

Management and Improvement of Natural Grassland

Natural grasslands are the primary source of fodder for livestock in Himachal Pradesh. Total areas for grazing is about 32 lakh hectares which comes to 56.7% of total geographical areas of the State. These grasslands are spread over from 300 to 4,800 m altitude with climate varying from sub-tropical to alpine types. Dry matter production from these areas varies from 10 to 50 q/ha. However, this could be increased to 100 q/ha if grasslands are improved and managed properly. Vegetative growth in most of the grasslands takes place only for a period of three to five months in a year resulting in acute shortage of green fodder in the remaining part of the year. Area under cultivable fodder crops in the State is only 8000 hectares. For increasing green forage production and to have regular supply of fodder throughout the year, area under superior varieties of fodder crops needs to be increased. For augmenting fodder supply from natural grasslands, emphasis has to be given on their improvement and better management. Conservation of surplus fodder from the grasslands during monsoon season in the form of silage is essential to ensure supply of green fodder during the lean period.

Most of the grasslands and meadows in our State are on steep slopes and rocky terrain. Due to lack of proper management and improvement, their productivity is very low. Following recommendations are made for their proper management and improvement:

(a) Improved cutting and grazing management

Although grasses are tolerant to frequent cuttings they, like other green plants, depend on their leaves for photosynthesis. The maximum forage is, therefore, obtained by the most lenient cutting or grazing. On the other hand, the longer the grass is allowed to grow, the lower will be the quality of the produce as protein content starts decreasing with the advance in age. Every effort should be made to harvest the grassland after the cessation of monsoon rains in order to conserve fodder of good quality in the form of hay. Delayed cutting of grassland when grasses have matured gives herbage of very low nutritive value. For getting better distribution of green forage from grassland; the grassland should be fertilized and harvested twice.

Overgrazing of pasture/forest areas should also be avoided as it results in elimination of desirable species and loss or stand. Since it will not be possible to stop grazing over the entire area when no other alternative areas are available, the practical method is to adopt rotational grazing system. This provides grasses a period of rest. It would be more desirable if a portion of pasture is not grazed or cut for hay till grasses have shed seed as this would give a chance of reseeding.

(b) Removal of bushes and other species

In uncared grassland, undesirable bushes like cactus, lantana, barberry, etc. start appearing in large number. These plants compete with grasses for soil moisture and affect grass production adversely. Thus, efforts should be made to remove undesirable bushes from grassland. Application of 1% Glyphosate (ai) on stump after removal of aerial parts has been found to be successful for their control.

(c) Use of fertilizers:

Practically none of natural grasslands receive fertilizer in any form excluding what is added in the form of dung and urine by livestock grazing on them. Thus, there is a continuous depletion of plant nutrients from such lands resulting in a very low forage yield. This effect is more pronounced due to the lack of legume components which are capable of adding nitrogen to soil. As the forage yield falls, competitive capacity of desirable species also falls and other plants better adapted to the lower fertility condition will tend to replace them. The major plant foods for pasture plants are nitrogen, phosphorus, potash, sulphur, lime and magnesium. Trace elements required in much smaller quantity are molybdenum, copper, zinc, manganese, boron and iron. Approximate dose for any grassland will depend upon its topographic condition and soil test.

Increase in forage yield upto 200% has been recorded on the application of 80 kg nitrogen and 60 kg phosphorus per hectare from a natural grassland of moderate slope in mid-hill region. Application of nitrogen

fertilizer increases crude protein content also. Care should be taken while applying fertilizer to natural pasture. If it is too sloppy, it should be applied on higher side of hillocks. The best time of its application is the beginning of premonsoon rains. Split application of nitrogenous fertilizer would give better response.

(d) Introduction of suitable legumes:

In Himachal Pradesh, cattle mostly depend on crop-straw and grass-hay which contain mostly cellulose, which can provide only energy but no digestible protein to animals. Continuous use of energy feed without sufficient intake of protein has resulted in degradation of genetic potential for production and reproduction in indigenous as well as exotic cows.

