

Pollination Dynamics and Seed Production of Berseem (*Trifolium alexandrinum* L.) in Haryana

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Abstract

Berseem is an important leguminous fodder crop and is mostly grown in northern part of India. Albeit it is traditionally grown as fodder crop but can be successfully harvested for seed purpose if provided with proper pollination. For pollination farmers can go for beekeeping. Moreover, salt affected soils of Haryana have potential for seed production of berseem. In this article, package and practice of berseem have been discussed along with pollination dynamics.

Berseem (*Trifolium alexandrinum* L.)

Egyptian clover (*Trifolium alexandrinum*) or Berseem is one of the most important rabi season annual forage legumes in India. According to the branching behavior and productivity it can be classified into various cultivar groups; amongst Mascavi and Khadravi are highly branching and productive type cultivars (Hannaway *et al.*, 2004). Berseem is believed to be originated in Egypt. It was introduced into India in 1904. Now it is the prominent rabi season fodder legume in irrigated areas of the Punjab, Haryana, Delhi, Rajasthan and Uttar Pradesh and other parts of western and northern India.

Haryana is divided into two agroclimatic zones *i.e.*, eastern and Eastern zone. Eastern districts *viz.*, Kaithal, Karnal, Panipat, Sonapat, Yamunanagar, Kurukshetra are mostly suitable for most of the fodder crops like berseem, sorghum, oats etc. It is mainly grown as fodder crop in 2601.415 acres area in Haryana.

CROP UTILITY:

1. It is most potent milk multiplier as it remains soft and succulent at all stages of growth. It has good forage quality with 20% crude protein content, digestibility up to 65% and high palatability.

2. It can be used for phytoremediation of heavy metals viz., Cd, Pb, Cu and Zn due to its multi-cut nature, short life cycle and production of considerable biomass (Ali *et al.*, 2012)
3. Berseem clover can also be used as green manure crop.
4. The crop can substantially improve soil fertility.

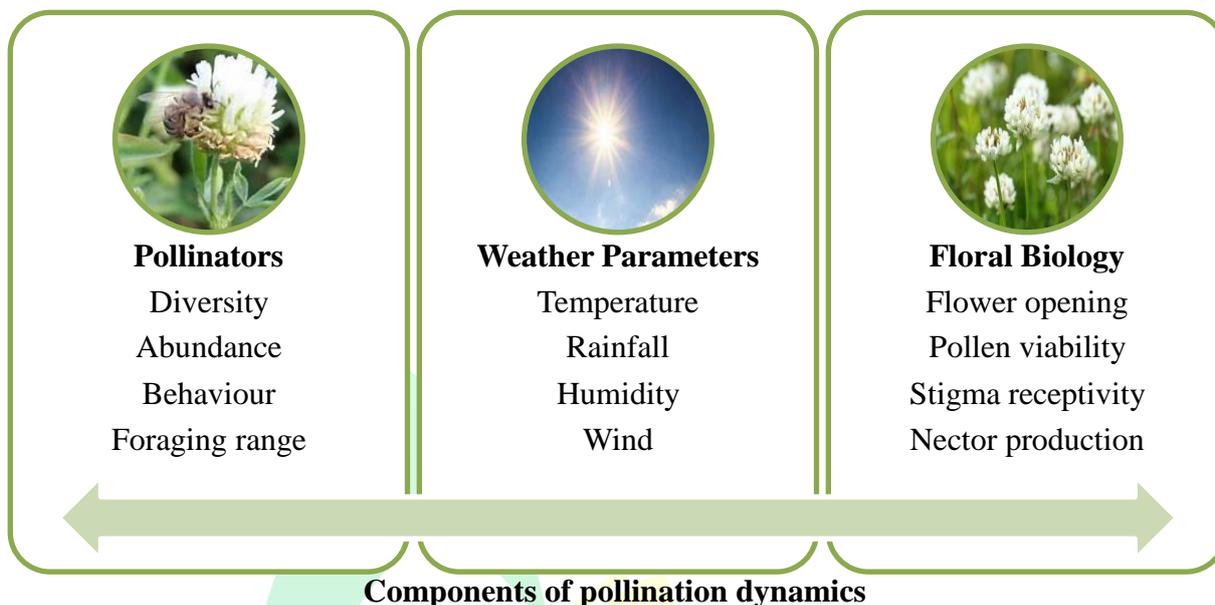


Botanical Description

Berseem have sparse hairy, erect stem having 30 to 80 cm height and shallow taproot. Its stems are hollow, branching at the base, with alternate leaves and leaflets. Flowers are yellowish-white and form dense, elliptical clustered heads. The fruit is a pod containing one single white to purplish-red seed. It is self-incompatible (gametophytic) in nature.

