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Course name :

**Crop Production Technology-II
(ASAG 2204)**

Course credit :

(2-1-0)

Lecture 16

**Topic: Fodder & Forage crops-
Barseem and Lucerne**



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Fodder & Forage crops

Fodder refers Coarse grasses such as corn and sorghum harvested with the seed and leaves green or alive, then cured and fed in their entirety as forage or mostly the **crops** which are harvested and used for stall feeding.

Forage A crop of cultivated plants or plant parts, other than separated grain, produced to be grazed or harvested for use as feed for animals. **Forage crops** include grasses, legumes, crucifers and other **crops** cultivated and used in the form of hay, **pasture**, **fodder** and **silage**. **silage** (Forage preserved in a succulent condition by partial anaerobic, acid fermentation.)



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- **1.1 TYPE OF FODDER**
- Legume Fodder
- Cereal Fodder
- Grass Fodder
- Tree Fodder
- **1.2 IMPORTANCE OF FODDER CROPS:**
- Forage dry matter consumption should be near 2% of the body weight. At least 19-21% acid detergent fibre should be in the total ration. At least 28-30% neutral detergent fibre should be in the total ration. Provide at least 2 Kg of fibre a day. Rumen PH should be above 6.0. A lower PH could limit fiber digestion and protein synthesis



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1.3 IMPORTANCE OF FORAGE CROPS

Live stock production is an integral part of Indian agriculture.

India ranks **first in live stock production** and accounts for 15% of cattle production in the world.

States with largest acreage under cultivated fodders are Rajasthan, Gujarat, Haryana, Punjab, U.P., M.P., Maharashtra, Tamil Nadu.

Total area under forage crops in India is 8.3 m.ha which is 4.2 to 4.9% of total cropped area.

There is need to improve the fodder acreage up to 8 to 10% of total cropped area to meet the deficit of green fodder for sustained live stock production in India which is considered as an important avocation of rural areas in India .



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Reasons for low productivity of forage crops

1. Allotment of poor and marginal lands.
2. Poor management practices.
3. Unavailability of seed of forage crops.
4. Growing less productive forage crops.



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1.4 Dairy & Forage related Institutes

- ✓ **NDRI** National Dairy Research Institute, Karnal
- ✓ **CAZRI** Central Arid Zone Research Institute, Jodhpur
- ✓ **IGFRI** Indian Grassland and Fodder Research Institute, Jhansi,
- ✓ **CSWRI** Central Sheep and Wool Research Institute, Avikanagar, Rajasthan.
- ✓ **AICRP NETWORK**-All India coordinated research project on forages was established in the year 1970 with 18 sub centres and main center at Jhansi.
- ✓ **NRCAF** – National Research Center For Agro Forestry, Jhansi
- ✓ **NDDB** – National Dairy Development Board, Anand, Gujarat.



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Berseem (*Trifolium alexandrinum*)

Common name: Egyptian clover

Plant characters:

- It is considered as KING OF FODDER crops because of its nutritional qualities.
- It is main fodder for horses, camels and donkeys.
- Annual bushy shrub and winter growing to a height of 0.9 to 1.0 m with upright and decumbent succulent stem terminating in trifoliate leaves.
- Seed is pear shaped and yellowish brown colour.
- crude protein is content 18-21% and it is good soil binder.
- The green forage can also be converted in to excellent hay and utilized for enrichment of poor quality roughages from cereals.



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1.5 Origin and distribution

Berseem is believed to be indigenous to **Egypt**.

It is introduced in India from Egypt in 1904 and tried at various centers for its performance, with such good results by 1916 it was recognized as a widely adaptable and valuable addition to the forage crops of India.

Now it is the prominent fodder legume in irrigated areas of **Punjab, Delhi, Rajasthan and Uttar Pradesh**.

Due to shorter winter period, **berseem cannot be cultivated in southern India**.



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1.6 Climate and soil

Grows in tropics, subtropics and temperate regions.

Temperature range is 25-35⁰C optimum for seedling growth. 25-27⁰C optimum for vegetative growth and branching. 35-37⁰C optimum for flowering and seed setting.

