

# Improved Green Fodder Production



**An important and economic source  
of macro and micro nutrients  
for livestock**



**National Dairy Development Board  
Anand**

## Introduction

In India, an estimated 50 million tonnes of concentrate feed ingredients are available annually which yield about 10 million tonnes of crude protein (CP) and 32.5 million tonnes of total digestible nutrients (TDN). In comparison, the annual production of green fodder is estimated at nearly 500 million tonnes, yielding around 12 million tonnes of crude protein and 55 million tonnes of total digestible nutrients. Thus, green fodder is a vital source of nutrients, especially vitamins, for livestock.

Green fodder is primarily obtained through cultivation. Presently, 9.38\* million hectares of cultivated land is under fodder crops, with a meagre average annual yield of 40 tonnes/hectare, which is low. In view of land constraints, efforts need to be put forth to: (i) enhance fodder production from available land and (ii) increase availability of fodder by minimising wastage.

## Strategies to increase green fodder production and availability

- Use quality seeds of high yielding varieties/hybrids of fodder crops
- Follow recommended agronomical practices of cultivation
- Follow suitable crop rotation
- Select short duration fodder crops (sunflower/mustard/turnip) during the switch-over season
- Sow legume as an inter-crop or as a mixed crop with a non-legume crop to enhance the nutritional value of fodder and improve soil fertility
- Plant perennial grasses like hybrid napier bajra/guinea grass in about 15 to 20 per cent of the cultivated area to get green fodder round the year
- Plant fodder trees/shrubs on farm boundaries to get green fodder during the lean period
- Harvest fodder at the appropriate stage to get the maximum nutrients
- Adopt modern practices for hay and silage making to ensure supply of fodder during scarcity and avoid wastage of surplus green fodder
- Use chaff-cutter to minimise wastage of fodder

## Various fodder crops/grasses/trees

1. <b>Annual</b>	<b>Legumes</b>	: Berseem, Lucerne, Cowpea, Guar, Rice bean, Velvet bean
	<b>Cereals</b>	: Sorghum, Oats, Maize, Millets, Barley
	<b>Miscellaneous</b>	: Mustard (Chinese cabbage), Turnip, Fodder beet, Soya bean, Sunflower
2. <b>Perennial</b>	<b>Grasses</b>	: Hybrid napier bajra, Guinea grass, Para grass, Congo signal grass
	<b>Range Grasses</b>	: Nandi grass, Anjan grass, Blue panic grass, Marvel grass, Rhodes grass
	<b>Pasture legumes</b>	: Butterfly pea, <i>Stylo</i> , <i>Siratro</i>
	<b>Shrubs &amp; trees</b>	: Hedge lucerne, Subabool, Siris, Khejari, Shevari, <i>Gliricidia</i>

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## Important fodder crops

**Sorghum** (*Sorghum bicolor*): It is the most important cereal fodder crop grown in summer/rainy season. Covering the maximum cultivated area among fodder crops, sorghum is grown in all parts of the country except the cool hilly areas. It has high tolerance to drought and excessive rainfall. There are single, two and multi-cut varieties/hybrids of sorghum giving one to six cuts per crop producing 50 to 100 tonnes/hectare of green fodder. To avoid prussic acid or cyanide toxicity to livestock, the crop should be harvested at about 50 per cent flowering or after irrigation at the pre-flowering stage. The crop is also useful for hay and silage making.

Important varieties: PC-1, PC-6, PC-9, PC-23, HC-136, HC-171, PSC-1, Pant Chari-5, Pant Chari-6 and Sorghum sudan hybrid.

**Berseem** (*Trifolium alexandrinum*): It is a legume crop of the winter season grown mainly in Bihar, Haryana, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. It gives six to seven cuts between November to May and produces 70 to 80 tonnes/hectare of extremely palatable and nutritious green fodder containing about 20 per cent crude protein. Berseem fodder is known as the 'milk multiplier'. Being a leguminous crop it also fixes atmospheric nitrogen in the soil and improves soil fertility.

Important varieties: JB-1, BL-1, BL-10, BL-42, UPB-110, Mescavi and Wardhan.

**Lucerne** (*Medicago sativa*): Known as the 'queen of fodder', lucerne is the most popular fodder crop in the country after berseem and sorghum. As a winter legume, lucerne is grown mainly in Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. The crop can give seven to eight cuts from November to June with an average green fodder yield of 60 to 80 tonnes/hectare. The fodder contains about 20 per cent crude protein. The crop is appropriate for hay making. In some areas, it is cultivated as a perennial crop.

Important varieties: T-9, A-2, A-3, RL-88, CO-1 and LLC-5.

**Cowpea** (*Vigna unguiculata*): This legume crop is grown under both irrigated and rainfed conditions. It is widely cultivated across the country excluding the temperate hilly areas. It has great potential as a mixed crop when sown with maize, sorghum and millets to produce an ideal 'legume & cereal' fodder mixture. It grows quickly and can yield 25 to 45 tonnes/hectare of green fodder. It also finds use as green manure.

Important varieties: EC-4216, UPC-287, UPC-5286, GFC-1, GFC-2 and GFC-4.

**Oats** (*Avena sativa*): It is a winter season cereal fodder crop, mainly cultivated in Bihar, Haryana, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. It has excellent growth and shows quick regeneration capacity after cutting. The green fodder is succulent, rich in carbohydrates and palatable. The yield ranges from 30 to 50 tonnes/hectare. The crop can also be used to prepare hay and silage.

Important varieties: Kent, UPO-94, UPO-212, OS-6, OS-7, OL-9, JHO-822, JHO-851 and HFO-114.

**Maize** (*Zea mays*): Maize is one of the best cereal fodder crops grown during summer, rainy and/or early winter season. It produces rich and nutritious green fodder which is a good source of carbohydrates. The green fodder is particularly suitable for silage making. The yield varies from 30 to 40 tonnes/hectare.

Important varieties: African tall, JS-1006 and Vijay composite.



**Cowpea**



**Sorghum**

## Crop rotation

Suitable rotation of crops not only enhances the productivity of land but also ensures availability of green fodder round the year. An indicative list of some crop rotations is given below:

Sr. No.	Crop rotations	Green fodder production potential (tonnes/hectare/year)
1.	Hybrid napier bajra + Cowpea – Berseem + Mustard	285
2.	Maize + Cowpea – Maize – Cowpea – Oats – Maize + Cowpea	165
3.	Maize + Cowpea – Rice bean – Berseem + Mustard	110
4.	Hybrid napier bajra + Guar – Lucerne	250
5.	Sorghum + Cowpea – Maize + Cowpea – Maize + Cowpea	110
6.	M.P chari – Cowpea – Berseem + Mustard – Sorghum + Cowpea	168

## Silage

It is preserved fodder obtained from the anaerobic fermentation of green fodder. Cereal fodder crops rich in carbohydrates make good silage. About 5 to 1000 tonnes of green fodder can be preserved as silage in a surface silo.

To make silage: (i) harvest the crop at 30 to 35 per cent dry matter stage (ii) chop the crop into small-sized pieces (2-3 centimetres) (iii) fill the chopped fodder into a silo (iv) press the green fodder either manually or mechanically to create anaerobic condition (v) seal the silo with a polythene sheet and cover with soil and (vi) leave it for a minimum 45 days to complete the process of anaerobic fermentation. The silage is ready for feeding animals.



**Chopping of fodder**



**Pressing of fodder in a silo**



**Sealing of silo**