

FORAGE CROPS

RED CLOVER

Red clover (*Trifolium pratense*) is a tall growing perennial legume suited for high altitude and cooler regions, 400 to 600 quintals fresh forage yield can be obtained per hectare.

Variety :Palampur Composite

Sowing time : April-May, after melting of snow

Manuring :

Nitrogen	20 kg/ha
P ₂ O ₅	20 kg/ha

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

Others 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 can be obtained in the following years.

WHITE CLOVER

White clover (*Trifolium repens*) is an excellent pasture legume 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.

Varieties

Palampur Composite-I : It is a fast-growing temperate legume suitable for growing in temperate pastures. It has broad leaves, long petioles, vigorous growth habit, good regeneration capacity and high protein content in its herbage (about 23% protein on dry-matter basis). It can be grown alone or in mixture with other grasses. It has beneficial association with grasses growing with it in their growth and nutritive quality. It gives 3-4 cuttings in a year, if harvested for green fodder or hay. But generally, it is used for grazing purpose. If introduced in orchards, it preserves the moisture content of soils and acts as cushion for dropping fruits, in addition to providing a nutritive forage for animals. It has very high nitrogen fixing capacity as well (200-400 kg/ha). It gives, on an average, yield of 700-800 q/ha of green fodder.

Other variety is Ladino

Sowing time :March-April, after melting snow or in October-November

Seed rate : 4-6 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 high hill region. It gives, on average, 400 quintals green fodder per ha and can be utilized for grazing and hay making. The crude protein content in lucerne is 22% on dry matter basis.

Varieties

Sirsa-9 (Type-9) and Anand-3

(Given under Lucerne for other zones)

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.

FESCUE

Fescue (*Festuca arundinacea*) is a perennial grasses adapted to an altitude about 1500 m and is suitable for grazing and hay. 300-500 quintals of green fodder per hectare can be obtained in 4 to 6 cuttings in a year.

Variety : Hima-1 : Has dark green leaves, medium thick round stem, deep fibrous root system, long open panicle & bold seed. It is suitable for temperate grasslands & forest between 1800-3300 m msl. Plant height 1.5-2.0 metres. Resistant to lodging, cold & frost. Very nutritive & 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 or in October-November. Root-slips can be transplanted in monsoon season in rows 40 cm apart.

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

Manuring

Basal dose of 40 kg N and 40 kg P₂O₅ per hectare 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

Orchards grass (*Dactylis glomerata*) is a soft, palatable, deep rooted and long-lived perennial suitable for temperate and alpine areas. It yields about 500 quintals green fodder per hectare per year in 3 to 4 cuttings. It is mostly suited for grazing.

Varieties : Commet and Sumax

Sowing time : March-April or in 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/ha.

Manuring

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

Other practices : Two to three irrigations should be given, if available.

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 year.

Variety : Common canary grass

Sowing time : March-April or in September-October. Root-slips can be transplanted in monsoon in rows 40 cm apart.

Seed rate : 6-10 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 hectare followed by top dressing of 20 kg N/ha.

Other practices : At lower altitude and drier areas, 2-3 irrigations should be given in summer. It can be grazed or cut for hay making.

TIMOTHY

Timothy (*Phleum pratense*) is a soft palatable suited for cooler and higher altitudes. It gives fresh fodder yield of 500 q/ha per year in 3 to 4 cuttings. Suitable for hay as well as for grazing.

Varieties : Clair and Eugme.

Sowing time : March-April. Root-slips can be transplanted in monsoon season in 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 40 kg N and 40 kg P₂O₅ per hectare followed by top dressing of 20 kg N/ha.

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

Scheme for producing Green Fodder for 10 cows :-

1. Green fodder required @ 35 kg/cattle/day. Total requirement for one year would be about 130 tonnes for 10 cattle.
2. To produce the above tonnage, about 1.1. hectare irrigated land will be needed.
3. Following fodder crop-rotations may be adopted in low and mid hill regions :

Rotation A (0.35 ha)

Napier-bajra hybrid+velvet bean/cowpea-berseem+Chinese sarson

Rotation B(0.2 ha)

Maize+Soybean-maize+cowpea-oats+Chinese sarson

Rotation C (0.2 ha)

Teosinte+velvet bean/cowpea-berseem+oats

Rotation D (0.35 ha)

Setaria+velvet bean/cowpea-berseem/lucerene+Chinese sarson

The following chart shows the details of seeding time, availability of fodder, etc.

Silage making

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 as 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 the 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 stages 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 55 to 75% (ii) excluding air, and (iii) encouraging a rise of temperature from 30 to 38°C.

A farmer who has a herd of ten milch animals will require 120 to 130 quintals of silage for feeding for a period of sixty days when green fodder will not be available. A silo pit of the dimension of 4.50x1.80 m. and 1.80 m depth with proper partitions will meet this demand. This site may be located at a place where the chances of seepage of water are negligible. The sides should be slopy. The floor and the sides should be covered with 6 inch layer of dry grass or any other suitable material. The silage material may be chaffed to the length of 2 to 2.5 cm.

Chart showing details of seeding and fodder availability

Crops	Rotation & area	Time of sowing	Time of fodder availability	Fodder reqd. (tonnes)	Fodder available (tonnes)	Surplus/ shortage (tonnes)
Berseem + Chinese sarson	A(0.35 ha)	Mid Sept.	Dec.-May	Dec. 10.85	11.50	+0.65
Oats+Chinese sarson	B(0.2 ha)	End Sept.	Dec.-March	Jan. 10.85	11.00	+0.15
Berseem+oats	C(0.2 ha)	End Sept.	Dec.-May	Feb. 9.80	6.00	-3.80
Berseem+Chinese	D(0.35 ha)	Mid Sept.	Dec.-May	March 10.85	13.50	+2.65

sarson						
Maize+soybean	B (0.2 ha)	Early April	June	April 10.50	11.50	+1.00
				May 10.85	9.00	-1.85
				June 10.50	10.75	+0.25
Napier-bajra hybrid+velvet bean	A (0.35 ha)	End June	June-Nov.	July 10.85	12.00	+1.15
Teosinte+velvet bean	C(0.2 ha)	Early June	Sept. Nov.	August 10.85	15.50	+4.65
				Sept. 10.50	18.50	+8.00
Maize+cowpea	B(0.2 ha)	Early June	September	Oct. 10.85	11.50	+0.65
Setaria+velvet Bean/cowpea	D(0.35 ha)	May-June	May-Dec.	Nov. 10.50	7.25	-3.25
		Total			138.00	

Note : Surplus fodder in March-August and September should be conserved as silage or hay for feeding during deficit period.

Silage material

Preservatives

- | | |
|------------------------|---|
| 1. Grasses alone | 2.5-3.5 kg of molasses/q of silage material |
| 2. Legumes and 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 the silage when prepared from grasses alone, 0.02% urea may be mixed with the molasses which will be entirely free of risk due to ammonia toxicity to the animals. The material is to be packed pile with the inter-mixings 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 as and when cracks appear. The silage becomes ready for feeding to the animals after a period of 6 to 8 weeks.

Characteristics of a good silage

The good silage has a clean odour without any objectionable after smell as well as 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.