Agro Techniques of Berseem for Enhancing Livestock Production

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ABSTRACT
Currently, 65 % of the people of Indian lives in rural areas and livestock are the imperative for their subsistence farming and sustainable livelihood. India has recently emerged as largest producer of milk (187.7 million tonnes) in the world. Consequently, the livestock productivity is very low as compared to the developed countries. Crop residues and pastures grazing are the major feed resource for this activity. Although, the forage cultivation has remained almost neglected. As we all know that feeding management plays a very significant role in exploiting the full potential of dairy animals. Therefore, it is necessary to evolve, standardize and demonstrate forage production technologies that have potential to give high monetary returns from small and marginal farmers and can improved quality of natural fodder recourse in a sustainable manner. Berseem cultivation has better option to overcome poor quality and insufficient availability of forage during rabi season.

INTRODUCTION
Berseem (Trifolium alexandrinum L.) is the prominent leguminous fodder and hay crop of rabi season in entire North West, Zone, Hill Zone and part of Central and Eastern Zone of the country. It remains soft succulent at all stages of growth with better digestibility and palatability by which milch animals are very much benefited (Chaterjee and Das, 1989). It contains dry matter, crude protein, digestible dry matter, NDF, ADF, and cell content ranged from 12.0 to 22.2 %, 18.0 to 25.1%, 51.6 to 91.1 %, 38.0 to 64.0%, 29.4 to 37.2% and 36.0 to 62.0%, respectively (Prajapati et al., 2017).
**Origin and History:** The origin of Berseem is apparently from the Mediterranean region however, the exact place of primary center of diversity is not known since the original wild parents seem to have become extinct. It is introduced in India from Egypt during 1904 (Abdalla et al., 2012).

**Botanical description:** The genus *Trifolium* commonly called clovers comprises 237 annual and perennial species out of which 25 are agriculturally important as cultivated and pasture crops. The genus has wide range of variability for habit (annual, biennial and perennial), habitat (tropical, subtropical and temperate) and tolerance to biotic and abiotic stresses. The important perennial pasture clover *T. repens* (white clover), *T. hybridum* (alsike clover), *T. pratense* (red clover) and *T. ambiguum* (caucasian clover) are widely distributed in the temperate and sub temperate regions while the annual types such as *T. resupinatum* (Persian clover), *T. Subterraneum* (subterranean clover) and *T. alexandrinum* L. (Egyptian clover or berseem) are commonly cultivated as winter annuals in the tropical and subtropical regions (Alfred, 2012).

**Classification:**

Cultivars of berseem are classified according to their branching behaviour, which is related to plant ecology and its utilization.

1. **Basal or crown branching type:** This can yield 4-7 cutting per growing season under irrigated condition *e.g.*, Mescavi, Kahdrawi, Nile and Hustler type. In this type “basal shoots” develop freely after cutting and the regrowth is also due to emergence of “side branches” making it suitable for multicut.

2. **Stem branching type:** They exhibit both basal and apical or stem branching and can be cut two to three times. It is drought tolerant and deep rooted *e.g.*, ‘Saidi’ type berseem clovers.

3. **Apical branching type:** Branching is limited to upper third of the main stem and can be cut only once *e.g.*, ‘Fahli’ type. It is adapted to semi-arid areas mainly for hay.

**Climatic requirements:**

Berseem thrives best under dry and cool conditions for proper growth. It is suitable for cultivation in areas where annual rainfall of 250 to 300 mm or even lower but the irrigation must be assured. Maximum herbage yield can be obtained between 15-25°C. If temperature exceeds 40°C then regrowth is retarded. Ideal temperature for sowing berseem crop is 25°C, which is recorded mostly in the 1st to 3rd week of October in North India.

**Soil:**

Berseem can be grown on all types of soils except very light sandy soils. Well-drained clay loam soils rich in calcium and phosphorus are ideally suited for its cultivation. Soil pH should be above 7.0. The crop can be grown successfully on alkaline soils having good water retention capacity. If soil pH is less than 7.0 then planting of berseem should be done after adding lime.