Pollination Dynamics:

Berseem is an entomophilous cross pollinated plant. Pollen is highly dependent on flower biology and pollinator diversity. The typical flower structure in berseem needs, tripping for pollination to begin. Tripping is a very common practice in nature and varies with genetics, habitats, pollen masses and climatic boundaries. Climate plays a vital role in pollination. The good interaction of these different elements is essential for successful seed production (Fig.1). Among insects, honey bees play a vital role in pollination. During peak flowering different bees namely, *A. florea*, *A. dorsata* and *A. indica* visit berseem flowers. High pollinator activity is considered around 11 AM which is considered to be the best time for pollination followed by a decrease in activity during the day. *A. dorsata* produces the most effective pollen in berseem. However, this also depends on the location and the presence of various bees in the vicinity of the plants under natural conditions.



Components of pollination dynamics

Table: Improved varieties of berseem suitable for Haryana condition

Variety	Green fodder yield potential (q/ha)	Seed yield (q/ha)
Mescavi	650	3-4
Hisar Berseem1	700	4-4.5
Hisar Berseem2	780-800	3.5

Cultivation

- **Climatic requirement:** It grows best below 650 m elevation under irrigated conditions but can be grown without irrigation in areas with high water table and under water-logged conditions. It is slightly less drought-resistant but does better on high moisture and alkaline soils. The seeds are abundant under favourable conditions and require 18-25° C and 300 mm annual rainfall uniformly distributed. When winter temperature falls to 6-8° C the crop growth is severely affected.
- **Crop season** - Rabi (November to May)
- **Soil:** Loamy soils rich in calcium and phosphorus with pH ranging 7 to 8 are ideally suited for its cultivation. It can also be grown in salt affected soils of northern India.
- **Field Preparation and sowing:** The field should be properly tilled and be free from weed flora. Berseem is sown during mid-October and 20-25 kg/ha seed is required. Prior to sowing, seeds should be treated with fungicides and insecticides, e.g.

Carbendazim or Captan @ 2 g/kg of seed. Seeds are inoculated with *Microbial Tikka* using *gur* solution. Albeitberseem seeds are sown by broadcasting but seed production it is sown with seed drill with 40 cm spacing between two rows and sowing depth 3 to 4 cm is optimum.

- **Nutrient management:** At the time of sowing 10kg nitrogen and 28 kg phosphorus per acre is applied for good plant growth.
- **Water management:** The critical growth stages in berseem with respect to seed purpose point of view are seedling, flowering and seed filling stage. Before that the crop should be irrigated at timely intervals of one week to 10 days.

Crop protection:

Weed management-

- *Anagalisarvensis*, *Chenopodium album*, *Melilotus alba*, *Melilotusindica*, *Cichoriumintybus*, *Coronopusdidymus*, *Spergulaarvensis*, *Eclipta alba*, *Sonchusoleraceus*, *Sonchusasper*, *Medicago denticulate*, *Medicagoauxalis*, *Trifoliumresupinatum*, *Rumexdentatus*, *Physalis minima* and grassy weeds viz., *Poaannua* and *Phalaris minor*.
- Weed infestation can reduce 5-20% green fodder and 13-37% seed yield. Chicory (*Cichoriumintybus*), locally known as Kasni, is an objectionable weed which can be controlled by dipping berseem seed in brine solution. At later stages application of Imazethapyr @ 0.1 kg a.i./ha should be applied 15-20 days after sowing.

Disease management-

The stem rot is caused by *Sclerotiniatrifoliorum* and occur during January-February. Water-soaked lesions just 5 cm above the ground might appear and rapidly progress along and around the stem above and below infected nodes occur. It can be managed by spraying of Bavitin@ 0.1%.

Insect-pest management-

For black ant and surface grasshopper 400ml melathion (50EC)/acre is to be sprayed by dissolving in 300 l water.

Harvesting:

The last cut is generally taken in the end of March or first week of April. Irrigation is applied after last cut. Seed is ready to harvest in May and around 180-200 kg seed per acre is obtained.

Seed Quality Maintenance:

- Spray of 2% KNO₃ during panicle initiation stage is very effective for seed setting.
- Crop should be cut at a stubble height of 10 cm.
- Spray of superphosphate (2 kg P₂O /ha) + KNO₃ (4 kg/ha) is good for quality seed production.

Conclusion:

It seems that seed production is an underutilized potentiality of berseem. By adding bee keeping component it can provide threefold profit to the farmer in terms of fodder; seed production and natural products *i.e.*, honey, wax etc. Therefore, there is a need to provide proper knowledge and suitable variety to the farmers of Haryana for the high potential of this crop in the future.

References:

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