

Production technology of berseem as fodder and green manure crop in West Bengal

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Berseem, a leguminous fodder crop, is useful for both milch and draught animals. It can also be used for green manuring in irrigated areas, thereby improving the soil fertility that has a tremendous influence on the productivity of boro / summer rice. It has wider adaptability in adverse soil condition. It is, therefore, aptly called 'King' of fodder crops.

Key words: Fodder, Green manure, Production, *Trifolium alexandrinum*

BERSEEM, EGYPTIAN CLOVER, (*Trifolium alexandrinum* L.) a leguminous (Papilionaceae) crop has a bright scope for increasing the fodder yield and improving the soil fertility. It can be grown in lands having irrigation facilities during *rabi* with cool weather in West Bengal. Severe frost destroys the above ground shoots. Good growth and fodder yields were obtained under longer duration of cool temperature.

PACKAGE OF PRACTICES

Soil and land preparation

Berseem can be grown on a variety of soils except very light sandy soils. It performs best on well drained, medium-loamy soils, rich in phosphorus and calcium and free from harmful salts (threshold salinity of 1.5 dSm⁻¹). The seeds being very small, a fine tilth is essential for good germination. The field should be ploughed 3-4 times followed by planking for breaking the clods and levelling the soil. In light soil, puddling is necessary to prevent excessive percolation loss of water. As berseem bears nodule bacteria, waterlogging is not desirable.

Improved cultivars

The well known cultivars of berseem can be put into two groups. One is diploid group, in which the most promising varieties are 'BL 1', 'Meskavi', 'Khadrabi', 'Chindwara 561' and 'Wardan'. Another is the tetraploid group having very promising high yielding varieties like 'Pusa Giant', 'T 678' and 'Bundel Berseem 3'

Among all the varieties, Meskavi berseem is very promising in India especially in West Bengal in particular

and the fodder obtained from it is highly nutritious, succulent, palatable and suitable for all types of livestock bedding and green manuring. 'Bundel Berseem 3' is a recently released high-yielding and disease tolerant variety for West Bengal.

Sowing

There are 2 methods for berseem sowing:

(i) *Dry bed method*. The field should have sufficient soil moisture for good

Fig.1. Early stage of Egyptian clover (field view).



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germination and the seedlings establish within a fortnight. Irrigation should be given only after proper germination, and

(ii) *Wet bed method.* The seeds should be sown by broadcast method after inundation of the field with 5-6 cm deep water. Puddling is must either by puddler or by planking in water for proper setting of the seeds.

In West Bengal and in the eastern region it is generally sown from the beginning of November to the first week of December. For the first time cultivation in a field, seeds should be treated with *Rhizobium* culture. It helps in nitrogen-fixation after the establishment of the seedlings. Berseem seeds are soaked in water for 10-12 hr prior to sowing preferably in the evening to soften the hard seed coat. The recommended seed rate is 25 kg/ha.

Fertilizer management

Farmyard manure or compost should be applied @ 8-12 tonne/ha and mixed thoroughly with the soil 20-30 days before sowing. Inorganic fertilizer should be applied @ 20-13-8 kg N, P and K through urea (45 kg/ha), single super phosphate (375 kg/ha) and muriate of potash (32 kg/ha) respectively. Berseem responds well to the application of phosphates. Phosphate as single super phosphate is superior to diammonium phosphate as the former yielded more under West Bengal condition. Full doses of all the fertilizers should be incorporated at the time of sowing as basal application.

Irrigation

After the emergence of seedlings, first irrigation should be provided and subsequent 2-3 irrigations should be given at 10-day-intervals. Irrigation interval should be increased from 15 to 20 days up to the end of February and decreased to 10 days from March to May.

Not more than 5 cm irrigation water should be given after each cutting and timing of irrigation is important. Irrigation should be



Fig. 2. Berseem crop (a close up).

provided 10 days before each cutting to ensure quick and better re-growth. In total 10-12 irrigations are necessary for successful berseem cultivation in West Bengal.

Weed control

Chicory (*Cichorium intybus* L.) is a notorious weed in the berseem field. One deep ploughing is necessary to eradicate the weed seeds from the field after the final harvest of berseem. Seeds should be dipped in 15-20% common salt solution to eliminate the chicory seeds from berseem. Besides this measure, contact herbicide viz. Dinoseb acetate may be used as post-emergence application. Other weeds like *Asphodelus*, *Chenopodium* (lambsquarters), *Convolvulus* (field bind weed) etc. may be present in the field but do not cause any great harm as they are suppressed by the vigorous canopy growth of berseem after the first cutting.

Plant-protection measures

Among the diseases, stem rot caused by a fungus (*Sclerotinia*

sclerotium) is soil borne and it attacks the basal portion of the stem resulting in collar rot. To control the disease, seeds should be taken from a disease free crop, flooding the affected field during the summer and soil drenching with 0.4% solution of Brassicol (pentachloro nitrobenzene) after cutting of fodder.

