USE OF POLYMERS FOR DRY AFFORESTATION IN CHOLISTAN

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INTRODUCTION

Most of the area of Pakistan is arid and semi-arid where artificial means of irrigation are also not available due to different reasons. It is, therefore, not feasible to grow agricultural crops or even trees with ordinary efforts and techniques. Trees have great importance in these areas as these fulfil the basic needs of fuel and fodder of the local inhabitants. Different silvicultural techniques have been and are being tried for afforestation in these areas keeping in view their climatic conditions. One of these is to use chemicals to retain the available moisture for longer time and make it available to plants in their tender age. An experiment was laid out at Maujghar in Cholistan to study the effectiveness of such a chemical 'alkasorb' for its water retaining capacity and its ultimate effect on the survival and growth of tree species.

REVIEW OF LITERATURE

Much of the work so far done on Viterra 2 is on its water holding capacity . Matro (1963) working with tomato transplant found that Viterra worked well as a moisture aid in the growing of transplants. Likhof and King (1973) showed that water content of chrysanthemum plants was higher in containers with Viterra than in control without the polymer material on

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the fourteenth day after termination of watering. They further reported that Viterra can increase the period potted chrysanthemums and poinsettias lasted by 40% 100% without wilting. That Viterra 2 exhibits good water holding characteristics was confirmed by Ulahos and Goodley (1973) with the best result obtained when it is mixed with solid. Chen (1974) reported no difference in height between Viterra treated and untreated chrysanthemums but submitted that it induced early flowering in tomatoes. Nwonwu (1987) observed the suitability of Viterra as a soil amendment polymer for tree crop growing. Tooted cuttings of cottonwood (Populus euroamericana) were grown in three different soil mixes. Soil mix A contains 75% peat and 25% fine sand, mix B contains 75% peat, 25% fine sand and 3.3 kg of Viterra/m^3 of mix while mix C contains 50% peat and 50% fine sand. Result on the water retaining ability of Viterra showed that the plant in Viterra treated mix continued normal growth for over 8 days while the plant in the untreated mix died 6 days after watering was stopped. The results show that Viterra 2 does not aid the growth of plants but has a high capacity to hold water for gradual release to plants. It is, therefore, recommended not as an aid to plant growth but for water conservation especially in the arid and semi-arid zones of the tropics.

MATERIALS AND METHODS

An experiment was laid out at Maujghar in Bahawalpur district in Cholistan area in split plot design in eight replications. Ten species were planted in 45 x 45 cm size pits

as main plot. These species were Tecoma undulata, Acacia cynophylla, Acacia victoriae, Acacia tortilis, Prosopis cinereria, Albizzia lebbek, Eucalyptus camaldulensis, Zizyphus mauritiana, and Zizyphus nummularia.

Four different levels of alkasorb (water absorbant material) were applied to see its effect on the survival and growth of different species. These four levels were (i) two grams of alkasorb per litre of water (ii) four grams of alkasorb per litre of water (iii) six grams of alkasorb per litre of water and (iv) control (without the application of alkasorb). The alkasorb was mixed in water as per dose and was set aside for half an hour. The maxiture acquired the shape of a paste which was put into the pit. After planting the seedling the pits were filled with soil as usual. First irrigation was applied at the time of planting. Distance among trenches was 9 meters whereas plant to plant distance was 2 meters. There were three plants in each sub-plot (alkasorb) whereas main plot (species) comprised of 12 plants. Each replication had 120 plants and total number of plants in eight replications was 960 of all 10 species in the experiment.

Heights of the plants were measured at the time of planting. Then survival and height of all the plants were taken quarterly upto one year and the last measurement was taken when the crop was three years old.

RESULTS AND DISCUSSION

This experiment was designed to see the extent of efficiency of alkasorb by applying it to different species in Cholistan area. For this purpose ten different species were tried with four different levels (doses) of alkasorb. Results of alkasorb doses were nonsignificant. The results are as under:

1. Tecoma undulata; plants of 28.65 cm average height were planted in monsoon season. After three months the increase in height was recorded 2.31 cm. In sixth and nineth month,

the height was 28.58 and 28.02 cm, respectively. It gained the height of 33.73 cm after one year. Measurement taken after three years of planting showed the average height of 91.44 cm. Survival percentage was also recorded quarterly. After one year of planting survival recorded was 84.53% which decreased to 37.47% at the end of third year.

2. Acacia nilotica: Average height of plants of Acacia nilotica was 91.99 cm when planted in the field for this experiment. The height decreased during the winter season due to severe weather. After one year plants gained average height of 99.50 cm which reached 134.24 cm within three years. 75.09% plants survived after one year of field planting. This figure decreased to 68.78% after three years of planting.

3. Acacia cynophylla: Some Australian tree species were also planted in that area. Acacia cynophylla was one of them. It did not adjust in that climatic condition and 100% mortality was recorded after one year.