**Land Preparation:**

As the seed of berseem is small, it needs a fine, well-pulverized and leveled field for good germination. One deep ploughing followed by 3 to 4 harrowing and planking should be done. Field should also be free from weed infestation.

**Sowing time:**

Optimum sowing time of berseem is 1st week of October; however, it can be sown in the 2nd fortnight of September in vallies.

**Sowing method:**

There are two methods:

1. **Dry bed method:** In this method, seed is broadcasted, mixed and covered with soil. At the time of sowing there should be sufficient moisture for germination.
Irrigation should be given only after proper germination

2. **Wet bed method:** Convenient size of beds are made after field preparation. The beds are flooded with 5-6 cm deep water then stirred thoroughly to make a soil water suspension and then broadcasting of seed is done. This will help in proper setting of the seeds. Soil water suspension is to be done by paddler (light puddling) followed by planking.

**Varieties:**

Some of the important varieties given below:

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Adaptation</th>
<th>Green Forage Yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mescavi</td>
<td>Entire North West zone</td>
<td>700-900</td>
</tr>
<tr>
<td>Wardan   (S –99-1)</td>
<td>Entire growing region</td>
<td>800-1000</td>
</tr>
<tr>
<td>BL –1, BL –10</td>
<td>Punjab, H.P., Jammu</td>
<td>700-900</td>
</tr>
<tr>
<td>BL –20, BL –22, BL -42</td>
<td>North –West, Hill and sub – temperate zone</td>
<td>800-1000</td>
</tr>
<tr>
<td>JB –1, JB –2, JB –3, JB -5</td>
<td>Central India</td>
<td>800-900</td>
</tr>
</tbody>
</table>

**Cropping systems**

**Rotations:** Important are:

Maize – Berseem – Cowpea, Jowar – Berseem – Maize, Paddy – Berseem – Cowpea, Cotton – Berseem, Bajra – Berseem – Maize + Cowpea, Napier grass intercropped with Berseem, Napier + Berseem + Cowpea and Teosinte – Berseem – Maize + Cowpea

Mixed cropping: Berseem should be planted with either Brassica / Oat in order to get more green forage yield. In first cut, yield of berseem is very poor, so, mix lahi seed @ 1.0 kg per hectare with berseem seed which will produce more green forage at first cut or Mixture of berseem and oat (50:50 ratio) also gives higher yield. Under *ultera* conditions, seedling should be done 8-10 days before harvesting of paddy.

**Seed Rate:**

Optimum time planted crop requires 25-30 kg seed per hectare. In late planting, seed rate should be 30-35 kg per hectare.

**Seed treatment:**

Seed treatment should be done for two purpose:

(A) **To remove chicory (**Kasni**) weed seeds from the berseem seed:**

(i) First remove weed seeds with the help of winnowing

(ii) Fill 2/3 pot of broad mouth with 5% salt solution then put berseem seed after winnowing in this pot. Mix / shake the seed and salt solution with the help of hand many times. Light weed seeds will float on the top layer of the solution. Remove the weed with the help of hand and sieve. After removing weed seeds, wash berseem seed 4-5 times with clean water then dry seed. About 70-80% weed seeds can be removed by this method.

(B) **To inoculate berseem seed with Rhizobium culture:**

Seed require inoculation for those fields where earlier berseem was not sown or where berseem is being planted first time. For one-hectare area 1-1.5 kg rhizobium culture is required. Seed can be mixed with rhizobium culture in two ways(i) paste berseem seed with mustard or castor oil than put culture over the pasted seed and mix well with the help of hand (ii) Take 100 gm gur / sugar, put it in one litre water and boil it for 7-8 minutes and cool the gur /sugar solution upto room temperature. Spray sugar solution over seed and mix it well with the help of hand then broadcast the culture over it and again mix the culture and seed with the help of hand. Dry the inoculated seed in shade for 24 hours. Precaution should be taken that the inoculated individual seed should be separate. Inoculated seed should be sown in the afternoon. If rhizobium culture is not available, then take equal amount of soil from the previously sown
field and broadcast this soil in new soil / land before sowing.

