of the season. Very little information is available on growth and flowering of salvia *(Salvia splenens)* using different spacing and varieties but so far seed production potential of salvia has not been started. Keepign this fact in view the present invetigation was undertaken on *Salvia splendens*, a commercially summer season annual, under sub-temperate condition of Himachal Pradesh, to find out the optimum nutrition level for its better growth and seed production.

The experiment was conducted at Regional Horticultural Research Station, Bajaura (Kullu) of Dr. YS Parmar University of Horticulture and Forestry, H. P. during the year 1992 on a well drained sandy loam soil under irrigated conditions. Thirty days old seedlings of variety Scarlet Wueen of *Salvia splendens* were transplanted on 20 April at a spacing of 40 x 30 cm in a randomised block design with three replications. Twelve treatment consisting of four levels of nitrogen i.e. N_0-0 g; N_1 = 20 g; N_2 = 30 g and N_3 = 40 g/m^2 and three levels of phosphorus i.e. P_0 = 0 g; P_1 = 15 g; and P_2 = 30 g/m were used. Observations on plant height, plant spread, number of secondary branches plant, number of pods plant and seed yield were recorded. The plant height and plant spread were measured at the time of first picking. The pod numbers per branch were counted manually. The full mature seeds were harvested when the pods showed the sign of dryness and splitting. Seed/per net plot area was weighted after proper cleaning.

It is evident (Table 1) that application of nitrogen had a significant influence on plant height. Maximum plant height (72.13 cm) was recorded when nitrogen was applied with 30g/ m^2 which was significantly higher than the plant height 69.66 cm and 67.57 cm when nitrogen levels were applied @ 20 g/m^2 and 40 g/m^2, respectively. The plant height was found to be unaffected due to the application for phosphorus. The plant spread of 46.20 cm and 47.28 cm was observed when the nitrogen level of 20 g/m^2 and phosphorus level of 15 g/m^2, respectively were applied. With further increase in phosphorus level, plant spread decreased. The results are in close conformity with the findings of John *et al.* (1986) in pansy. The application of nitrogen had improved the plant growth due to increased synthesis of protein and protoplasm (Wandleigh, 1957).

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Application of nitrogen and phosphorus significantly enhanced the secondary branches, pod number and seed yield. Application of nitrogen and phosphorus @ 20 g/m^2 and 15 g/m^2, respectively, significantly increased branch number over the control. The values were 17.78 cm with N_1 level and 19.12 cm with P_1 level. Similarly, pod number per plant were maximum (148.20) at N^2 level as compared to control. The phosphorus application @ 30 g/m^2 resulted in maximum number of pod (153.26 / plant) as compared with 145.89 pods/plant at P_1 level. The seed yield 42.03 g/m^2 was recorded to be maximum with N_2 level, however, further increases in nitrogen level, the seed yield to decreased to 38.62 g/m^2 from N_2 to N_3. The increase in seed level of nitrogen upto 30 g was mainly due to increase in plant height and spread, which further encourage the production of branches and pods. Similar findings have been reported by John et al. (1986) in pansy. The data presented on yield/per plot revealed that it was heightest (42.67 gm^2) at P_1 level and lowest (39.56 g/m^2) at P_2 level. This could be attributed to the fact that phosphorus playas key role in plant metabolism and structure. Similar are the findings of Broschat (1979). It can therefore, be concluded that phosphorus upto 15 g/m^2 is beneficial for higher seed yield of salvia.

The interaction of nitrogen and phosphorus significantly improved plant height and spread which ultimately influence seed yield (Table 2). Maximum plant height i.e. 74.30 cm was recorded in treatment combination N_2P_1 whereas the plant spread was maximum (48.96 cm) at N_1P_1 level. Significant differences in secondary branches, pod number and seed yield were also observed due to interaction between different nitrogen and phosphorus levels. The maximum secondary branches (20.56/ plant) and seed yield (49.67 g/m^2) were record with N_2P_1. Maximum pod/plant 158.67) was recorded with N_1P_2 levels. The result are in conformity with the findings of Jana and Pal (1991) who recorded maximum growth of plants, more number of flowers and seed yields due to combined application of 20 g nitrogen, 10g phosphorus and 10 g potash per m^2 in cosmos

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Table 1. Effect of interaction N x P on plant growth seed yield attributes in salvia

Treatment	Plant height Cm	Plant spread cm	Secondary Branches/ Plant	Pod Number/plant	Seed Yield/m^2 (g)
N_0	70.56	42.36	16.67	135.67	40.76
N_{20}	69.66	45.29	17.78	146.08	40.98
N_{30}	72.13	45.12	17.21	148.20	42.03
N_{40}	67.57	46.20	17.56	146.46	38.62
CD 0.05	0.93	0.96	1.02	9.86	2.69
P_0	72.16	46.56	18.16	150.57	40.89
P_{15}	71.96	47.28	19.12	145.89	42.67
P_{30}	70.60	46.78	17.58	153.26	39.56
CD 0.05	0.82	0.84	0.88	8.36	2.24

Table 2. Effect of interaction N x P on plant growth and seed yield attributes in salvia

Treatment	Plant height Cm	Plant spread cm	Secondary Branches/ Plant	Pod number / Plant	Seed yield/m^2(g)
N_0P_0	72.56	42.78	18.67	138.68	43.08
N_0P_{15}	71.20	43.16	18.67	139.33	42.67
N_0P_{30}	76.78	45.79	15.66	141.67	39.33
$N_{20}P_0$	69.67	45.60	18.67	143.56	42.20
$N_{20}P_{15}$	71.56	48.96	19.78	147.23	45.46
$N_{20}P_{30}$	71.48	45.92	18.98	158.67	39.67
$N_{30}P_0$	72.96	45.33	17.36	156.22	43.86
$N_{30}P_{15}$	74.30	45.70	20.56	142.96	49.67
$N_{30}P_{30}$	73.52	46.43	15.76	156.08	40.86
$N_{40}P_0$	71.70	46.97	19.56	156.22	41.76
$N_{40}P_{15}$	67.52	47.08	18.67	146.44	38.46
$N_{40}P_{30}$	67.30	45.56	18.78	148.66	30.56
CD 0.05%	1.49	1.58	1.72	16.96	3.98