PASTURE DEVELOPMENT PROGRAMME

Silvipastoral system is one of the major component of agroforestry and simply defined as a combination of trees and grasses. Nair (1985) includes animal production systems under silvipastoral systems in which multipurpose woody perennials provide the fodder (protein bank) or function as living fences around grazing land or are retained as commercial shade/browse/fruit trees in pasture lands. Therefore, silvipastoral systems integrate trees (timber, food or fodder producing ones) with pasture and livestock.

Like food and fuel, fodder availability is another critical issue which directly affects the livestock and indirectly the economy. As discussed earlier, wasteland offers a great potential for raising pastures to augment the scant fodder resources in Anantapur district. It is estimated that nearly 0.1 million ha of wasteland is suitable for pasture development. Therefore as an ameliorative measure, pasture development was taken up under DPAP and was discussed in Chapter IV. The main objective of the pasture development programme was to develop fodder thereby to augment with the available fodder resources. The work has been studied and approach made is discussed in the present chapter.

Under the programme degraded forest lands (plains or with moderate slope) and government wastelands in the vicinity of villages, over an extent of 11200 ha were selected during 1975 to 1978 in all the watershed areas for developing pastures. The
The details are as follows.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of plots</th>
<th>Area in ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>2</td>
<td>300</td>
</tr>
<tr>
<td>1976</td>
<td>7</td>
<td>2680</td>
</tr>
<tr>
<td>1977</td>
<td>18</td>
<td>6610</td>
</tr>
<tr>
<td>1978</td>
<td>6</td>
<td>1705</td>
</tr>
</tbody>
</table>

The 33 pastures plots were distributed over the entire district, in different watersheds (Fig. 25). Concurrently, the Animal Husbandry Department had constituted 45 sheep societies, adjoining these pasture plots. At the rate of 100 ha per each society, having 300 sheep, 4500 ha of pastures were set apart as sheep pastures. The remaining area of 6700 ha was utilised as cattle pastures for the local villages.

TECHNOLOGY ADOPTED IN PASTURE DEVELOPMENT

Selection of suitable site:

Degraded forest lands, containing scrub and thorny growth and also government wastelands in the vicinity of village's having sparse growth, easy topography with tolerably good soil conditions were selected. While selecting the areas, existing soil and moisture conservation plots formed under Rural Works Programme earlier were included.

The treatment included the following measures:

a) Fencing

Generally consisted of dry rubble masonry wall of the size $[(90+60)/2] \times 120$ cm (where stones were available locally). In other places, barbed wire fence was erected.
PASTURE DEVELOPMENT UNDER D.P.A.P
IN ANANTAPUR DISTRICT

SCALE
3 cm = 23 km

FOREST AREA
PASTURE LAND

Fig. 25
Figure 26

Fodder for prosperity.
b) **Soil and moisture conservation**

The treatment consisted of gully plugging, construction of check dams and contour trenching in the eroded patches.

c) **Contour furrowing**

Along the contour, 'V' shape furrows of the size 30 cm width at the top and 20 cm depth were dug at 5 m interval. The dug-out earth was formed into a mound along the lower slope.

The above operations were completed before the onset of monsoon.

d) **Seeding the area**

Under the advice of the World Bank Expert, grass seed of *Cenchrus ciliaris* was sown on the mounds and along the furrows at the rate of one to two Kg per hectare, with the out break of monsoon. During early years of pasture development (1974 to 1976), the results of seed sowing were not encouraging. Resowings with increased seed rate (5 Kg/ha) was done in the same areas for successful results. The grass seed was made into pellets by mixing with cow-dung, silt and superphosphate and the pellets were sown along the mounds. The seed was also pretreated with gammaxine and kerosene to prevent damage from insects and rodents. Seed was sown in patches 30 cm apart, after racking up the soil, 10-15 cm deep along the furrows in a staggered fashion. This technique gave satisfactory results. In the plain areas, 4 to 10 ha blocks were selected, ploughed
twice and insecticide-coated seed of *Cenchrus ciliaris* was sown by dibbling and broadcasting. This helped good germination and establishment.

e) **Planting of top feed**

In order to augment the availability of green fodder during the lean months, top feed species were introduced in the pastures from 1978 onwards. The choice of species were *Acacia nilotica*, *Hardwickia binata*, *Azadirachta indica*, *Dalbergia sissoo*, *Albizia lebbeck*, *Leucaena leucocephala*. Six to eight month old nursery raised seedlings were planted in the pasture plots developed after intensive land preparation, at an espacement of 6 x 6 m in 30 cm cube pits. However, protection of the seedlings from grazing, was found difficult. Therefore, within the pasture plot, the top feed species were introduced at 5 x 2 m apart. The plots were fenced with brush-wood.

f) **Introduction of *Cenchrus ciliaris* and fodder legumes**

Despite adoption of several techniques, *Cenchrus ciliaris* failed to give encouraging results, mainly due to unfavourable soil and climatic conditions. The germinated grass unable to compete with the local grasses like *Sehima nervosum*, *Heteropogon contortus* and *Cymbopogon caesius* which were found to be more aggressive. It was uneconomical and difficult to establish pure *Cenchrus ciliaris* pastures. Further the percentage of crude protein content of *Cenchrus ciliaris* (8 per cent) was more or less equal to local grasses (*Heteropogon contortus* 5 per cent, *Chrysopogon fulvus* 3 per cent, and *Sehima nervosum* 6 per cent), it was found desirable to encourage native grasses
by protection and removal of weed. In order to improve the forage value of the plots, nutritive legumes, suitable for the tract, were tried.