Straw and hay can be judiciously used in proper combination with protein rich feed like oil cakes or leguminous fodder crops. The grass flora of our grasslands have very low proportion of legume component. Increase in their proportion would yield fodder rich in protein and other essential nutrients. The following legumes can be introduced in grasslands/pastures of different agro-climatic zones of the State :

<u>Legume</u>	<u>Seed rate(kg/ha)</u>
Zone I	
Siratro (<i>Macroptilium atropurium</i>)	6-8
Glycine (<i>Neonotonia weightii</i>)	5-6
Dolichos (<i>Macrotyloma axillara</i>)	6-8
Zone II	
Glycine (<i>Neonotonia weightii</i>)	5-6
Dolichos (<i>Macrotyloma axillare</i>)	5-6
White clover (<i>Trifolium repense</i>)	3-5
Red clover (<i>Trifolium pratense</i>)	10-12
Zone III	
Red clover (<i>Trifolium pratense</i>)	10-12
White clover (<i>Trifolium repens</i>)	3-5
Zone IV	
Lucerne (<i>Medicago sativa</i>)	15
White clover (<i>Trifolium repens</i>)	3-5
Red clover (<i>Trifolium pratense</i>)	10-12

Inoculation of seed with suitable Rhizobium culture and application of 60 kg P₂O₅ and 100 g molybdenum is essential for establishment of these legumes. Micro-elements such as Mg and boron are also essential in certain soils for good establishment and growth.

Reseeding method : Circular pits of 15 cm radius and 20 cm deep should be dug up and all natural grasses removed. The fertilizer should be mixed thoroughly and seed broadcasted and mixed with the soil. Sowing should be done during end of June in Zone I & II, during October in Zone III and during April in Zone IV.

(e) Introduction of superior grasses

Introduction of suitable high yielding and nutritive grasses in degraded grasslands, pastures, waste and barren lands, not only increases herbage production considerably but availability of green forage is increased from 3-4 to 7-8 months due to their longer growing period. Grasses which have been found promising for introduction in different zones are:

i) Zone I

Napier-bajra hybrid – IG-7 and NB-37

Panicum maximum – Guinea grass & Green panic

Urochloa mosambicensis – Sabi grass

Setaria anceps- Nandi

ii) Zone II

Setaria anceps- PSS-1

Napier-bajra hybrid-IG-7, NB-37

Panicum maximum – HGG-2

Paspalum wettsteinii – Broad leaf paspalum

Pennisetum clandestinum – Kikuya grass

iii) Zone III

Dactylis glomerata - Commet, Sumax

Festuca arundinacea – Hima-1

Phalaris tuberosa

Phleum pratensis- Clair & Eugme

iv) Zone IV

Festuca arundinacea-Hima-1

Dactylis glomerata – Commet, Sumax

Agropyron spp.

Sowing method

As young grass seedlings are weak and take longer time to establish and most of the time are eliminated by shading and strong competition from already established grasses. Therefore, for good results, first seedlings should be planted in the nursery and seedlings transplanted in the field during 2nd year. For fine grasses, seedlings block along with soil should be planted, while for thick grasses like NB-hybrids, individual cuttings can be transplanted. Transplanting should be done in lines 30 cm apart with plant distance of 20cm. Circular pit method of seed sowing can also be adopted in far away places where transporting costs are higher.

(f) Plantation of fodder trees :

Fodder trees and shrubs provide green fodder when native grasses have dried or are dormant. In addition to supply of green fodder during scarcity period, their plantings do not compete with other crops as they are planted on wasteland, grassland and bunds of fields and require little care after establishment. Common fodder trees suitable for different agro-climatic conditions are listed below :

Common Name**Scientific Name**

Zone-I

Dheu	<i>Atrocarpus lakoocha</i>
Kachnar	<i>Bauhinia variegata</i>
Khair	<i>Acacia catechu</i>
Losura	<i>Cordia mysia</i>
Bans	<i>Bambusa arundinacea</i>
Ber	<i>Zizyphus jujuba</i>
Soo-babool	<i>Leucaenia leucocephala</i>
Mulberry	<i>Morus alba</i>
Biul	<i>Grewia optiva</i>

Zone- II

Kachnar	<i>Bauhinia variegata</i>
Biul	<i>Grewia optiva</i>
Khirak	<i>Celtis australis</i>
Bans	<i>Bambusa arundinacea</i>
Safeda or white poplar	<i>Populus alba</i>
Robinia	<i>Robinia pseudocacia</i>
Mulberry	<i>Morus alba</i>

Zone-III

Robinia	<i>Robinia pseudo acacia</i>
Poplar	<i>Populus alba</i>
Khirak	<i>Celtis australis</i>

Zone-IV (dry zone)

Willow	<i>Salix denticulate</i>
Poplar (Tilnjna)	<i>Populus alba</i> and <i>P. ciliata</i>
Indian Poplar	<i>Populus eupharatica</i>
Robinia	<i>Robinia pseudocacia</i>
