

### III. FEED AND FODDER DEVELOPMENT

The utility and usefulness of various species of livestock in Himachal Pradesh cannot be fully manifested and exploited, unless and until the feed and fodder resources are also fully developed and properly utilised. In H.P., we do not have large cultivable areas, which could be spared for the production of fodder and fodder seeds; besides this the irrigation facilities are limited. Due to over-grazing over generations, nutritive grasses have been depleted considerably. This is, perhaps, the situation practically all over the country. Alpine pastures in the northern part of the country have also suffered the same fate. Milk production is one of the most important activities for the fulfillment of the Prime Minister's 20 Point Economic Programme for rural areas, and its impact on the small and marginal farmers and agricultural labourers has been spectacular. However, milk production depends primarily on the availability of proper nutritive feeds and fodder.

The area under fodder crops being small and the possibility of any significant increase, being remote, livestock have to depend for their sustenance on the grassland resources of the country. The most pertinent component of the cattle development programme is the provision of proper and balanced feed. Howsoever superior the germ-plasm that is introduced, its intrinsic inherent characteristics cannot be fully manifested unless the genetic merit is fully exploited by proper/scientific feeding and management. The age-old system of feeding animals on straw and fibrous grasses needs to change. Presently, the fodder resources of the State are limited to natural grasslands/*ghasnis*, shrubs, fodder trees, residues of crops, straw/agricultural by-products, and some leguminous fodder cultivated in the fields; mainly in the milch pockets located in the valley areas. At present, the level of dry matter production from our natural grasslands and meadows has been found to vary from 25 to 52 quintals/ha. Thus, the availability of dry fodder in the form of roughages, which are of very low nutritive value, has been estimated by the Forest Department to be around 7 million tons in the State. The whole of this quantity is not being properly/fully utilized. H.P. is very deficient in concentrates and the availability of green fodder is scarce. It is estimated that H.P. is deficient in concentrates by 80 per cent and in green and dry fodder it falls short by 50 per cent. At present, it is estimated that only 7,500 ha is under fodder cultivation in H.P., and thus is 0.74 per cent of the total cultivated area.

## **The Present Situation and Prospects**

### *Area under Permanent Pastures and Grasslands*

Of the total physical area (5,567,300 ha) in Himachal Pradesh about 1,185,930 ha and 2,132,400 ha are under permanent pastures and grasslands and forests respectively. However the net area available for grazing is estimated at 2,728,250 ha which constitutes 49 per cent of the total area.

### *Vegetative Zones and their Grasses and Legumes*

Himachal Pradesh can be broadly divided into three major vegetative zones. (Anon 1976).

- (i) Sub-Tropical Zone: This zone is also further classified into foothills and valleys (up to 1000 m) and mid-hills (1000-2100 m) where *arundinella*, *bothriochloa*, *chrysopogon*, *digitaria*, *imperata*, *medicago*, *paspalum*, and *sorghum* species are some of the common grasses that are available. For detail see appendix 2, table - 1.
- (ii) Humid/Sub-Temperate Zone: This zone includes high hills with the elevation ranging from 2100 m to 3200 m. Some of the important grass species that are commonly available are: *agropyron*, *bromus*, *chrysopogon*, *dactylis*, *festuca*, *lolium*, *lotus*, *medicago*, *poa*, *stipa*, *trifolium*, etc. For detail see appendix 2, table - 2.
- (iii) Dry Temperate and Alpine Zone: Areas at and above 3,200 m fall under this category of vegetative zone. Some of the easily available grasses include: *agrotis*, *agropyron*, *bromus*, *dactylis*, *festuca*, *lolium*, *poa*, and *trifolium* species. For detail see appendix 2, table - 3.

