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Growth of forest tree species as influenced by foliar spray of nutrients

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ABSTRACT

A study was undertaken to evaluate the effect of foliar spray of nutrients on growth of different tree species in nursery with the objective to get good quality planting stock for the plantation in field. Pooled results of two years indicate that foliar application of phosphoric acid @ 0.1 per cent at 45 and 90 days after sowing (DAS) of seeds in polybags recorded maximum growth (height and collar diameter) of all tree species viz *Acacia leucophloea, A holosericea, A Senegal, Albizzia lebbeck, Leucaena leucocephala* and *Prosopis cineraria* which was significantly higher over water spray and ammonium molybdate @ 0.01 per cent followed by DAP (1.0%), thiourea (550 ppm) and urea (3.0%).

Keywords: Phosphoric acid; DAP; urea; thiourea; ammonium molybdate; growth

INTRODUCTION

The establishment and survival of the planting stock in the field are mainly dependent on the production of good quality planting stock which is dependent on the suitable potting mixture as well as artificial supply of nutrients. Evidences have clearly shown that nutrition in nurseries would ward off any incidence of stunted growth, poor survival as well as lower seedling stand (Raina et al 1988, Tiwari and Saxena 2003). For such purposes the application of nutrients to the foliage as foliar spray during early stages of growth has been found effective for correction of serious nutrient deficiencies, to enhance biochemical content in a readily available form and provide instant nourishment to the seedlings (Dhiraj and Kumar 2012). Further due to the presence of antioxidants, essential amino acids and macro and micro nutrients in foliar spray it directly influences the seedling growth of tree species. Since information on effect of nutrients applied through spray on forest seedlings is scarce the present study was carried out with the objective to study the effect of foliar application of nutrients and thiourea on growth of tree saplings in the nursery.

MATERIAL AND METHODS

A study was carried out under nursery condition at Soil and Water Conservation Research and Demonstration Centre, College of Technology and Agricultural Engineering, Udaipur. The soils of experimental site used in filling of polythene bag were clay loam and had pH 7.4, available nitrogen 295.2 kg/ha, phosphorus 21.5 kg/ha and potassium 355.4 kg/ha. Uniform and surface sterilized seeds of *Acacia leucophloea, A holosericea, A Senegal, Albizzia lebbeck, Leucaena leucocephala* and *Prosopis cineraria* were taken and after hot water treatment were sown in polythene bags (size 25 x 10 cm) duly filled with mixture of soil, sand and FYM in the ratio of 3:1:1. Two seeds of each species were sown in poly bags in the last week of March during both the years. Regular irrigation was done throughout growing period in the nursery beds as per requirement. After 3 weeks thinning operation was performed to retain one healthy seedling in each poly bag. Poly bags with single seedling of each tree species were then divided and arranged in beds into 6 groups containing 40 seedlings of each tree species in each group in completely randomized block design. Group 2 to 6 were given scheduled treatments ie phosphoric acid (0.1%), DAP (1.0%), urea (3.0%), thiourea (500 ppm) and ammonium molybdate (0.01%). All chemicals were foliar sprayed at 45 and 90 days after sowing (DAS) of seeds in poly bags. Group 1 was kept as control and sprayed with water only. Ten seedlings from each group/treatment and of tree species were selected for recording shoot length and collar diameter after 15 days of last spray.

RESULTS AND DISCUSSION

The foliar application of nutrients/ chemicals viz phosphoric acid, DAP, urea and thiourea at 45 and 90 DAS of seeds in polybags significantly enhanced growth in terms of height and collar diameter of *Acacia leucophloea, A holosericea, A Senegal, Albizzia lebbeck, Leucaena leucocephala* and *Prosopis cineraria* compared to water and ammonium molybdate spray. Foliar spray of phosphoric acid at 0.1 per cent recorded maximum growth of all tree species under study which was found at par with DAP 1.0 per cent, urea 3.0 per cent and thiourea 500 ppm. The phosphoric acid significantly improved height and collar diameter of *Acacia leucophloea* by 50.9 and 51.8, *Albizzia lebbeck* by 67.1 and 46.4, *L leucocephala* by 39.6 and 38.0, *Acacia holosericea* by 53.4 and 63.6, *P cineraria* by 52.7 and 61.9 and *Acacia senegal* by 63.8 and 84.6 per cent respectively over control. The DAP was found next best treatment which increased above growth parameters of *Acacia leucophloea* by 47.5 and 48.1, *Albizzi lebbeck* by 54.0 and 39.3, *L leucocephala* by 31.9 and 30.0, *Acacia holosericea* by

Table 1. Effect of chemical/nutrient foliar spray on growth of tree species

Treatment	*Acacia leucophloea*		*Albizzia lebbeck*		*Leucaena lecocephala*		*Acacia holosericea*		*Prosopis cineraria*		*Acacia senegal*	
	H	D	H	D	H	D	H	D	H	D	H	D
Phosphoric acid 0.1%	48.0	0.41	42.1	0.41	83.9	0.69	42.2	0.36	45.2	0.34	68.0	0.48
DAP 1.0%	46.9	0.40	388	0.39	79.3	0.65	40.1	0.34	43.1	0.32	62.3	0.44
Urea 3.0%	42.3	0.35	33.5	0.34	72.4	0.60	37.7	0.33	40.5	0.31	60.7	0.42
Thiourea 500 ppm	45.9	0.40	37.0	0.37	79.2	0.64	36.8	0.31	39.5	0.30	59.0	0.41
Ammonium molybdate 0.01%	38.3	0.32	29.8	030	67.8	0.55	32.0	0.26	34.3	0.26	50.0	0.34
Control	31.8	0.27	25.2	0.28	60.1	0.50	27.5	0.22	29.6	0.21	41.5	0.26
$CD_{0.05}$	6.83	0.072	6.46	0.062	10.2	0.088	5.57	0.052	5.98	0.042	9.70	0.077

H: Shoot length (cm) D: Collar diameter (cm)

45.8 and 54.5, *P cineraria* by 45.6 and 52.3 and *Acacia senegal* by 50.1 and 69.2 per cent respectively over control. The increased effectiveness of phosphoric acid and DAP in respect of increasing growth of various tree species seems to lie in the fact that phosphorus being readily available from both the sources might have translocated in plant providing favorable nutritional environment hence the plant could put forth better growth (Singh et al 2001, Kumar 2006). Phosphorus being an essential constituent of several enzymes and co enzymes which are involved in basic reaction of photosynthesis it is assumed that phosphate had a specification on encouraging shoot development.The results are in collaboration with the findings of Mahnot and Chaplot (1999). When compared to control foliar spray of thiourea @ 500 ppm significantly increased height and collar diameter of all tree species in the range of 31 to 47 and 28 to 58 per cent respectively over control. Since thiourea contains sulphur (42.1%) which helps in maintenance of balance between –SH and –SS groups (Vora 1984) it can be safely assumed that formation of –SH group was favored due to effect of foliar spray and as a result significant improvement was observed in growth of above tree species. The foliar spray of urea albeit less magnitude of increase in growth as compared to phosphoric acid, DAP and thiourea.

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CONCLUSION

In order to obtain healthy and quality planting stock from nurseries the tree seedlings should be foliar sprayed by either phosphoric acid @ 0.1 per cent or DAP @ 1.0 per cent. This will hold good promise for successful forestry plantations in field with better survival and establishment.

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