

Temperate Forages

I. LEGUMES

RED CLOVER

Red clover (*Trifolium pratense*) is a tall growing perennial legume suited for high altitude and cooler regions. 400-600 q/ha forage yield can be obtained.

Variety : Palampur Composite

Sowing time : April-May, after melting of snow

Seed rate : 9-12 kg/ha. It can also be planted by rooted slips.

Other Practices : 2-4 irrigations in summer, if available. First cutting is ready in about 3 months after sowing. One cutting in spring and subsequent cuttings at an interval of 6 weeks till October can be obtained in the following years.

WHITE CLOVER

White clover (*Trifolium repens*) is an excellent pasture for cooler regions mainly used for grazing purpose and is known to be the best nitrogen fixing legume. On an average, it yields 400 quintals green fodder per hectare.

Variety : Palampur Composite and Ladino

Sowing time : April-May, after melting snow

Seed rate : 3-5 kg/ha

Other practices : 2-4 irrigations in summer, if available. First cutting is ready in about three months period. In subsequent years, 3-4 cuttings can be obtained.

LUCERNE (ALFALFA)

Lucerne (*Medicago sativa*) is a perennial pasture legume suitable for dry hill region. It gives, on an average, 400 quintals green fodder per hectare and can be utilized for grazing and hay making. The crude protein content is 22% on dry matter basis.

Variety

Anand-3 : It has dark green trifoliolate leaves, medium thick stem, deep root system, tillers varies from 10-15/plant, have quick regeneration capacity, flowers are blue in colour with yellow seeds. On an average, it provides 400-500 q/ha of green fodder in 5-6 cuttings annually. Its herbage contains 23-24% CP (DM) and is very nutritive.

Sowing time : March-April, after melting of snow

Seed rate : 15 kg/ha

Other practices : 2-4 irrigations in summer, if available. Three cuttings can be obtained in a season.

II GRASSES

FESCUE

Fescues (*Festuca arundinacea*) is a perennial grass adapted to an altitude above 1500 m and is suitable for grazing and hay. 300-500 quintals of green fodder per hectare can be obtained in 2 to 3 cuttings in a year.

Variety

Hima-1 : It has dark green leaves, medium thick round stem, deep fibrous root system, long open panicle and bold seed. It is suitable for temperate grasslands and forest between 1800-3300 m asl. Plant height is 1.5-2 m. It is resistance to lodging, cold and frost. It is very nutritive and palatable grass containing 12-14% crude protein on dry matter basis. Average yield is 400-500 q/ha.

Sowing time : March-April, after melting of snow. Root-slips can be transplanted in monsoon in rows 40 cm apart.

Seed rate : 12-16 kg/ha, or about 1,00,000 root-slips are required per hectare.

Manuring : Basal dose of 40 kg N and 40 kg P₂O₅ per ha followed by top dressing of 20 kg N/ha.

Other practices : Usually not irrigated. One to two irrigations may be given in summer, if available.

ORCHARD GRASS

Orchard grass (*Dactylis glomerta*) is a soft, palatable deep rooted and long-lived perennial suitable for temperate alpine areas. It yields about 500 quintals of green fodder per hectare for grazing.

Varieties : Commet, Sumax and common orchard grass should be grown.

Sowing time : March-April or September-October, when propagated from rooted slips, the best time is early monsoon period.

Seed rate : 9-11 kg/ha or about 1,00,000 root-slips are required per hectare.

Manuring : Basal dose of 40kg N and 40 kg P₂O₅ followed by top dressing of 20 kg N/ha.

Other practices : 2-3 irrigations should be given.

CANARY GRASS

Canary grass (*Phalaris tuberosa*) is a soft and palatable perennial grass best suited to areas above 1500 m altitude. It yields 500 quintals green herbage per hectare in 2-3 cuttings per ha.

Variety : Common canary grass

Sowing time : March-April or September-October, root-slips can be transplanted in monsoon in row 40 cm apart.

Seed rate : 6-10 kg/ha or about 1,00,000 root slips are required.