## *Grazing Incidence*

Based on Anon's (1970) assumption (e.g. body weight, feeding habits of animals) there are altogether 15.26 million units of livestock in H.P.<sup>1/</sup> Hence the intensity of grazing comes to 0.18 ha/per unit as against 0.5 ha/per unit considered necessary as per the recommendation of the Grazing Advisory Committee constituted by the Himachal Pradesh Government. During the past two decades the grazing incidence has decreased from 0.25 ha/per unit in 1969 to 0.21 ha/per unit in 1972 and 0.18 ha/per unit in 1982. The reasons for this decrease in the grazing areas are the increasing livestock population, increase in area under cultivation and horticulture, and prohibition of grazing by the Forest Department, as a soil conservation measure in the catchment areas of hydro-electric projects to protect the dams, and also due to different afforestation programmes. The increase in the grazing incidence has a detrimental effect not only on the quality and quantity of the grass cover but also on soil fertility. This fact is amply evident from the state of affairs of the village grazing lands which are denuded of top surface vegetation and are severely affected by soil erosion. The migratory livestock owners, who have been rearing sheep and goats for generations, are the worst affected by the drastic reduction and closure of their grazing areas for which they had grazing rights. They are compelled to sneak into the DPF and UDPF, thus causing colossal damage to the vegetation. If this situation continues, it is feared that the reserve and protected forests will also be depleted, further aggravating the fodder problem in the State.

## **Improvement of Grasslands and Pastures**

Since the present grass cover available in Himachal Pradesh, especially in the lower hills, is of a very poor quality, and the alpine pastures are also deteriorating, some suitable remedies and methods are urgently required to prevent their further depletion. For the improvement of pastures and grasslands which form the main source of fodder production, general principles of improvement such as reseeding; controlled grazing; reduction in the grazing incidences; application of inputs; removal of weeds, bushes, and obnoxious plants will have to be adopted (Whyte 1964), although on a limited scale because of the peculiar topographical and other inherent hazards. Reseeding of legumes on the pastures can be done by laying contour channel/terraces. Transplantation of roots of improved grasses and legumes in the pre-monsoon period is quite successful. Grasses and legumes can also be introduced in orchards besides growing them on the pasture lands. Lucerne can be grown along the streams and small water channels where adequate moisture is available.

## *Cultivation of Fodder*

Cultivation of legumes is the cheapest way of providing nitrogen for the animal and associate pasture grasses. Therefore, priority should be given to the introduction of high quality grasses, as well as legumes, into the native pastures.

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### 1/ Conversion coefficients

one buffalo	= 6.0 units	one equino	= 4.0 units
one cattle	= 4.0 units	one pig	= 4.0 units
one sheep	= 1.0 unit		
one goat	= 1.5 units		

Apart from the grasses some fodder crops can also be propagated in this zone, especially the *Napier-bajra* hybrid which can be planted along the banks of small streams, river beds, bunds, and wastelands. It will help to check soil erosion in addition to providing green and nutritive fodder. Wherever some land can be set apart for forage production, the following rotations can be followed:

#### For Irrigated Areas

- i) Maize + Cowpeas (June-September) - *Berseem* + Japanese Sarson (October-May)
- ii) Maize + Cowpeas (April-June) - Maize + Cowpeas (June-September)- Turnip (September-November) - Oat + Vetch (December-April)
- iii) Sorghum/*Bajra* (April-June) - Maize + Cowpeas (July-September) - Oats + Pea (October-March)
- iv) Maize + Cowpeas (April-June) - Sorghum (June-September) - Oats + Vetch (October - March/April)
- v) Sorghum (June-September) - *Berseem* + Oats (October-May)

#### For Non-irrigated Areas

- i) Maize + Cowpeas (Kharif) - Oats + Vetch (Rabi)
- ii) Maize + Cowpeas (Kharif) - Barley + Vetch (Rabi)
- iii) Sorghum (Kharif) - Oats + Vetch (Rabi)

On an average, dry matter production of 160 and 100 quintals/ha can be obtained from irrigated and non-irrigated areas, respectively.

