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Pasture management for sustainable forage production

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Introduction

In the livestock management grazing was the major feed resources in the past and even today a significant portion of livestock is being sustained on grazing resources from pastures and other grazing lands like forest, fallow lands, cultivable waste lands *etc.*

During the last few decades ever increasing livestock population has created enormous grazing pressure on pasture resources leading to deterioration and destruction of pastures. This has led to the urgent need of improvement of pastures as well as judicious implementation of grazing management practices. There has been certain constraints on pasture development which include fragmentation and degradation of the pastures over the common land including forest contributing around 280 million tonnes of forage annually (Anon, 2007), diversion of non-demarcated grazing land to other land uses, transfer of land for development purposes, allocation of land to landless, bringing more land under irrigated crop production and invasion of pastures/grazing lands by weeds/alien species like *Lantana camara*, *Parthenium hysterophorus*, *Eupatorium odoratum*, *Prosopis juliflora*, *Leucaena leucocephala* severely affecting quality and productivity of pastures.

Materials and Methods

While making strategies on pasture management the factors affecting pasture management need to be analysed as growth and development of the vegetative cover is governed by three primary factors i.e. climatic, edaphic and physiographic factors. Among the three growing seasons (summer, rainy and winter season) in India, rainy or wet season is most favourable for luxuriant growth of vegetation or grasses as soil moisture become available for longer period and grasses get very suitable climatic condition for vegetative development. On the contrary, summer season is not favourable for vegetative growth because of high atmospheric temperature and low soil moisture availability. Besides, due to the effect of global warming the climate is becoming more and more unpredictable and fluctuation of climate from year to year are causing changes in the growth habits of various perennial plants. The composition and density of the grasses over the soil depend on soil parent material, nature of soil and climatic condition. Often the association of a particular pasture community with a certain soil type is simply because of the differences in the moisture availability of that soil. Apart from these factors for pasture management, there are several other activities responsible for poor maintenance of the pasture like uncontrolled livestock grazing, land clearing, burning etc. Even mining destroyed several thousand hectares of grassland and forests and industrial urban or farm pollution affects the grasslands/pastures. Certain approaches and principles need to be adopted for better pasture management. The farmers will have to choose suitable and better management practices according to the local conditions in order to provide nutritional support to the livestock, without damaging the vegetative cover of the soil. In other words scientific management of pasture is based on ecological principles (Chandy, 2013).

Table 1. Grazing resources in India

Resources	Area (Million hectare)	Percentage
Forest	69.41	22.70
Permanent pasture, grazing lands	10.90	3.60
Cultivable wasteland	13.66	4.50
Fallow land	24.99	8.10
Fallow land other than current fallow	10.19	3.30
Barren uncultivated wastelands	19.26	6.30
Total common property resources other than forest	54.01	17.70

(Source: Vision 2030, IGFRI (2011)

Results and Discussion

The general principles for scientific pasture management are grazing at proper stage in accordance with the pasture maturity and carrying capacity of pasture, compatible combination of legume and grasses in pasture, conservation of excess forage in the form of hey and silage, appropriate grazing strategies for minimising the impact of frequent and occasional grazing, incorporation of trees/shrubs in pasture for getting foliage during summer in a complementary way with grasses and adoption of appropriate soil and water conservation measure to maximise pasture productivity. In broad sense pasture management practices are based on ecological approaches like protection for vegetation recovery, soil and water conservation, reseeding, implementation of improved pasture management techniques and grazing management practices (Roy, 2009). Pasture degradation due to over grazing results in the dominance of nutritionally poor and unpalatable vegetation. It has been found that just by providing protection through fencing a lot of benefits in terms of vegetation recovery can be obtained. However, the time required for natural recovery of vegetation will vary from one habitat to another and from one climatic zone to another. Enrichment of pasture through reseeding is essential to replace low yielding annual grasses with high yielding perennial grasses which are adoptable to the prevailing condition of that region (Roy, 2009) and introduction of suitable pasture legumes may be one of the best way to improve quality. Pre-monsoon broadcasting of legume *Stylosanthes* seeds in *Sehima, Heteropogon* grasslands was found best in terms of legume establishment. Reseeding after monsoon results in good plant establishment. However, success of reseeding also depends upon the after-care. The grazing during first year of seeding should be very light once the grass has reached to seed setting stage and after that grazing will be moderate in succeeding years. Adoption of management practices like removal of undesirable plants/weeds/bushes, fertilizer application, controlled burning, soil and water conservation, controlled defoliation are essential for enhancing productivity of existing pasture. It is misunderstood that pastures are maintained for grasses and weeds are also grasses providing forage to the animals. However, for maintaining productivity of pasture, it is necessary to make the pasture free from unwanted plants/weeds those reduce quality of forage and are unpalatable.

Fertilizer application in terms of nitrogen application about 30 days after onset of monsoon showed maximum response on productivity of pastures/grasslands. Application of 60 kg N/ha in three split dose at 25 days interval has been found superior in improving forage yield to the tune of 40-70 per cent over control (Mahanta *et al.,* 2013). Controlled burning in combination with moderate grazing management is useful for better pasture management. Controlled burning of unused and dried vegetation at an interval of three years before onset of monsoon encourages vegetative growth of grasses in coming rainy season. The unused vegetation can also be composted instead of burning. Soil conservation like contour furrowing, small check dams in erodible land and water conservation like deep summer ploughing, harrowing, *in situ* water conservation practices in scanty and low rainfall areas are integral part of good pasture management. Controlled defoliation resulted from controlled grazing maintains enough remaining leaf area to provide energy for regrowth. Grazing below 3 inches of the forage species should not be allowed as the grasses store protein and sugar at the bottom 2-3 inches for regrowth. The thumb rule of "take half, leave half" is good to retain stored energy for regrowth. Grazing should be avoided four weeks before the end of growing season.

Conclusion

Scientific pasture management, which includes proper stage of grazing and appropriate grazing strategies, compatible combination of legume and grasses, excess forage conservation, incorporation of trees/shrubs for getting foliage during summer, adoption of appropriate soil and water conservation measures, removal of undesirable plants/weeds, reseeding, protection for vegetation recovery, fertilizer management, controlled burning and controlled defoliation, needs to be adopted for sustainable forage production in pastures/grasslands.

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