Paper ID: 1208
Theme 3. Sustainability of grasslands- social and policy issues
Sub-theme 3.3. Sustainable use of grassland resources

Seasonal influence on seed yield and quality of Anjan grass (*Cenchrus ciliaris* L.) genotypes

R. P. Nagar*, S. S. Meena
WRRS (IGFRI), Avikanagar Rajasthan, India
*Corresponding author e-mail: rp_nagar_06@yahoo.co.in

Keywords: *Cenchrus ciliaris*, filled spikelets, Germination Seasons, Seed yield

Introduction

Cenchrus species are important perennial pasture component of *Dichanthium-Cenchrus-Lasiurus* grass cover of India associated with arid and semi-arid regions of tropical and sub tropical climate. It is adapted in wide range of environments due to its drought tolerance, deep roots, rapid response to summer rains, high biomass, resistance to overgrazing, palatable with crude protein 8-10% and 60-70% digestibility (Sawal *et. al.*, 2009). After well establishment these grasses give 8-10 t/ha dry fodder out of 3-4 cuts in a year and 100-250 kg/ha seed yield. There is a wide gap between demand and supply of *Cenchrus* grass seeds resulted about 85% area of grazing lands and wastelands of the country remains underutilized. High grazing pressure, shortage of fodder, low productivity of seed, high proportion of empty spikelets, indeterminate seed bearing, seed shattering problem, lack of mechanization for seed picking, high volume of seed for storage/transport and lack of seed chain/market are the major factors which limits grass seed production as commercial activity. Higher seed production of this species can lead to higher and sustained forage production; hence, there is a need to develop methods and technologies to obtain more yields of good quality seed from same piece of land in a year. *Cenchrus* grass seed production is commonly done in monsoon season traditionally in India while, information is limited on seed production in other seasons under irrigated conditions. The present investigation was undertaken for assessing seasonal effect on seed and fodder productivity and seed quality produced during different seasons round the year.

Materials and Methods

To workout the seasonal effect on seed productivity and its quality and fodder production of *C. ciliaris* a experiment was laid out at Western Regional Research Station of Indian Grassland and Fodder Research Institute, Avikanagar, Rajasthan, India.The climate of experiment site is semi-arid with an average rainfall of 600 mm and mean maximum temperature varied from 40-45^{o}C in summer and minimum of 5-6^{o}C in autumn and was sandy with low water retention capacity and light in texture. Seven high fodder yielding varieties/genotypes of *C. ciliaris* were planted in Randomized Block Design with three replications during July 2014. Each genotypes was accommodated in 20 sq. m plot size with inter row spacing of 50 cm. The present investigation on seed and fodder yield and related traits during three seasons of a year was undertaken *viz.*, monsoon, autumn and spring season. Fertilizer dose and other package of practices required for raising a good crop, were applied. 0.5% Thiourea was foliar sprayed to all genotypes at panicle initiation stage in every season. During two non-traditional seasons sprinkler irrigation was applied for meeting moisture requirement of the crop. The spikelets were collected three times within a season. Seed of all pickings mixed thoroughly before taking samples for quality testing. Observation on seed yield and fodder was recorded on plot basis and converted as kg and quintal/ha respectively for seed and fodder. The proportions of filled spikelets were observed under X-ray machine. Germination was evaluated between papers in dark at 25^{o}C for 10 days.

Results and Discussion

Analysis of variance revealed significant differences ($P < 0.05$) for seasons, genotypes as well their interactions for all the traits under investigation except 1000-spikelet weight. Seed yield was low during establishment season irrespective of genotypes while, in IG 96-531 flowering did not appear. Highest seed yield was recorded in spring season (148.8 kg/h) followed by autumn season irrespective of genotypes (Table 1). Among the genotypes IG 67-3833 produced maximum seed yield ranging from 51 kg/ha in monsoon to 237 kg/ha in spring season followed by CAZRI-75 (42 - 221 kg/ha) and IG 96-531 (46 - 161 kg/ha). Number of spikelets/spike was more in monsoon season while 1000-spikelet weight in autumn season. Rajora and Singh (2005) also reported significant differences among the genotypes for seed yield and its components. Fodder yield would be higher during monsoon season but in establishment year it was at par in monsoon and spring season while in autumn season it was significantly lower. It might be due to low temperature. The fodder production was highest in IG 67-365 ranging from 15.0 to 20.5 q/ha followed by CAZR-75 ranging from 15.5 to 17.5 q/ha in monsoon and spring season, respectively. Chander *et al.* (2009) also reported significant differences among the *C. ciliaris* genotypes for biomass production under arid region. The proportion of filled spikelets and germination are major