Insect pests like black ants, caterpillar and cotton worm are causing economic damage. Black ants destroy the seeds when it is just germinating. Application of contact insecticide like Dichlorvos (Nuvan) @ 0.07% in the soil before sowing can reduce the ant attack.

Rotation

Berseem can be more conveniently rotated with fodder maize, sorghum, pearl millet, sweet sudan for intensive fodder cultivation with irrigation facility. Under West Bengal condition Berseem (taking only few cuttings) – boro rice (cv. MW 10) – maize (fodder) is a suitable rotation with profitable return.

Mixed cropping

It is practised with Japanese rape,

Chinese cabbage, senji (*Melilotus alba*), barley, oats, sugarcane and napier as intercrop. Both crops in mixed cropping give good yield besides enriching the soil with nitrogen.

Nutritive value

Berseem is palatable, highly nutritious and very succulent. Hence, it plays a dual role as fodder and as green manure. Green fodder of berseem contains 2.8% crude protein (Table 1) which is an essential dietary component for cattle feed.

Table 1. Chemical composition of green fodder of berseem.

Berseem (Green fodder)	Chemical composition (%)
Moisture	84.9
Crude protein	2.8
Crude fibre	2.9
Ash	2.2
Calcium	0.40
Phosphorus	0.07
Potassium	0.72

Forage conservation

Later cuttings are generally preferred due to low moisture content for making good quality hay. Drying should be done with much care to prevent bleaching and leaf shedding. March and April are the best months for hay making as the air temperature remains quite high. Shade dry hay, bright green with high quality, can be effectively used as cattle feed for milch animals. There is no standardized technique for making a good quality silage from berseem, hence hay is preferred.

Seed production technology

The plants should be allowed to

Table 2. Effect of fertilizers on yield (tonne/ha) and dry matter production (g/m²) of root and shoot of berseem cv. Meskavi (pooled data of 2 years)

Treatments	Dry matter production (g/m ²)		Forage yield (tonnes/ha)
	Root	Shoot	
T ₁ : 100% N, P, K	307.2	557.3	39.5
T ₂ : 75% N, P, K	267.6	516.1	35.8
T ₃ : 50% N, P, K+ farmyard manure+ 10 tonne/ha	314.9	576.7	42.9
T ₄ : 100% N, P, K	281.9	537.5	38.0

Note: 100% N, P, K = 20kg, 13 kg and 8 kg of N, P and K respectively. In T₁, T₂ and T₃, N, P, K given through urea, single super phosphate and muriate of potash and in T₄, N, P, K given through urea, diammonium phosphate and muriate of potash.

grow for seed production after taking 3-4 cuttings i.e., from 3rd week of March. Seed crop should be given light irrigation till flowering to check the excessive vegetative growth. The plant starts flowering from the last week of April and seeds get matured in the end of May when seed bolls turn yellow to brown. The crop should be harvested and threshed either by beating with sticks or by trampling with bullocks. Seeds should be cleaned, dried and stored in the damp proof stores. The average seed yield ranges between 6 and 8 kg/ha.

Economic feasibility and effect on soils and crops in rotation

Berseem adds about 225 kg N/ha to the soil. The succeeding crops like sugarcane, cotton, chillies are often benefited to the extent of 45 kg N/ha. As the growth of berseem is slow in the beginning, some quick growing *rabi* crops can be grown in association to

increase the yield in the first cut. Rotation is necessary in the fodder farms for improvement of the quality and yield of fodder. Like other leguminous crops, berseem can fix atmospheric nitrogen by their root nodules (*Rhizobium trifolii*), thereby increasing the soil fertility by reducing the cost of application of inorganic nitrogenous fertilizers and also has tremendous effect on soil physical properties.

Harvesting and yield

The first cut of berseem is usually taken 60-70 days after sowing, whereas, the subsequent cuttings are done at 30-45 days interval. Cutting should be done 5-6 cm above the ground level so that the young up-coming basal branches are not damaged. A well-maintained crop yields up to 42 tonnes/ha and averages yields of 35-38 tonnes/ha is quite common.

SUMMARY

Berseem produced very high yield of good quality fodder at this Krishi Vishwa Vidyalaya during *rabi* of 1998 and 1999 after the harvest of *kharif* rice in medium to low land situation with 20-13-8 kg/ha of N, P and K through urea, single super phosphate and muriate of potash. The maximum shoot dry matter production of 576.7 g/m² and green forage yield of 42.9 tonne/ha of berseem was recorded at 50% recommended dose of N, P and K along with 10 tonne farmyard manure/ha (Table 2). Hence, there is immense scope of growing berseem as fodder as well as green manure in West Bengal, which not only influences the soil fertility but also improves the productivity of *boro* or summer rice when grown after berseem.

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