INTRODUCTION

The domestication of livestock in India is second most important occupation, only next to agriculture. India contributes 15% of world livestock population while it has only 2% (326.8 mha) of world geographical area. The total utilizable area of 301 mha is further devoted to arable lands 51 percent, forests 16 percent, permanent pastures 4 percent and other grazing lands and uncultivable degraded lands constitute an area of 29 percent. Even if non-agricultural land is included, the total area under grazing lands works out to 85.5 million ha. This is the area which supports India’s livestock population, in addition to a proportion of agriculture crops which are fed to the livestock. Hence the total area of grazing lands in India is 100.3 mha.

The grazing lands, pasture and forests are major forage resources for the livestock in our country but these resources are over utilized. A rough estimate shows that grassland and forests together contribute to about 40% of the present forage supply position and the remaining 60% of the forage supply comes from the fodder crops, agrowastes and crop residues. The cultivated lands are already under tremendous pressure of food crops cultivation in order to feed the growing human population and hence, there
is no scope of increase in the area under forage crop production. Moreover, the
cultivation of fodder crops is meager mainly due to the lack of irrigation facilities.
Availability of crop residues is also insufficient as most of the cultivated area is rainfed
and single cropped. The cropped area under fodder production is about 8.3 million ha.
(4.4%). It is difficult to maintain a huge livestock population due to low level of biomass
production from degraded grasslands.

In general the grazing intensity in our country is very high i.e. 2.6 ACU/ha as
against 0.8 ACU/ha in developed countries and in semi-arid region it is very high viz.,
4.72 ACU/ha. The number of bovines per hectare is very high which results in to
compaction of soil, decrease in production and nutritive value of natural grazing lands,
add to this is the fact that ecosystem is disturbed. Due to disturbance in ecosystem the
geology, soil and plant stability is also disturbed leading to change in the flora, fauna,
hydrological relation and soil biological systems. The losses in physical and nutritionally
lost fertility status of soil are so high that it may take several years to recoup.

Restoration of ecosystem is of paramount importance; one of the steps to restore it
is protection of habitats and communities from further deterioration and losing of the
extinct species of vegetation. The present availability of livestock grazing resource can
significantly be improved by adopting the improved technology specially renovation of
grazing areas to improve pasture, grazing lands which supply biomass manifold
(depending up on soil, rainfall, climate etc.). Low biomass and poor nutrition of present
grazing lands is due to heavy grazing pressure per unit area and disappearance of
potential species of grasses, legumes, shrubs and trees. To overcome this problems, the
scientists at Indian Grassland and Fodder Research Institute, Jhansi have developed
various technologies relating to grassland management, livestock improvement and
varietal development of fodder crops. Application of the improved technologies of soil
conservation, vegetative sustenance, grazing management to utilize the biomass
efficiently and economics of system has resulted into overall improvement and ultimately
more return from degraded lands. Keeping above in view the present study entitled "Vegetation
dynamics of a grassland ecosystem under four utilization patterns" was
planned with the aim to identify the appropriate utilization system for maintaining these
grasslands as sustainable production unit.
Considerable works have been carried out on the structure and productivity of these grasslands while the studies are meager on their utilization. The present study is a part of the project on grassland based animal production at Indian Grassland and Fodder Research institute, Jhansi. In 1986, it was felt that animal grazing was responsible for deforestation and environmental degradation in the ecologically fragile areas, which, however, could not be authentically substantiated by the Task Force Committee of GOI because of lack of critical research data. It was a general feeling that in the ecologically fragile zones of country, specially in Bundelkhand region being semi-arid, livestock grazing particularly sheep and goat in large number is mainly responsible for deterioration of grassland ecosystem causing environmental degradation. So in the 4th Regional Committee Meeting of Indian Council of Agriculture Research in 1986, it was decided that a collaborative research programme on various aspects of forage and fuel production, livestock feeding and their economical impact should be developed by Indian Grassland and Fodder Research Institute, Jhansi.

In the first phase (1987-92) of the project the four forage production systems viz. three tier, sown pasture, improved pasture and natural grassland were evaluated for plant, nutrient loss in soil, animal, water run off and economic components. At the end of first phase, improved pasture was found best. In the second phase, keeping the production system i.e. improved pasture as a constant, four grassland utilization systems viz., rotational, deferred rotational, continuous and cut & carry (no grazing) were evaluated ultimately to find out sustainable utilization system. Accordingly the present study was initiated with an aim to find out the best system of grassland utilization for sustainable production.