seed quality determining parameters in *Cenchrus* species. The mean proportion of filled spikelets observed under x-ray was 65.9% ranging from 54.7 to 71% during monsoon season and it was slightly higher during autumn season 68% (59.3 - 72%). Significant differences were found among the genotypes for proportion of filled spikelets which ranging from 58.5 (IGFRI-727) to 71.2 (IGFRI-3108). Seed germination showed significant differences between seasons irrespective of genotypes. Highest germination (44.0 %) was found in autumn produce. Genotypes also showed significant difference for seed germination ranging from 27.4% (IG 96-414) to 59.7 % (IG 96-531). Most of the genotypes in all the seasons were meeting the minimum seed standard for germination i.e. 30%.

Table.1 Seasonal effect on seed yield and seed quality parameters in *C. ciliaris* genotypes

Trait/Season/ Genotype		**IG 67-365**	**IG 96-531**	**IG 96-414**	**IG 67-3833**	**IGFRI-727**	**IGFRI-3108**	**CAZRI-75**	**Mean**
Seed yield (kg/ha)	S_1	18.5	-	70.9	51.0	15.6	68.6	41.7	44.4
	S_2	23.9	45.7	84.1	90.4	36.5	74.7	51.0	58.0
	S_3	134.6	160.6	110.9	236.6	77.0	101.2	221.0	148.8
	Mean	59.0	103.2	88.6	126.0	43.0	81.5	104.6	86.5
	CD (5%)	Season-7.1; Genotype-10.8; Season x Genotype- 18.7							
Fodder yield (q/ha)	S_1	18.3	16.6	19.3	13.3	16.0	13.2	15.5	16.1
	S_2	15.0	11.7	11.6	10.5	14.0	10.5	15.6	12.7
	S_3	20.5	16.4	13.9	16.4	15.2	11.4	17.5	15.9
	Mean	18.0	14.9	14.9	13.4	15.1	11.7	16.2	14.9
	CD (5%)	Season-0.96; Genotype-1.31; Season x Genotype-2.27							
1000-spikelet weight (g)	S_1	3.26		2.62	2.45	3.17	2.45	3.20	2.86
	S_2	3.36	2.64	2.71	2.51	3.33	2.55	3.35	2.92
	S_3	3.19	1.92	1.88	2.77	3.24	2.82	2.88	2.67
	Mean	3.27	2.28	2.40	2.57	3.25	2.61	3.14	2.79
	CD (5%)	Season-NS; Genotype-0.13; Season x Genotype-NS							
Seed filling (%)	S_1	62.7	-	67.3	69.0	54.7	71.0	67.7	65.9
	S_2	64.0	71.7	69.3	72.0	59.3	71.3	68.0	68.0
	Mean	63.3	71.7	68.3	70.5	57.0	71.2	67.8	66.9
	CD (5%)	Genotype-4.4							
Germi nation (%)	S_1	41.7	-	34.3	40.7	26.0	32.0	34.3	34.8
	S_2	31.0	64.3	36.0	62.7	48.7	43.0	34.7	44.0
	S_3	33.3	55.0	12.0	35.0	36.7	33.3	27.3	35.0
	Mean	35.3	59.7	27.4	46.1	37.1	36.1	32.1	39.1
	CD (5%)	Season-2.2; Genotype-3.4; Season x Genotype-5.9							

S_1- Monsoon season; S_2- Autumn season; S_3- Spring season

Conclusion

It is possible to produce quality seeds during the three seasons in a year in semi-arid condition with supplemental irrigation during autumn and spring. On the basis of fodder (cut and carry system) and seed yield, genotype IG 67-365, CAZRI-75 and IG 96-531 of Anjan grass were found suitable.

References

Chander, S., K. C. Sharma, H. S. Jat and R. P. Meena. 2009. Influence of varieties and cutting shedules of perennial pasture grasses on soil fertility, nutrients content and uptake, productivity and economics in hot arid conditions of Rajasthan. *Indian J. Agric Sci*. 79(10): 798–803.

Rajora, M. P. and M. Singh. 2005. Seed yield and its components in autumn regenerated flush of buffel grass (*Cenchrus ciliaris* Linn.) under rainfed conditions of Rajasthan. *Seed Research* 33(1): 65-69.

Sawal, R. K., R. Ratan and S. Chander. 2009. Nutritive evaluation of *Lasiurus sindicus* and *Cenchrus ciliaris* hays in sheep. *Indian J. Small Ruminants* 15(2): 277-280.

Acknowledgement

Authors are thankful to the Head, Regional Station (Indian Agricultural Research Institute), Karnal Haryana India for using X-ray facility for seed scanning.