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Production potential of different pasture grasses under off- season rainfall in arid conditions of Bikaner, India

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Introduction

Livestock rearing is the important source of livelihood in arid region of Rajasthan where the crop production is unstable due to low and erratic rainfall. The rangelands and pastures are important land use system and provide main support to the livestock in the arid region of Rajasthan. Grazing of livestock is a common practice in arid zone as about 50 % of total area of western Rajasthan is available for grazing mainly for cows, sheep and goat, however, the availability of green fodder is restricted to monsoon and post monsoon months only and during rest of the period livestock graze on dry grasses and crop residues available in cultivated, fallow and wastelands and other grazing lands. The perennial grasses like *Lasiurus sindicus*, *Cenchrus ciliaris*, *C. setigerus*, *Panicum turgidum*, *P. antidotale* etc. with some annuals are dominated in the rangelands and pastures in the arid zone of Rajasthan. Generally these grasses are grown during rainy season but also regenerated during off-season condition when sufficient moisture is available through rainfall or irrigation and provide fodder during the lean period. Productivity of these pasture grasses were assessed during rainy season but information of the production potential during off-season is not available in literature. Therefore, present study was conducted during March to May 2015 at Arid Region Campus of CSWRI, Bikaner to assess the production potential and regeneration of different grasses during off-season under arid condition.

Materials and Methods

The established pastures of different grasses were used for recording observations under different harvesting time for estimation of forage production. Under first set of management the pastures were harvested during November, 2014 and the second were remain unutilized during above mentioned period and harvested on 24 April, 2015. The observations were recorded from harvested and un-harvested pastures dominated by *L. sindicus*, *C. ciliaris* and mixed grasses comprising *L. sindicus*, *C. ciliaris*, *Chloris gayana*, *Cymbopogon jwarancusa* and *Panicum turgidum*. The total 107.5 mm of rainfall was received in 5 spell during March –April, 2015. The soil of experimental field was sandy having pH 8.58, EC 0.71 dS/m, low in organic carbon (0.21%), available N (128.4 kg/ha), P (8.20 kg/ha) and K (138.5 kg/ha). The fresh and dry forage yields were recorded from one meter square quadrat from 5 random places in each pasture and converted into yield per hectare.

Results and Discussion

Result shows that the production of different pasture grasses under harvested condition was higher than that of un-harvested condition (Table 1). Under harvested situation two cut were taken while under un-harvested only single cut was taken. Even though, the forage yield of harvested pasture in single cut was less than forage yield of un-harvested pasture grasses, however, the total forage yield contribution was higher under harvested pasture as compared to un-harvested pasture due to precipitation received during the off-season. Pasture grasses produced 24.7 to 64.6 q fresh and 14 to 30 q dry forage yield per hectare during off-season (II nd cut) under harvested situation. The average forage production of the pasture under harvested condition was 114.27 q/ha fresh and 50.77 q/ha dry where as under un-harvested condition it was 72.1 q/ha fresh and 42.47 q/ha dry. Moreover, there was overall increase in forage yield under harvested and un-harvested situation due to off-season rainfall, however, the increase in forage yield, fresh as well as dry under un-harvested situation was less than the respective fresh and dry forage yield of harvested situation. This may be because the harvesting (cutting) of the grasses and onset of rain coincided which might have triggered rejuvenation and better growth of pasture. The earlier researchers have reported that the average production potential of *Lasiurus sindicus* and *Cenchrus ciliaris* based pasture is 29.39 q/ha and 25.69 q/ha respectively as dry forage yield but the dry forage yield production recorded for

Lasiurus sindicus based pasture was 65.50 q/ha under harvested situation where as 63 q/ha under unharvested situation. Similarly, dry forage yield production recorded for *Cenchrus ciliaris* based pasture was 32.50 q/ha under harvested situation where as 26.6 q/ha under unharvested situation. The off-season rainfall might have favoured the increased dry forage production. Among the grasses, *Lasiurus sindicus* produced higher forage yield followed by mixed pasture and *Cenchrus ciliaris* under harvested condition. Similar trend was also observed under un-harvested condition. The higher forage yield of *Lasiurus sindicus* might be due to its suitability to lower rainfall zones and its genetic potential. Since, *Cenchrus ciliaris* is considered the grass of the semi-arid regions and require more than 300 mm annual rainfall for better production. Chander *et al.* (2010) also reported that biomass productivity of *Lasiurus sindicus* (total yield 29.39 q/ha) was significantly higher when compared with *Cenchrus* (25.69 q/ha). Higher productivity of *Lasiurus* than *Cenchrus* also reported by Chander *et al.* (2004) and Patidar *et al.* (2008).

Table 1: Productivity of pasture grasses under different management during off-season at Bikaner

Treatments	1 st Cut		2 nd Cut		Total	
	Fresh yield (q/ha)	Dry forage yield (q/ha)	Fresh yield (q/ha)	Dry forage yield (q/ha)	Fresh yield (q/ha)	Dry forage yield (q/ha)
Harvested field in November 2014 and April 2015 (Two cut)						
<i>Lasiurus sindicus</i>	87.0	35.5	64.6	30	151.6	65.50
<i>Cenchrus ciliaris</i>	46.4	18.5	24.7	14	71.1	32.50
Mixed grasses	71.6	29.8	48.5	24.5	120.1	54.30
Mean	68.3	27.93	46.07	22.83	114.27	50.77
Un harvested and un grazed field (single cut in April 2015)						
<i>Lasiurus sindicus</i>	-	-	101.5	63	101.5	63
<i>Cenchrus ciliaris</i>	-	-	47.0	26.6	47.0	26.6
Mixed grasses	-	-	67.8	37.8	67.8	37.8
Mean			72.1	42.47	72.1	42.47

Conclusion

The Perennial pasture grasses like *Lasiurus sindicus* and *Cenchrus ciliaris* have ability to regenerate and produce substantial yield during off-season as and when received sufficient rainfall. Thus, proper management and utilization of pasture of these grasses can help in supplying green and dry fodder during lean period (dry season) to sustain livestock productivity in these regions.

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