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Short Communication

SALTBUSH : ITS PERFORMANCE AND POTENTIAL IN THE INDIAN ARID REGION

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Saltbushes (*Atriplex* spp.), family Chenopodiaceae, occur widely in the arid and semi-arid regions of the world, particularly in the southern rangelands of Australia and north America. They are perennial, evergreen, fodder shrubs, and are reported to grow in saline soils even with only 50 mm rain water (Francelet and Le Houerou, 1971). Some frost resistant species thrive under low temperatures of -10° C to 15° C, while A. confertifolia, is photosynthetically active from 5° to 50° C. This is the widest range of temperature adaptability known for any plant (Caldwell, 1972). They are excellent colonizers of newly disturbed areas (Mc Arthur *et al.*, 1983). All saltbushes from Australia are C4, whereas other areas have both C3 and C4 species (Osmund *et al.*, 1980). Saltbushes exhibit ecotypic adaptations, genetic variability and physiological drought resistance capability. Introduction of these species in the arid regions of the country is of paramount importance for enhancing fodder production.

The seeds of the three species namely, *A. nummularia* (EC 129766), *A. halimus* (EC 129767) and *A. canescens* (EC 129768) introduced from Tunisia in 1979 were sown in pots. The seedlings, 15-20 cm in height, were transplanted in furrows at a spacing of 2 m at the experimental farm of the Regional Station of National Bureau of Plant Genetic Resources at Jodhpur. Irrigation @ 1 litre water per plant at the time of transplanting followed by 2 litres for 20 days was applied. Afterwards, no regular irrigation was given and the plants received only rain water.

Five year old plants were harvested above ground level and observations were recorded for number of branches, length of branches, number of leaves per plant, and fresh and dry weights of branches and leaves. Since the branches exhibited wide variations in length, three arbitrary categories were made to ease the analysis and interpretation of data i.e. <50 cm, 50-75 cm and> 75 cm in length.

Out of the three species transplanted, *A. canescens* and *A. halimus* revealed 85 per cent and 50 per cent survival in the field compared to only 30 per cent of *A. nummularia.* High temperatures (39-41° C) alongwith meagre rainfall (8-16 mm) for two months after transplantation resulted in their poor survival.

Growth studies revealed that *A. halimus* and *A. canescens* were drooping types, while *A. nummularia* was erect growing. Five years old plants of *A. nummularia* were the tallest with a height of 1.5 m followed by *A. halimus* (0.9 m) and *A. cancesens* (0.8 m). The leaves of these three species were semi-succulent and flattened. The maximum deposition of salt on leaf surfaces was observed in *A. nummularia* followed by *A. halimus* and *A. canescen.*s In *A. nummularia*, the leaves are bluish grey, broad, oval and almost circular. *A. halimus* also bears

circular leaves with serrated margins but are smoother than *A. nummularia*. In *A. canescens*, the leaves are smooth, narrow with entire margins. The plant canopy ranged from 0.75 m to 1 m in these species (Plate I).