It cannot tolerate frost & temperature below 4-5⁰ C.

Well drained deep loamy soils rich in lime, P, K with PH 5.5-8.5 are recommended.

Does not perform well on sandy soils, water logged and acidic soils.

Can tolerate salinity, alkalinity and is thus useful for reclaiming coastal and alkaline lands.



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1.7 Land preparation

The land should be opened with soil inversion plough followed by 2-3 operations by deshi plough/cultivator and planking.

The preparation of good seed bed is an essential to obtain desired level of tilth.

Fine seed bed is required especially when berseem is to be grown as seed crop.

When the crop is to be sown in puddled beds, cross harrowing /ploughings are needed to remove established weeds, stubbles of the previous crop and to open the soil for leveling by planking.

1.8 Season

- ✓ It is a **rabi season crop**.
- ✓ **October to November** sowings are adopted depending on prevailing temperatures and vacation of kharif crop.



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1.9 Varieties

Mescavi: The variety is an introduction from Egypt followed by selection at HAU, Hisar. It is recommended for cultivation in all *berseem* growing regions of India especially Punjab, Haryana and Himachal Pradesh. Plants are shrubby and erect growing up to a height of 45–75 cm, with profuse tillers. Stem is succulent which gives off branches terminating in 2 or 3 leaves. It yields about 65 t/ha green fodder in 4–6 cuttings.

Berseem Ludhiana-1 (BL-1): The variety has been bred through selection by PAU, Ludhiana from Mescavi. It is adapted to Punjab situation. Its first cutting is ready about a week earlier than that of Mescavi. It continues to supply green fodder up to the end of May about 2 weeks late than Mescavi. It yields 80–110 t/ha green fodder.



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- **Jawahar Berseem-1 (JB-1):** The variety has been developed at JNKVV, Jabalpur. It is recommended for cultivation in all berseem growing areas of the country especially CZ and NWZ. Its productivity is **70–75 t/ha** green fodder and 12–15 t/ha dry fodder.
- **Wardan:** The variety has been evolved through selection by IGFRI, Jhansi in 1981. It provides green fodder yield **70–75 t/ha** and dry fodder 12–15 t/ha. This is a diploid variety of Berseem.
- **BL-10:** The variety has been bred through selection from irradiated material of Mescavi by PAU, Ludhiana and released in 1983. Its productivity is **70 t/ha** of green fodder.



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Lucerne

25.1 Varieties

- **Chetak (S-244):** This is a variety developed by IGFRI, Jhansi in 1975. The variety is suitable for cultivation in Punjab, Haryana, Uttar Pradesh and Gujarat. It yields 140–150 t/ha green fodder.
- **Sirsa Type 9:** This variety is released in 1975 by Fodder Research Station, Sirsa. Its yield potential is about 80–85 t/ha of green fodder. Suitable for growing in Punjab, Haryana, Delhi and Uttar Pradesh.
- **Sirsa-8:** This is a variety developed by Fodder Research Station, Sirsa and released in 1975. The variety is suitable for northern India where cold temperature prevails. Its yield potential is about 80–85 t/ha of green fodder.



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- **Type-9:** The variety was developed by Fodder Research Station, Sirsa in 1978. This is suitable for northern India where cold temperature prevails. Its yield potential is about 75-80 t/ha of green fodder.
- **Co-1:** The variety was developed by TNAU, Coimbatore. The variety is recommended for cultivation in Tamil Nadu. It has high (20%) protein and the green forage yield is 80–90 t/ha. This is a perennial cultivar which can be maintained successfully for three years.
- **GAUL-1 (Anand-2):** The variety was developed by Gujarat Agricultural University, Banaskantha. The green forage yield is 80–100 t/ha. It is suitable for cultivation in Gujarat, Rajasthan and Madhya Pradesh. Yield is 70–80 t/ha green fodder in 10–12 cuts.