4. Acacia victoriae: It is also an Australian species. Its results are also not promising as its survival percentage recorded after one year was 6.22%which is nominal.

5. Acacia tortilis: An Australian species which showed good results. 67.80% plants with an average height of 127.00 cm were recorded in the field at the end of third year.

6. Prosopis cineraria: It is a plant of dry area. Its survival was 74.07% and 67.03% after first and third year of planting respectively. Its height was 75.31 cm at the end of third year.

7. Albizzia lebbek: This species failed in this area as survival recorded after one year was 13.53% which further decreased to 1.03%within next two years.

8. Eucalyptus camaldulensis: An Australian species which has wide range of adaptability but it failed in Cholistan area as the mortality rate was about 91% after one year of planting.

9. Zizyphus mauritiana: This species gave good results in this area. Survival percentage of 89.59 was recorded after one year and it remained 71.91% even after third year of planting. Plants gained the height of 48.34 cm and 117.98 cm after first and third year of planting.

10. Zizyphus nummularia: Last species tried in this area was Z. nummularia. Its survival was 76.04% and height 31.32 cm after one year. Survival decreased to 36.7% and height attained was 82.07 cm at the end of third year.

As the data was recorded quarterly, it is evident from the Table-2 that average height of some species decreased, especially during first and second quarter and also in other quarters in some cases. Reason for this decrease was die-back process in which leading shoots of plants died back and again sprouted when these species established themselves in the soil when favourable season started. In this experiment seedlings were planted in monsoon season and cold weather started after some months in which plants did not grow. After winter, in spring season plants started their growth. Another reason for this decreased or constant growth was biotic factor which has to be kept in view during the assessment of any species.

CONCLUSION

After analysis of the final data it is concluded that polymer (alkasorb) did not have any significant effect on the survival and height of plant, however, the difference between survival and height of different species due to their inherent properties was significant. Some species gave better result than

others. On the basis of two parameters (survival and growth) studied Zizyphus mauritiana was thought the best amongst the species studied. Its survival percentage was 71.91 and it gained 93.33 cm net increase in height. Acacia tortilis, P. cineraria and A. nilotica got second, third and fourth priority for this area in this experiment. Survival percentage of above four species was more than 50%. Tecoma undulata and Zizyphus nummularia survived 34.47 and 36.47 percent and got the net height of 62.79 and 59.89 cm, respectively. So these species may also be planted in this area, if necessary. The remaining four species i.e., Acacia cynophylla, Acacia victoriae, Albizzia lebbek and Eucalyptus camaldulensis are not recommended for such dry area without irrigation.

TABLE 1: SURVIVAL %AGE OF DIFFERENT SPECIES UPTO THREE YEARS AGE AFTER FIELD PLANTING.

Sl. No.	Name of species	Survival %age at different ages				
		1/4 yr.	1/2 yr.	3/4 yr.	1 yr.	3 yr.
1.	Tecoma undulata	97.94	96.91	93.81	84.53	37.47
2.	Acacia nilotica	76.13	76.13	76.13	75.09	68.78
3.	Acacia cynophylla	15.53	11.38	4.13	-	-
4.	Acacia victoriae	29.19	26,03	26.03	6.22	3.09
5.	Acacia tortilis	86.53	81.34	81.34	78.16	67.80
6.	Prosopis cineraria	93.81	89.69	85.50	74.07	67.03
7.	Albizzia lebbek	97.94	96.91	88.63	13.53	1.03
8.	Eucalyptus camaldulensis	28.13	21.84	18.72	9.28	1.03
9.	Zizyphus mauritiana	98.97	93.78	92.75	89.59	71.91
10.	Zizyphus nummularia	90.69	81.28	77.13	76.09	36.47

TABLE 2: HEIGHT OF DIFFERENT SPECIES UPTO THREE YEARS OF AGE AFTER FIELD PLANTING.

Sl. No.	Name of species	Height at the time of planting (Cm)	Height at different ages				
			1/4 yr. (Cm)	1/2 yr. (Cm)	3/4 yr. (Cm)	1 yr. (Cm)	3 year (Cm.)
1.	Tecoma undulata	28.65	30.96	28.58	28.02	33.73	91.44
2.	Acacia nilotica	91.99	78.89	76.02	84.50	99.50	134.24
3.	Acacia cynoohylla	15.70	15.95	10.57	10.16	-	-
4.	Acacia victoriae	15.80	16.94	20.47	20.47	22.48	69.67
5.	Acacia tortilis	43.26	44.73	46.74	49.20	54.56	127.00
6.	Prosopis cineraria	26.04	20.88	18.42	18.34	23.01	75.31
7.	Albizzia lebbek	36.83	36.42	34.44	30.48	37.24	60.96
8.	Euc. camaldulensis	45.31	40.49	43.54	42.65	58.42	111.76
9.	Zizyphus mauritiana	29.85	33.25	31.67	33.10	48.34	117.98
10.	Zizyphus nummularia	23.18	23.50	21.31	22.05	31.32	82.07

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