

Faba Bean: A Potential Legume Crop in Jharkhand Condition

Sourav Ranjan Nanda and Sambita Bhattacharyya
Birsa Agricultural University

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Introduction

Faba bean (*Vicia faba* L.; $2n = 2x = 12, 14$; Family: Fabaceae) is known by many names like broad bean, horse bean, winter bean, windsor bean, pigeon bean and popularly known as bakla and kala matar in India (Singh et al., 2013). It is a hardy plant, which can tolerate extreme cold temperature. Faba bean is the only bean which grown as winter crop. It is widely believed to have originated in the North Africa and South Caspian Sea (Tanno and Willcox, 2006) and introduced in India by Arab traders.

In India, faba bean was probably introduced during the period 1206-1555 AD. Initially, Europeans grown faba bean as a garden crop in India. Faba bean is seen as an agronomically viable alternative to cereal grains and other pulses. The area under faba bean crop in India is very less that's why it is still categorized as minor, unutilized, underutilized, less utilized, potential crop and still not fully exploited crops.

In 2018-19, faba bean ranked 6th with respect to production worldwide, after the common bean, pea, chickpea, cowpea and lentil with total production of 4.5 M tons, while the area harvested was 2.5 M ha (Khazaei and Vandenberg, 2020). China is a leading growing country of faba bean with respect to area and production.

In India, the area and production of faba bean is low and that is why it is still categorized as minor crops. The statics of faba bean with respect to area and production in India is not available (Pradhan and Sinha, 2012). It is a traditional legume crop of Bihar that is why in India, faba bean have maximum area in Bihar. In India, faba bean cultivated in Madhya Pradesh, Odisha, Jharkhand and Uttar Pradesh (mainly eastern part) (Singh et al., 2012).

Faba bean is a diploid with $2n = 2x = 12$ chromosomes, is partially cross-pollinated ranging from 4 to 84%, and possesses one of the largest genomes among crop legumes (~13000 Mb). Faba bean is a partially allogamous species (Self-fertile with about equal

amount of self and cross-pollination occurring depending on the presence of insect pollinators. The honey bee plays a decisive role in the pollination of allogamous lines.

The Indian Council of Agriculture Research (ICAR) recognised faba bean as a potential grain legume crop and included it in AICRP programme. The Consultative Group of International Agricultural Research (CGIAR) ranked the faba bean as 8th major grain legumes on priority basis (Sharifi, 2015).

The optimum temperature for flowering of faba bean is 22–23° C (Patrick and Stoddard 2010). Temperature above the 27° during pod development stage tends to depress the seed weight. When temperatures are high, too much energy is lost through the process of transpirations by the plants and the reduced residual energy results in poor pod formation and lower yield.

Morphology of faba beans

Vicia faba L. is an upright annual pulse crop that can grow to a height of 1-2 m. It has a taproot and many fibrous lateral roots that explore up to 60 -90 cm of the soil area with nodule in the secondary root. The stems are coarse, hollow, and unbranched (only primary branches are present and no secondary branches). Faba bean has branches that grow from the basal nodes. The leaves are alternate, up to 6-8 cm long, pinnately compound, with 2 to 6 leaflets, without or with a very rudimentary tendrils. The leaflets are oval or rounded shape, up to 5-8 cm long and 2-4 cm broad



. The inflorescences are borne on axillary racemes and they bear between 1 and 6 papilionaceous flowers. These flowers are large (up to 3-4 cm long), white or white with black per dark purple spots on centre where the stem is also slightly coloured. The fruit is a dehiscent cylindrical pod, up to 67-10 cm long and 1-2 cm in diameter. The pods are green when young and turn to dark brown or black at maturity. The pods contain 2-4 oblong-oval seeds (beans) that have a distinctive hilum on their short side.

Uses of Faba beans

- Faba bean have many medicinal values as it is used as ingredients and applications to soften stiff limbs. The seeds of faba bean are good source of L-DOPA, a precursor dopamine, which is used as a medicine for the treatments of Parkinson's disease. It also has antioxidant activities. It is also used as medicine for the treatment of Parkinson's disease.
 - A nutraceutical agent, which might help in controlling hypertension.
 - Faba bean is grown for green manure crop and help in nitrogen fixation.
 - Its tannin-free varieties could be directly processed and fed to swine and poultry.
- Faba bean seeds are rich in protein (25-33% DM) and starch (40-48% DM) therefore, a rich and valuable source of protein and energy for livestock.

Constraint

- The seed teguments of faba beans contain variable amounts of tannins, especially condensed tannins (proanthocyanin's), depending on the variety. Some varieties/genotypes are tannin-free while some other contain 0.5-1% DM condensed tannins.
- The cotyledons of faba beans contain high concentrations of vicine and convicine as anti-nutritional factors. Vicine and convicine contains pyrimidine glycosides responsible for favism, an acute hemolytic disease resulting due to oxidative damage in red blood cells which affects human suffering from glucose-6-phosphate dehydrogenase deficiency.
- Vicine and convicine were not shown to affect faba bean digestibility in livestock except in poultry where they were reported to be responsible for lower egg weight in laying hens.

Importance of Faba Bean in Jharkhand Condition:

Faba bean is cultivated in Jharkhand in different purpose for green pod, seed and fooder. Jharkhand is rainfed condition where maximum farmers are marginal. The cropping system follows Rice –fallow. Faba bean good alternative grow Rice- Faba bean so that it helps in nitrogen fixation of the soil. It requires less as compared to other legume. Food security great problem in Jharkhand from decades mainly due to unavailability of good amount of protein. Faba bean consist 22-28% protein which is higher than other legume. In Jharkhand Faba bean is sown during the month of November. Late sowing beans are suffers from terminal heat which decrease the yield drastically.

Conclusion-

Faba bean is slowly getting popularity in Jharkhand due to its high nutritional value. Farmer of Jharkhand may done Rice-Faba bean cropping system as faba bean is nitrogen fixation legume it will fix around 66 kg to 220 kg nitrogen in a cropping season. Growth and development is highly depend on temperature. Farmers of Jharkhand should encourage for growing this potential legume.

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