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Influence of different combinations of nitrogen, phosphorus and potassium on seed yield and quality in phlox *(Phlox drumondii cv.* GLOBE MIX*)*

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ABSTRACT
Investigations were carried out to study the effect of NPK in different combinations on seed yield and quality in phlox. It was concluded that application of 60:30:30kg NPK ha^{-1} recorded the highest seed yield (118.4kg/ha^{-1}) with maximum germination (91.5%).

Key ward : Phlox, Drumondri, Nitrogen, Phosphorus, Potassium.

INTRODUCTION

Phlox, a genus with 60 species of herbaceous perennials, handy and half-hardy, sub shrub and annuals. Most of which are native to North America and Mexico, and grown for their show flowers. *Phlox drummondii* is an annual flower crop with purple flower, which belongs to polemoniaceae. Seed production in flower crop is a highly specialized task warranting expertise technical knowledge, frequent and timely attention compared to other commercial crops. The major constraints in annual flower seed production are non-availability of information on various aspects of seed production such as spacing, manuring and foliar spray effect (Tomar, 1998). For the cultivation of modern varieties an appropriate management strategy with chemical fertilizer have contributed upto 50% increase in food grain output (Brown and Ray 1983). In order to achieve higher productivity of quality seeds, a knowledge on optimum fertilizer dose and plant population is important. Keeping in view the above factors, the present experiment was conducted with aim to study the influence of major nutrients on yield and quality of phlox seeds.

MATERIALS AND METHODS

A field trail was conducted during Rabi season at Horticultural Research Station, Udhagamandalam. The graded seeds (BSS 16X16) of phlox were sown in raised nursery beds and thirty-five days old seedlings were transplanted in the main field after basal application of fertilizer as per treatment by adopting randomized block design with four replications. The treatment details are as follows

T_0 - With out fertilizer application (Control)
T_1 - 60: 30:30 kg NPK/ha
T_2 - 80: 40:40 kg NPK/ha
T_3 - 100: 50:50 kg NPK/ha
T_4 - 120: 60:60 kg NPK/ha
T_5 - 140: 70:70 kg NPK /ha

The Full dose of P, K and half dose of the N was applied as basal and remaining N was applied at split doses; one at 20 days after transplanting and other at the time of flowering. Yield and Yield attributing parameters were recorded in each treatment namely, days to flowering, days to 50% flowering, number of branches $plant^{-1}$, plant height (cm), pod number $plant^{-1}$, pod yield $plant^{-1}$, pod yield $plot^{-1}$, pod yield ha^{-1}, seed yield $plant^{-1}$, seed yield $plot^{-1}$and seed yield ha^{-1}. The seed quality parameters viz., Seed recovery (%), germination (%), root length (cm), shoot length (cm), dry matter production (mg) and vigour index (Abdul-baki and Anderson (1973) method). The data obtained were subjected to statistical Analysis (Panse and Sukhatme, (2000).

RESULTS AND DISCUSSION

Various doses of fertilizer application had highly significant effect on yield and yield attributing characters. Among the treatments, the plots applied with 100:50:50 kg NPK ha^{-1} flowered earlier (I^{st} & 50% flowering) than other treatments and Control (5&6 days, respectively over control). In control flowering was delayed due to nitrogen deficiency, which caused delay in the formation of flower buds. (Bose and Roy, 1968). The plant characters viz., number of branches $plant^{-1}$ plant height (cm), pod and seed characters in terms of $plant^{-1}$, $plot^{-1}$, and ha^{-1} were higher in lower dose of fertilizer applied plot (60:30:30 kg NPK ha^{-1}) over higher doses and control (table 1). The enhancement of growth characters might be ascribed to the influence of nitrogen, the chief constituent of protein, essential for the formation of protoplasm. Moreover, nitrogen is an important component of amino acids and co enzymes which are of considerable biological importance (Verma and Tandon, 1988). Application of nitrogen seems to result in greater synthesis of carbohydrates in plants, which accelerated seed formation. Similarly, seed recovery (%) was also higher for the above said treatment. The resultant seed obtained from the plots fertilized with 60:30:30 kg NPK ha^{-1}

Table 1 : Effect of fertilizer levels on Plant height, Number of branches, days to flowering, Pod number and Pod yield in Phlox cv. Globe mix

Treatments	Plant height (cm)	Number of branches $plant^{-1}$	Days to flowering	Days to 50% flowering	Pod number $plant^{-1}$	Pod yield (g $plant^{-1}$)	Pod yield (g $plot^{-1}$)	Pod yield (kg ha^{-1})
T_0	25.7	6.0	45.5	58.0	141	1.81	11.5	115.4
T_1	35.6	9.5	42.5	52.0	201	2.51	17.3	173.3
T_2	32.2	8.3	40.5	52.3	183	2.28	15.9	159.1
T_3	30.6	7.0	42.8	53.8	169	2.20	14.9	148.8
T_4	31.1	7.3	41.3	54.3	164	1.95	13.9	139.3
T_5	31.2	6.5	41.0	54.5	166	1.96	13.8	138.1
SE(d)	1.21	0.94	1.47	1.28	4.3	0.06	0.58	5.84
CD (P=0.05)	2.54**	1.97**	3.12**	2.70**	9.2**	0.12**	1.25**	12.46**

Table 2 : Effect of fertilizer levels on Seed yield, Seed recovery, Seed quality and Vigour in Phlox cv. Globe mix

Treatments	Seed yield (g plant^{-1})	Seed yield (g plot^{-1})	Seed yield (kg ha^{-1})	Seed recovery (%)	Germination (%)	Root length (cm)	Shoot length (cm)	Drymatter production (g Seedlings^{-10})	Vigour Index
T_0	1.22	7.7	77.9	90.7 (72.2)	73.0 (58.70)	2.8	2.6	0.017	391
T_1	1.72	11.8	118.4	91.7 (73.3)	91.5 (73.3)	6.0	5.7	0.034	1067
T_2	1.56	10.9	108.9	92.3 (73.9)	88.0 (69.8)	5.3	5.2	0.029	922
T_3	1.50	10.1	101.7	92.9 (74.5)	79.5 (63.1)	5.0	5.0	0.033	795
T_4	1.34	9.6	95.9	92.3 (73.9)	79.0 (62.8)	5.2	4.9	0.032	796
T_5	1.34	9.5	94.6	91.5 (73.0)	81.5 (64.5)	4.9	4.8	0.030	794
SE(d)	0.04	0.33	3.32	0.68	2.04	0.27	0.30	0.002	41.79
CD(P=0.05)	0.09**	0.71**	7.09**	NS	4.34**	0.58**	0.63**	0.005**	89.07**

Figures in the paranthesis indicate arc sine values

registered higher germination (92%), root length (6.0 cm), shoot length (5.7 cm), dry matter production (0.034 g per 10 seedling) and vigour index (1067) (table 2). The reason could be that the nutrients applied at optimum rate for plant is to induce the formation of protein, enzymes in adequate quanta's which would have acted on the metabolites in the seed (Tisdale and Nelson, 1975) and resulted in the better seed quality.

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