FORAGE PRODUCTION AND CARRYING CAPACITY COMPARISON UNDER SEEDED & UNSEEDED CONDITIONS IN RAKH SHADAN LUND RANGE LAND (DERA GHAZI KHAN)

Sarfraz Hasan Dogar[*] and Ashar Farooq[**]

Abstract

The study was conducted in Rakh Shadan Lund rangeland of Dera Ghazi Khan during October, 2010 for comparison of forage production & carrying capacity in seeded & unseeded range areas. Reseeding was done during 2009-2010. Data were collected by laying out eight transect lines each 30 meters long, four each in seeded and unseeded areas. Forty quadrats (1x1m) i.e. 20 in seeded area and 20 in unseeded area were studied for forage yield determination. Data were statistically analyzed using t-test. Results revealed that forage production in seeded area was significantly higher than in the unseeded area ($P<0.01$). The forage production was about 5 times more in seeded area as compared to un-seeded area. As a result of re-seeding, the carrying capacity has also been increased. This study clearly depicts that range re-seeding is an effective technique to enhance the forage production and carrying capacity of less producing range areas of Dera Ghazi Khan Rangelands.

Introduction

Rangeland is defined as a land on which the indigenous vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs and is managed as a natural ecosystem. If plants are introduced, they are managed similarly. Rangeland includes natural grasslands, savannas, shrublands, many deserts, tundra, alpine communities, marshes and meadows. (SRM, 1998).

Rangelands occupy about 52.20 m.ha area of Pakistan. Out of total area of rangelands, only 6.4 m.ha area is under the control of Provincial Forest Departments (Anonymous, 1992). The rangelands of the Punjab province are located in the arid and semi-arid parts of the province. The major range areas are Pothwar, Thal, Cholistan and Dera Ghazi Khan. D. G. Khan Rangelands lie between the Sulaiman range and the Indus river over an area of 0.5 million ha. Almost all rangelands are subject to wind and water erosion. The current trend of retrogression/ deterioration of these rangelands is still in progress (Mohammad, 1989).

Heavy grazing pressure is one of the main problem to which the arid/semi-arid range lands have been subjected for a long time. Due to this heavy grazing pressure, these range lands are in deteriorated condition. This raises serious questions to the possibility of restoring vegetation through improvement measures such as protection from grazing, re-seeding or manuring in the highly deteriorated rangelands. Generally, the soils also indicate very low levels of available previously un-grazed grasses. The time of forage removal greatly influences the ability of the

[*] Range Forest Officer, Punjab Forest Department

[**] Range Management Officer, Pakistan Forest Institute, Peshawar

plant to recover afterwards, and to achieve normal carbohydrate storage (Stoddart *et al*., 1975).

Rangeland reseeding is an attempt to re-establish desirable species in areas where those species have disappeared or have been weakened by overgrazing or they are over dominated by other undesirable species as a result of misuse. Range reseeding is accomplished by both natural and artificial means. Artificial reseeding offers greater possibilities for range restoration than does natural reseeding. New and more productive grasses can be introduced. It can be done in a relatively short possible time. Range reseeding is potentially the most effective means of increasing forage and livestock production on favoured sites.

The carrying capacity of highly depleted rangelands of Pakistan could be increased manifold by reseeding with palatable grass species. Depleted ranges are generally reseeded with palatable, nutritious and adopted forage species to enhance forage production, prolong grazing season and carrying capacity .Seeding is generally regarded as the most effective means of improving rangelands.

Punjab Forest Department has launched a project for rehabilitation of depleted rangelands of the province. Under this project, reseeding has been carried out on a vast area. Rakh Shadan Lund Range is located in Dera Ghazi Khan District and was reseeded in 2009-10 (Anonymous, 2010).

This study has been designed to compare the forage production & carrying capacity of seeded & un-seeded areas of Rakh Shadan Lund rangeland of Dera Ghazi Khan.

