

Regeneration behaviour of degraded pasture of *Lasiurus sindicus* grass under different cultural practices in extreme arid conditions of Jaisalmer, India

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Introduction

The agriculture of seventies in the hot arid zone of India (western Rajasthan) was chiefly the subsistence farming involving rearing of livestock in association with rainfed cultivation of guar, moth and pearl millet. Pasturelands dominate among different land use systems and provide main support to the huge livestock population of the region (Kar *et al.*, 2009). With the advent of Indira Gandhi Canal and commencement of tube-well technology in 1985, livestock based economy saw a change in the land use and large tracts of sewan grass (*Lasiurus sindicus*) came under the plough. Further, in arid zone as a whole, the density of livestock increased from 50 animal per 100 hectares of grazing land in 1951-52 to 154 during 2012. According to livestock census (2012), the number of animals in the arid zone increased by 41 % between 1951 and 1961 and by 15 % between 1995 and 2012. In terms of adult cattle units (ACU) the livestock pressure was 9.58 million in 1983, which increased to 11.27 million in 2001 and 11.65 in 2012. Local grazing pressures are surpassing the recommended stocking rates of the rangelands at an enormous pace. The pressure was 0.87 ACU/ha in 1981 which increased to 1.02 ACU /ha in 2001 and 1.55 in 2012 against the optimum desirable density of 0.2 ACU/ha (Tiwari and Arya, 2006). The grasslands face two threats: one from land coming under water-intensive agriculture, and the other from indiscriminate use of water from the canal to irrigate these pastures. The increase in grazing pressure and shrinkage of grazing area resulted in severe degradation of the sewan pastures to as low as 0.1 t/ha/yr in the desert areas (Roy and Roy, 1996). Since the economy of the hot arid zone is livestock based and improvement in the productivity of the animal husbandry is directly correlated with the improvement in native degraded pasturelands (Sharma, 2013). Burning was recognized as one of the important techniques for the grassland management (Chatterjee and Das, 1989), but burning at large scale found environmentally unsafe. Thus, present study was conducted to find out the effect of different cultural practice on the rejuvenation behaviour of degraded sewan pasture at Chandan (Jaisalmer), Rajasthan (India) during summer 2010.

Materials and Methods

The experiment was conducted in Factorial Randomized Block Design with two factors and four replications. In main plots three cultural practices viz., burning, no-till and till were taken while in sub-plots two levels of fertilizer viz., control and 40 kg N+20 kg P/ha were taken. The field was protected from grazing by barbered fencing. The practices of burning and tilling were done on 01-02-2010 levels of fertilizers were applied through broadcasting in all the three practices on next day after irrigating the field. Nitrogen was applied through urea while phosphorus was given through di-ammonium phosphate. Three irrigation were given through sprinkler during the experimentation. Five plants were uprooted from each treatment randomly for measurement of growth parameters in the month of April (30.04-2010). Plant parts were separated into crown, root and arial parts (fodder) and fresh fodder yield was averaged to get per plant green fodder yield. Root volume of freshly uprooted plants were measured by the measuring cylinder and expressed as ml per plant. All the plant parts were subjected for drying in an oven at 65°C for four days in hot air oven and of weight of crown, root and fodder was averaged and expressed as g/plant.

Results and Discussion

The results of the study revealed that cultural practice of no-till recorded 94 and 39 per cent higher green fodder yield and root volume (Table 1) than the tilling practice. Similarly, dry weight of fodder, crown and roots were also recorded 100, 93 and 50 per cent with no-till practice than the tilling practice, respectively. However, in the earlier studies maximum yield of sewan grass was reported with the burning of stubbles. It was opined that burning caused the deposition of ash provides P, K, Ca and Mg, which are favourable to regrowth and revival of grass soon on receipt of moisture (Paulsamy,

1992). The practice of burning was found next best practice in present study with regard to improve growth parameters of sewan. In case of fertilization, application of 40 kg N + 20 kg P/ha was found significantly higher than the control (Table 1). Application of fertilizer increased the fresh fodder yield, dry fodder yield, dry crown weight, dry root weight and fresh root volume per plant by 86, 127, 76, 67 and 63 per cent than the control, respectively. Yadav and Rajora (1995) also reported similar results in the study conducted at Jodhpur.

Table 1: Regeneration behaviour of degraded pasture of *Lasiurus indicus* grass under different cultural practices and fertilization during summer 2010.

Treatment	Fresh fodder yield/tussock at harvest (g)	Dry fodder yield/ tussock at harvest (g)	Dry Crown weight at harvest per tussock (g)	Dry root weight per tussock at harvest (g)	Root volume per tussock (cm ³) on fresh weight basis at harvest
Cultural practices					
Burning	446	326	312	27.26	76.33
No Till	632	431	461	38.23	97.50
Till	325	215	239	25.56	70.33
SEm±	12	10	10	0.98	2.83
CD at 5%	36	31	30	2.89	8.35
Fertility					
No Fertiliser	327	199	245	22.70	61.89
Fertiliser	608	449	430	37.99	100.89
SEm±	10	9	8	0.80	2.31
CD at 5%	30	25	24	2.36	6.82

Conclusion

The regeneration of degraded *Lasiurus indicus* varied considerably with different cultural practices and fertility treatments. Among cultural practices no-tilling of the degraded pasture recorded significantly the highest yield followed by burning during the initial years under irrigated conditions. Application of 40 kg N+20 kg P per hectare recorded almost double fresh and dry fodder yield of the grass together with other yield attributing parameters.

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