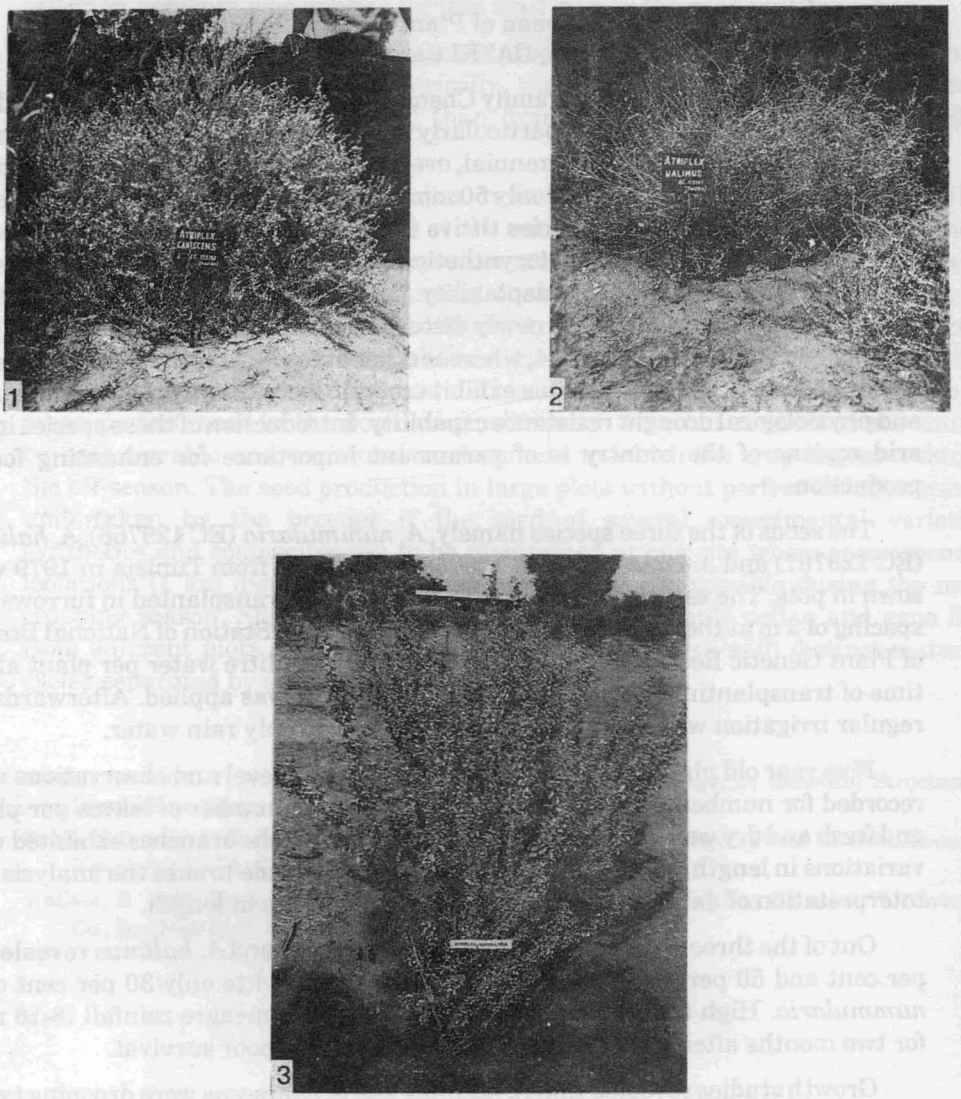

Plate I. Three introduced *Atriplex* species
1. *A. canescens*, 2. *A. halimus* and 3. *A. nummularia*.

Variation in the branch number (30 to 90 branches/plant) was noted in all the three species. Length of branches also varied from 12-125 cm. The number and proportion of long branches in *A. nummularia* were more than *A. canescens* and *A. halimus*. The fresh weight of the above ground plant parts per plant was the maximum in *A. nummularia* (658 g) followed by *A. halimus* (608 g) and *A. canescens* (538 g). Higher contribution of leaves (61%) to biomass in *A. nummularia* was observed compared to *A. canescens* (59%) and *A. halimus* (42%). Flowering was profuse in all the three species. However, the seed setting in *A. nummularia* was poor. Success in propagation by cuttings had also been achieved at this station. Seeds may be harvested from second season onwards. Properly dried seeds stored under dry conditions in tin or plastic bags retained their viability for about 3 years after which germination gradually declined.

Of the 300 *Atriplex* species known, about 50 are considered as fodder shrubs, of which, 10 are actually cultivated, *viz*, *A. atacemensis*, *A. canescens*, *A. glauca*, *A. halimus*, *A. lentiformis*, *A. nummularia*, *A. repanda*, *A. rhagodiodes*, *A. semibaccata* and *A. vesicaria*. They are known to produce large amounts (about 7590 - 10169 kg ha^{-1}) of herbage even under minimal cultural treatments (Goodin and Mc Kell, 1971). Out of the three species observed, *A. nummularia* produced maximum biomass as compared to *A. halimus* and *A. canescens*. Also, the contribution of leaves to biomass was found greater in the former. Yields of high edible matter in *A. nummularia* had also been reported (Watson *et al.*, 1987). Mean yield of 10.37 tonnes ha^{-1} of green mass and 2.91 tonnes ha^{-1} of dry mass per year was reported in *A. nummularia* (De Cock, 1980). Grazing experiments on sheep indicated that about two-third of the year's biomass was available as browse from the second season of plant establishment (De Cock, 1980). Ruminants require about 7% protein in their diets for rumen microorganism to effectively digest and metabolise carbohydrates and fats. The protein content in various *Atriplex* spp. ranges from 5.3 - 19.3% (Welch and Monsen, 1981). Also due to adequate digestibility, livestock feeding on saltbushes seldom loose weight. The mean values of analyses of various plant parts from several locations suggested higher protein percentage and nutrient status of *A. nummularia, A. halimus* and in *A. canescens* (Le Houerou, 1980).

Thus, the higher biomass together with high nutritive value render *A. nummularia* a better status as a fodder species in comparison to *A. canescens* and *A. halimus*. The wide adaptability of *Atriplex* to xericity and salinity, its high fodder production potential and rapid propagation by seeds and cuttings does offer a great scope for the cultivation of this plant in the Indian desert, particularly in the wastelands and saline areas. Attempts are to be made to seed them in mixes with grasses as natural supplement to improve the nutritional value of fodder. However, mass scale trials with different species at various sites ascertain the adaptive strategies and suitability at species level.

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