Materials and Methods

Dera Ghazi Khan Rangelands are administered by the Punjab Forest Department. Total area of Rakh Shadan Lund range is 4424 ha (Anonymous, 2010). Area is an alluvial formation with sandy loam to clayey soil in valley flats which are interposed with loose sand dunes. Mean monthly maximum rainfall occurs during the month of July i.e. about 50 mm. About 70% of average annual rainfall of 100 to 140 mm occurs in summer monsoon. June in the hottest month with the highest mean max temperature of 44°C, while January is the coldest month with the mean max temperature of 0°C (Mohammad, 1989; Quraishi *et al.*, 1993).

Two adjacent and homogeneous sites, one in seeded and the other in un-seeded area were selected randomly for this study. Reconnaissance survey of the study sites was done to locate the transect lines for field data collection. Four (04) transect lines 30 meters long each within seeded area and adjacent un-seeded area were laid out. Each transect line was laid out at a distance of 20 meters from the other transect line. On each transect line; five (05), 1x1 m quadrats were laid out at a distance of 5 meters. Thus, forty (40) quadrats i.e. 20 from seeded and 20 from unseeded area were studied. In each quadrat, species wise forage production was

recorded and then clipped. Carrying capacity of the study area was calculated applying 50 percent proper use factor. All the palatable grasses were clipped at 2.5 cm above ground level with the clipper (scissor). The clipped material was weighed with spring balance for fresh green weight. The clipped material of each quadrat was put in a paper sac separately and was dried in open air. The mean air dried weight in gm/m^2 was converted into kg/ha by multiplying with a factor of 10 (Hussain, 1968; Ashfaque and Rafique, 1999). Data were analyzed using t-test.

Figure 1. A view of seeded area of Rakh Shadan Lund rangeland

Figure 2. A view of un-seeded area of Rakh Shadan Lund rangeland

Results and Discussion

The analysis showed that the mean forage production under seeded and unseeded conditions were 7432.5 kg/ha and 1521.5 kg/ha respectively (Table) Statistical analysis t- test was applied to find out the significant difference. The result showed that under seeded condition, the mean air dried forage production was highly significant (at 1% probability level) than un- seeded condition.

The carrying capacity of the seeded area has been increased because reseeding enhances forage production. The present forage production (kg/ha) and number of animal units which can be grazed in one hectare in seeded and unseeded areas are given in table below:

Table 1. A comparison of forage production (kg/ha) and carrying capacity under seeded and un-seeded conditions at Rakh Shadan Lund rangeland

Parameters	Seeded Area	Un-seeded Area
Forage production (kg/ha)	7432.5	1521.5
Carrying capacity (AU/ha/yr)	1.13	0.23

From the above table, it is clear that carrying capacity of the area has been increased due to reseeding from 0.23 AUY to 1.13 AUY. This shows that carrying capacity of the depleted rangelands of Rakh Shadan Lund can be improved by reseeding these ranges. The results of this study are in agreement with the research findings of the others who showed that the seeding practices increase the forage production and carrying capacity of the depleted rangelands. Khan (1966) reported that air dried forage production in Thal ranges increased from 362 to 1964 kg/ha/annum due to reseeding with *Cenchrus ciliaris*. Khan and Zarif (1982) reported that due to grass seeding, the average forage yield increased from 45 kg/ha to 1324 kg/ha, a tremendous increase. Khan *et al.* (1999) reported that in Thatta Leghari rangeland of Dera Ghazi Khan, the reseeded area produced 10 times more forage than the native range in 1992 and more than twice the forage in 1993. Chaudhry *et al.* (2010) concluded that the reseeded area produced about 16 times more forage than the untreated area. Carrying capacity (Animal Units per Year) based on dry biomass of grasses/herbs was found to be 0.07 AUY/ha and 1.18 AUY/ha in untreated and treated areas.