Manuring : Basal dose of 40kg N and 40 kg P₂O₅ followed by top dressing of 20 kg N/ha.

Other practices : At lower altitudes and drier areas, 2-3 irrigations should be given in summer. Either it can be grazed by animals or cut for hay making.

TIMOTHY

Timothy (*Phleum pratense*) is a palatable suited for cooler and higher altitudes. It gives fresh yield of 500 q/ha per year in 2 to 4 cuttings. Suitable for hay as well as for grazing.

Variety : Clair and Eugme

Sowing time : March-April or September-October, root-slips can be transferred in monsoon season rows 40 cm apart.

Seed rate : 8-12 kg/ha. It can also be propagated from rooted slips about 1,00,000 rooted-slips are required per hectare.

Manuring: Basal dose of 40kg N and 40 kg P₂O₅ followed by top dressing of 20 kg N/ha.

Other practices : If irrigation facilities are available, 2-3 irrigations may be given as and when needed.

SUITABLE FODDER CROP COMBINATIONS FOR DIFFERENT AGRO-CLIMATIC ZONE ARE:

Zone I

Maize+Cowpea : Mixture of maize and cowpea provides an excellent nutrition fodder to animals with CP (DM) around 10-12%. Two crops of this mixture can be obtained during one year i.e. summer (April-mid June) and rainy season (mid June-September). On an average, 500-600 q/ha green fodder is obtained.

Seed rate : 40 kg maize + 15 cowpea per ha

Nutrient requirements

80 kg N and 60 kg P₂O₅ per hectare. Half N and full P should be drilled before sowing and remaining half N should be top dressed after one month of sowing.

Sorghum+Cowpea:

Mixture of sorghum and cowpea also provides good fodder for animals. Being a drought tolerant and multicut crop, sorghum is generally sown on marginal lands or as rainfed crop. Since it is a multicut crop, only long duration varieties which can cover both summer and rainy seasons, should be grown. On an average, 500 q/ha green fodder becomes available.

Seed rate: 45 kg sorghum + 15 kg cowpea

Nutrient requirements

It requires 80 N and 60 kg P₂O₅ per ha

Zone II

Maize+Field Bean : Mixture of maize and field bean provides an excellent fodder to animals with 10-12% CP. Two crops of this mixture can be obtained in one year i.e. April-mid June and June-October.

Nutrient requirements : 80 kg N and 60 kg P₂O₅ /ha

Zone III

In this zone, large area is under pastures and grasslands. Therefore, fodder crops are generally not grown. However, emphasis should be given to grow fodder crops in orchards to get forage. The following grasses and legumes are recommended for growing in orchards.

Red Clover-Orchard Grass : Mixture of red clover and orchard grass provides an excellent nutritive fodder to animals. Both are shade loving plants and most suitable for orchards. Orchard grass should be transplanted in lines 50 cm apart during July and red clover should be planted between orchard grass lines during October.

Seed rate

Red clover = 5 kg/ha

Orchard grass = 6 kg/ha or 25000 seedlings per ha

Nutrient requirements : 40 kg N and 60 kg P₂O₅ per ha

SCHEME FOR PRODUCING GREEN FODDER (FOR 10 COWS)

1. Green fodder required @ 30 kg/cattle/day. Total requirement for one year would be about 1100 quintals for 10 cattle.
2. To provide 1100 quintals of green fodder, about 1.2 hectares of irrigated land will be needed.

3. Following fodder crop-rotations may be adopted in low and mid-hill regions.

Rotation A = Oat-Maize+Velvet bean-Maize+Cowpea
(0.3 ha) (Summer) (Monsoon)

Rotation B = Berseem+J. Rape+Oat-Teosinte+Velvet bean
(0.6 ha) (Multicut)

Rotation C = Oat+Pea-Bajra + Velvet bean
(0.3 ha) (Multicut) (Multicut)

The following chart on the next page details the seeding time, availability of fodder, etc.