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- **GAUL-2 (SS-627):** This is developed by GAU, Banaskantha. It has been recommended for cultivation in whole Gujarat. The plants provide 10 to 12 cuttings in a year with 80–100 t/ha green fodder.
- **LL Composite 5:** The variety was developed by PAU, Ludhiana for cultivation in Punjab. It gives 8 cutting and has a yield potential about 70–75 t/ha fodder and 0.3–0.5 t/ha seed.
- **LL Composite 3:** The variety was developed at PAU, and downy mildew resistant. It provides 38–40 t/ha green fodder.
- **Lucerne no. 9-L:** This variety was developed at PAUniversity, Ludhiana. It grows well for a period of 5–7 years. Its yield potential is about 75 t/ha of green fodder/year.



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- **NDRI Selection No.1:** It is developed by NDRI, Karnal. This variety has the capacity of maintaining itself in its pure stands over 5–6 years without getting degenerated. The crop is ready for first cut after 60–70 days of sowing. Its green fodder yield potential is about 100 t/ha.
- **Anand-3:** The variety has been developed by AAU, Anand. It provides 40 t/ha green fodder.
- **RL-88:** The variety was developed by MPKV, Rahuri. This first cut of the crop can be taken in 50–60 days of sowing and thereafter cut can be taken at 25–30 days. The variety yields 75–100 t/ha green fodder in 11 cuts.



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- **Anand Lucerne-3 (AL-3):** The variety was developed at AAU, Anand. The plants have profuse tillers (47/plant). It is perennial type with dark green foliage and oblong leaves. The green fodder yield is 97 t/ha.



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Seeds & sowing

Seed rate: 10- 15 kg/ha in line sowing

20-30.kg/ha in broadcasting

Spacing : Inter row spacing of **25-30 cm** is adopted in solid rows. If seed production is taken intra rows spacing of **10 cm** is maintained.

Seed inoculation: Seed inoculation may be done with *Rhizobium trifolii* to increase biological N fixation.



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Methods of sowing

Can be sown dry or wet. The land is divided into small plots of convenient size, the plots are irrigated to a depth of 5 cm.

Seeds are soaked in water overnight and broadcast it in the standing water. In crosswise directions to obtain uniform seed distribution.

The sowing should be done towards the evening or during non windy periods of the day.

Manures & Fertilizer

Berseem responds well to manuring and need about 10 t FYM /ha, **25 – 30 kg N, 80- 100 kg P₂O₅, 30-40 kg K₂O kg /ha.**

P is applied as SSP and K as MOP.



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1/2 N, total P and K as basal and remaining 1/2 N should be applied 30 DAS. Micronutrient deficiencies are common with regard to B, Mo, Fe and Zn and has to be corrected.

Boron deficiency is very common in coarse textured and leached out soils. Its deficiency causes several **pale yellow spots on the leaves** which resemble the leaf hopper damage.

Corrected by foliar application of **0.1% borax** or soil application of borax @**10 kg/ha** as basal And Mo as Ammonium molybdate @1- 1.5 kg/ha.

Irrigation

Water requirement is quite high. Initially irrigation is given at weekly interval later at 10-12 days interval.

Crop requires **70-100 cm of water**.



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Season	Clay and clay loam	Loam soil
October to February	14-16 days interval	12-14 days interval
March to April	10-12 days interval	8-10 days interval

Weeding

Requires thorough weeding in initial stages. *Chicorium intybus* is associated weed of berseem.

Remedy is soaking in the 10% brine solution for 10-15 minutes, seeds floating on the water are removed with supplemental hand weeding at 30 DAS.

Chemical treatment : **0.75 -1.0 kg a.i. /ha pendimethalin**, as pre emergence herbicide is recommended.

Incidence of *Cuscuta* is also noticed.



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Harvesting

The first cut can be taken at 55-60 DAS or at 50% flowering stage.

Subsequent cuts are obtained at 25-30 days interval.

Mescavi types are good for fodder purpose as it gives 5-6 cuttings.

Yield

50-70 tonnes/ha/year in / 4-6 cuttings.



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Cropping systems

Rice-Berseem,

Sorghum-Berseem,

Sorghum + Cowpea –Berseem + Mustard,

N-B hybrid + (Cowpea –Berseem)

Guinea grass + (Cowpea –Berseem)

Berseem can be substituted with wheat in rice wheat sequence to minimize the incidence of *Phalaris minor* in wheat.