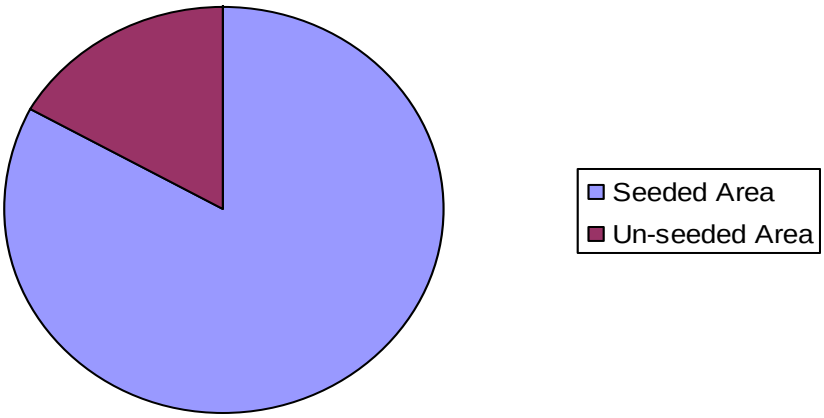

Figure 3. Forage production (kg/ha and carrying capacity (Au/ha/yr)

Conclusion

It is concluded from the comparison of forage production and carrying capacity of seeded and un-seeded areas that artificial re-seeding is a very important range improvement practice to enhance the grazing potential of depleted rangelands of arid/semi-arid rangelands. The forage production was about 5 times higher in seeded areas as compared to un-seeded area. As a result of it, the carrying capacity has also been increased in the area.

Recommendation

Based on the results of the study, it is recommended that depleted rangelands could be improved by artificial reseeding provided all the operations are carried out well in time before onset of monsoon season.

References

Anonymous, 1992. Forestry Sector Master Plan National Perspective Ried, Collins and Associates, Canada and Silviconsult Ltd. Sweden. Ministry of Food and Agriculture, Islamabad, Pakistan, 195pp.

Anonymous, 2010. Office record of Divisional Forest Officer Range Management Division, Dera Ghazi Khan.

Ashfaque, R. M. and S. M. Rafique, 1999. A guide to range analysis. Pakistan Forest Institute, Peshawar.

Chaudhry, A. A., M. S. Haider., J. Ahsan and S. Fazal, 2010. Determining carrying capacity of untreated and treated areas of Mari Reserve Forest (Pothwar Tract) after reseeding with *Cenchrus ciliaris*. The Journal of Animal & Plant Sciences 20(2): 103-106.

Hussain, I., 1968. Determination of forage production. Division of Forestry Research. Leaflet No. 1, Range Management Branch Pakistan Forest Institute, Peshawar.

Khan, C. M. A., 1966. Artificial reseeding in Thal ranges. Pakistan Journal of Forestry 16(1): 28-42.

Khan, M. F., D. M. Anderson, M. I. Nutkani and N. M. Butt, 1999. Preliminary results from reseeding degraded Dera Ghazi Khan Rangeland to improve small ruminant production in Pakistan. Small Ruminant Research 32 (1): 43-49.

Khan, S. M. and R. M. Zarif, 1982. Enhancing range productivity through grass seeding in sub- tropical semi-arid rangelands near Peshawar. Pakistan Journal of Forestry. 32(3): 89-94.

Mohammad, N., 1989. Rangeland Management in Pakistan. International centre for Integrated Mountain Development, Katmandu, Nepal.

Quraishi, M. A. A., G. S. Khan and M. S. Yaqoob, 1993. Range Management in Pakistan. Department of Forestry, Range Management and Wildlife University of Agriculture, Faisalabad. Kazi Publications, Ganpat Road, Lahore.

Society for Range Management, 1998. A Glossary of Terms used in Range Management. 4th Edition. Society for Range Management. Denver, Co.

Stoddart, Smith and Box, 1975. Range Management McGraw Hill Book, New York.