In order to get maximum green fodder per unit area in per unit time, the following crop rotations for mid hills areas under irrigated conditions have been found to be most promising:

1. Napier-bajra hybrid+Velvet bean-Berseem+Chinese sarson
(May-September) (September-May)
2. Maize + Cowpea - Berseem+Oats
(May-September) (September-May)
3. Setaria Kanjangulla/Narok/Nandi+Velvet bean-Berseem + Chinese sarson
(May-December) (September-May)

The rotation at Sr. No. 3 has been found to be the most economical as it does not involve land preparation after setaria introduction. Berseem is sown by broadcast in setaria grass in the month of September.

SILAGE

Silage is the term used for the product formed when any green plant material is cut and stored where it can ferment in the absence of air. During this process of fermentation, the silage develops acids which act preservatives for the nutrients of the forages.

Crops suitable for silage: There are as many kinds of silage as there are crops and crop mixtures. Common crops used for silage making are maize, sorghum, bajra, mixture of grasses and legumes. When properly made, grass silage is not only palatable and highly nutritious but it has also an agreeable smell and high carotene (Vitamin A precursor) content. The loss of nutrients is very much less than when crops are cured as dry hay.

The principle in making silage is to keep the green fodder material tightly packed in impervious containers, excluding air as much as possible. The crop should be harvested at the right stage of growth, viz. between the flowering and milk stage. The important conditions for getting quality silage are (i) storing the plant material at moisture content of 65 to 75% (ii) excluding air and (iii) encouraging a rise of temperature from 30 to 38°C.

Chart showing detail of seedling and fodder availability

Crop	Rotation & area	Time of sowing	Time of fodder availability	Distribution of fodder available	Surplus/ shortage
Oat-Pea	A1 (0.3 ha)	Early Oct.	Feb.-March	Dec.-60	-50
Berseem + J. Rape + Oat	B1 (0.6 ha)	Mid-Sept.	Dec.-June	Jan.-50	-60
Oat+Pea (Multicut)	C1 (0.3 ha)	Early Oct.	Feb-April	Feb.-70 March-170 April-170	-40 +60 +60
Maize+Velevet Bean (Summer)	A2 (0.3 ha)	Early April	June	May-60 June-120	-50 +10
Toesinte + Velvet bean	B2 (0.6 ha)	March-June	May-Sept.	July-130 Aug.-130 Sept.-230 Oct.-120	+20 +20 +120 +10
Maize+Cowpea (Monsoon)	A(0.3 ha)	End June	September	Nov.-60 Total-1370	-50

Note : Surplus fodder in September, March & April should be conserved as silage or hay for feeding during deficit period.

A farmer who has a herd of ten milch animals will require 120 to 130 quintals of silage for 60 days when green fodder is not available. A soil pit of the dimension of 4.50 x 1.80 and 1.80 m depth with proper partitions will meet this demand. The site may be located as a place where chances of seepage of water are negligible. The sides should be slopy. The floor and the sides should be covered with 15 cm layer or dry grass or any other suitable material. The silage material may be chaffed to the length of 2 to 2.5 cm.

Silage material

Preservatives

- | | |
|----------------------|---|
| 1. Grass alone | 2.5-3.5 kg of molasses/q of silage material |
| 2. Legumes & grasses | 3.5 kg of molasses/q of silage material |
| 3. Legumes alone | 3.5-4.5 kg of molasses/q of silage material |

In order to improve the quality of silage when prepared from grasses along, 0.02 per cent urea may be mixed with the molasses which will entirely free of risk due to ammonia toxicity to the animals. The material is to be packed with the inter-mixing of molasses and urea. The packing of the material is done manually or with a suitable machinery. The heap should be 60-90 cm high above ground level which may be covered with a layer of dry grass to a thickness of 8-10 cm and then with the earth layer of 30-60 cm thickness. The dome shaped structure is then plastered with mud which will have to be repaired as and when cracks appear. The silage becomes ready for feeding to the animals after a period of 6 to 8 weeks.

Characteristics of good silage

The good silage has clean odour without any objectionable after smell and has pleasing taste without any mould, sliminess or mushy rot. The body of the silage should be uniform in colour and moisture content. A dark brown or black colour indicates that the silage is useless and rotten. Green juicy silage is the most palatable and nutritious.