**Manure and Fertilizer:**

Berseem requires 20-25 kg N, 50-60 kg P₂O₅ and 40 kg K₂O per hectare. And is applied as basal dose. In saline or light textured soil, addition of 15-20 tonnes of well-decomposed FYM is beneficial. if FYM is not available. Application of molybdenum and boron may be done based on soil test. All these fertilizers are applied at the time of sowing.

**Irrigation:**

In wet bed method planted crop, first irrigation should be given 5-6 days after sowing and subsequent irrigation at the interval of 15-20 days. Irrigation after each cut is essential for good regrowth of the crop. When temperature increases after February then irrigate the crop at the interval of 10-15 days.

**Weed control:**

Chicory, the associated weed of berseem should be eliminated for higher herbage and good quality fodder. Application of Fluchloralin @ 1.2 kg a.i./ha at pre planting stage controls the chicory and other weeds effectively.

**Plant protection:**

Monitoring of crop is the most important aspect of plant protection. In case of any sign or symptom of diseases or pests plant protection measures are followed. However, if timely sown, managed properly and harvested. Plant protection measures are not required.

**Diseases:**

During the month of December and January when the crop attains luxuriant vegetative growth and cloudy days persist for longer period, the heavy infestation of fungal diseases such as root rot caused by *Rhizoctenia soloni* and *Fusarium smitactum* and stem rot caused by *sclerotinia trifoliorum* occur. If crop is cut the fungal growth in patches can easily be seen. As rotten stubbles. It has been observed that the problem is more acute under the following situation:

- Field is heavily manure with undecomposed farm yard manure and/or irrigated with sewage.
- Water stagnated creation damp conditions.
- Light penetration at the ground is curtailed due to delayed cutting.
- Cloudy condition prevails for longer period.

Agronomic approaches to solve this problem include.

1. Avoiding the growing of berseem crop in the same field year after year and deep ploughing during summer.
2. Using well rotten manure in proper quantities.
3. Fertilizing the crop with heavy dose of potassium.
4. Leveling field properly to avoid water stagnation.
5. Avoiding too frequent irrigations during cloudy days.
6. Cutting the crop frequently to expose the ground for adequate light availability.

**Insects:**

Pod borer (*Helicoverpa armigera*): The young caterpillars nibble the leaf surface, later as these grow they become voracious and destroys the whole crop. These cause more damage in crop left for seed.

**Management:**

Eliminate weeds in and around berseem fields. Sow berseem away from fields of *kharif* pulse crops. Spray neem seed extract@3%.

**Harvest management:**

First cutting of the crop should be taken at 50-55 days stage. Second to fourth cut at the
interval of one month and other cutting at the interval of 20-22 days. Crop should be harvested leaving 5-6 cm stubble height from ground level for proper uniform regrowth. From timely planted crop 6 cuts can be taken.

**Precautions**

1. Harvest the crop 5-6 cm above ground level.
2. Feed berseem mixed with dry fodder to the animals.
3. Before feeding to animals, leave berseem in field for some time to reduce moisture content in berseem.
4. If farmer wants to take seed of berseem then take last cut of berseem by the mid of March and leave the crop for seed production.

**Yield:** A good berseem crop can give 80-120 tonnes/ha green fodder and 15-20 tonnes/ha dry fodder.

**CONCLUSION:**

In order to make livestock rearing more profitable, the cultivation of berseem in *rabi* season will be able to provide good quality and nutritious fodder in adequate quantity which reduces the gap between demand and supply for livestock. It also helps in higher productivity and income in addition to environmental and nutrition security of India.

**REFERENCES:**