Since 1980, efforts were made to introduce fodder legumes like *Stylosanthes hamata* (Verano), *S. humilis* (Townsville), *Macroptelium atropurpureum* (Sirotro) at the rate of 5 Kg/ha. The results from propagating *Stylosanthes hamata* were encouraging. The species, as a prolific seeder, deep rooter, drought hardy and having long viability, was found to be very effective. The efforts were also made to plant 2-3 month old (10 cm) slips of *S. scabra* along mounds of furrows and trenches, and this gave satisfactory results. Protection for two years induced quick succession of grass species. Grasses like *Sehima nervosum*, *Chrysopogon fulvus* and *Eremepogon faveolatus* had taken up the ground. The succession of local land is found to be *Sehima* type.

**PRODUCTIVITY OF PASTURES**

The villagers, who were entitled for free grazing in these areas, were allowed to cut and remove the grass in these plots from 2nd year onwards. The removal of grass by head-loads in the form of hay were recorded in the registers, which indicated increase in the productivity level. The quantity of grass removed from the pasture plots was 1984 t during 1976-77; 2045 t during 1977-78 and 3201t during 1978-79. The quantity of grass removed year after year had been on the increase. This was a healthy trend.
The native grasses grew vigorously to a height of 60-80 cm before they flowered and set seed. If deferred grazing was permitted for sheep in the pasture, it was impossible for the sheep to graze the tall grasses after they flowered. This deferred grazing recommended by the World Bank, would have worked well with buffel grass which normally grows to a height of 20-30 cm. In the conditions prevailing in the pastures of Anantapur district, continuous grazing alone could keep the grasses low, to enable the sheep to graze.

Continuous protection resulted in the increased production of more palatable local grasses up to 3rd year and thereafter the production tended to decline, suggesting the need to introduce pasture legumes or fertilizer application for sustained fodder production. October and November were the months when, maximum harvests were recorded. Closure of areas induced natural tree growth. Species like Acacia chundra, Albizia amara, Azadirachta indica etc., appeared in measurable proportion. The average cost of pasture development worked out to Rs.400/- per hectare.

ESTIMATION OF PASTURE PRODUCTIVITY

The methodology for estimating the pasture production is presented in Chapter III. The quantitative and qualitative estimates done are presented below. The plots selected for the estimating pasture production in the present study are Chalakur (1977), Roddam (1978), Yerrakonda (1976) and Penukonda Anjaneyaswamy plot (1977).
Quantitative estimates

The pasture plots treated and maintained up to 1982 were subsequently not followed up. However, the local villagers were allowed to cut and carry the grasses for stallfeeding and sheep were allowed to graze. Except for Penukonda Anjaneyaswamy plot, which was sown with seed of *Stylosanthes hamata* during 1986 and 1987 (at 5 Kg/ha), other plots did not receive any attention. The quantitative estimates of the dry matter production has increased from an average of 310 Kg/ha in 1979 to an average of 1850 Kg/ha in 1988 and an average of 1050 Kg/ha recorded during 1989. The high yields recorded in 1988 are attributable to good rainfall during the year. Details of pasture production estimates in the selected four plots are given in Appendix -XIX.

Qualitative assessment

The palatable species composition in the selected plots is 97.59 and 95.86 per cent in 1988 and 1989 respectively. Unpalatable species comprise 2.41 and 4.14 per cent in 1988 and 1989 respectively. The palatable species composition and their dry matter yields are calculated and presented in Table 12. The details of palatable species composition in Chalakur, Roddam, Yerrakonda, Penukonda plots and their yields (fresh and dry matter) are given in Appendix - XX A and B.

*Cenchrus ciliaris*, which was tried intensively during 1979 and 1982 failed to establish and multiply naturally. However, the indigenous grasses viz., *Cymbopogon caesius*,...
### TABLE 12
PERCENTAGE COMPOSITION AND DRY MATTER YIELDS OF PALATABLE PASTURE SPECIES

<table>
<thead>
<tr>
<th>Palatable species</th>
<th>% Composition of palatable pasture species</th>
<th>Dry matter yield (Kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cenchrus ciliaris</td>
<td>0.43</td>
<td>0.85</td>
</tr>
<tr>
<td>Cymbopogon caesius</td>
<td>16.00</td>
<td>14.83</td>
</tr>
<tr>
<td>Heteropogon contortus</td>
<td>22.65</td>
<td>37.56</td>
</tr>
<tr>
<td>Chrysopogon fulvus</td>
<td>16.90</td>
<td>16.90</td>
</tr>
<tr>
<td>Panicum maximum</td>
<td>4.68</td>
<td>8.83</td>
</tr>
<tr>
<td>Stylosanthes hamata</td>
<td>29.68</td>
<td>16.88</td>
</tr>
<tr>
<td>Stylosanthes scabra</td>
<td>2.11</td>
<td>1.63</td>
</tr>
<tr>
<td>Sehima nervosum</td>
<td>4.75</td>
<td>1.55</td>
</tr>
<tr>
<td>Other legumes</td>
<td>2.80</td>
<td>0.97</td>
</tr>
</tbody>
</table>
Heteropogon contortus, Chrysopogon fulvus and Sehima nervosum accounted for 65 per cent of the total production. Sehima nervosum, which is a climatic climax species for these areas, which was totally absent earlier, has taken the ground and found to occur profusely along the middle slope and valleys. The most encouraging aspect of pasture development had been the propagation of legumes like Stylosanthes hamata, S. scabra which accounted for nearly 25 per cent of the composition. The S. hamata was found to be most successful, in that, it sustained itself qualitatively and quantitatively, over a period of 8 years multiplying naturally. Despite the fact that these pasture plots were not put to any systematic management during 8 years, the efforts made earlier in the form of land development, soil and moisture conservation and introduction of legumes, etc., yielded substantial results. Occurrence of 90 per cent palatable grasses producing nearly 1000 Kg of dry matter per hectare, is substantial.