The following fodder crops can be grown in the humid temperate zone (Narayanan and Dabadghao 1972):

#### Kharif season

- i) Maize + Cowpeas
- ii) Maize + Soyabeans

#### Rabi season

- i) Lucerne (can be cultivated as perennial)
- ii) Oats + Vetch
- iii) Barley + Vetch
- iv) Turnip
- v) Fodder beets and Mangels
- vi) Kales
- vii) Swedes
- viii) Rape

### *Bush Control*

This implies, the eradication of bushes, thistles, thorns, and obnoxious and ordinary weeds, by different means. In Himachal Pradesh, especially in the lower hills, bushes such as *Zarberi*, *Lantana*, and *Aegeratum* have become a nuisance for the pastures and grasslands. The carrying capacity of the existing land where such weeds predominate, has been considerably reduced. Its eradication by application of herbicides is cost prohibitive. The most effective and practical method for removal of such weeds seems to be the manual cutting of the aerial portion of the plant and then applying some chemical herbicide to the stump so as to check its further growth. Research work has been taken up by the scientists of Himachal Pradesh *Krishi Vishva Vidyalyaya*, but, so far, no definite recommendations at low cost have been made to eradicate these obnoxious plants.

### *Controlled Grazing*

It is true that controlled grazing provides sufficient time for the regeneration of grass cover, but is not easy to practice in Himachal Pradesh where already existing grasslands are shrinking due to the various reasons mentioned above. However, the village grasslands and pastures can be divided into plots and fenced wherever possible. Grazing should be done in these areas by rotation. In the alpine pastures, however, grazing is automatically controlled with adequate recess as the area remains under snow for a period of six months. For successful implementation of rotational grazing, the cooperation of local right holders, migratory graziers, and departmental agencies, is of vital importance for exercising control.

### *Reduction in Grazing Incidence*

It has been mentioned earlier that the incidence of grazing in the existing pasture lands is increasing gradually. On one hand, the livestock population is increasing, and, on the other hand, the grazing area is decreasing. There is no straight forward and easy solution to this problem. However, attempts at reducing the livestock population by persuading and educating the farmers to maintain fewer animals by stall feeding practices should perhaps become essential.

### **Proper Conservation and Utilisation of Forage**

#### *Preparation of Silage*

The available forage supplied from the grassland/pastures is of poor quality, as it is harvested by the farmers, at a time when the foliage is shed and only fibre is left and the stalk has lost its nutritive value. Significant decreases in crude protein and increases in crude fibre have been reported in most of the indigenous grasses of the mid-hills, when harvested after September (Dogra et al. 1979). While the grass should normally be cut before flowering, this is not done so because the grass cut at this stage does not dry up quickly and invariably gets spoiled by the rain. If it is harvested at a later stage, it clashes with their normal harvesting season. One solution to this problem appears to be conversion of surplus grass into silage. However, a proper technique for silage-making has to be evolved and farmers provided with necessary training in this technique. Silage facilitates utilisation of palatable fodder in much greener form with most of its nutrients preserved. However, it has to be decided what type of silo pit suits our conditions; whether to have a *kacha* silo pit or to adopt a surface tower silo.

### *Hay Making and Baling*

As mentioned earlier, the grasses are generally cut at a later stage of growth when plants are fibrous and highly lignified. In order to get good quality fodder, grasses need to be harvested before flowering and then baled after drying. The practice of hay baling is helpful in setting up fodder banks from where fodder can be transported to deficit areas. Some light and portable type of hay baling-machines have to be designed to suit the local hill conditions and the fodder banks need to be built up at various places where there are vast *ghasnis* both under the private and government sectors. Under the present conditions of successive droughts in the country, the building-up of fodder banks is very essential.

### **Fodder Trees and Silvopastures Arrangements**

In the hills, certain fodder trees, both deciduous and non-deciduous, provide a source of green fodder; especially during the lean period. These fodder trees are being destroyed by improper and heavy lopping. These fodder trees are also a source of energy supplied in the form of fuelwood. Fodder plants can be planted on the periphery of agricultural land where they can serve as wind-breakers, as well. Certain species of fodder trees have been identified in Himachal Pradesh which need to be propagated at a fast pace. The fodder trees, grown in Himachal Pradesh under different agro-climatic conditions, are presented in appendix 3 table - 1. On the basis of chemical composition, *Beul* (*Grewia optiva*), *Tut* (*Morus alba*), *Robinia* (*Robinia pseudoacacia*), *Khiak* (*Celtis australis*), *Dheu* (*Artocarpus lakoocha*), and *Siris* (*Albizia lebbeck*) were found to be superior fodder trees. Mixing tree foliage with dry roughages, such as hay or straw, improves its palatability and nutritive value.