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Growth and modelling in Mungbean

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History:

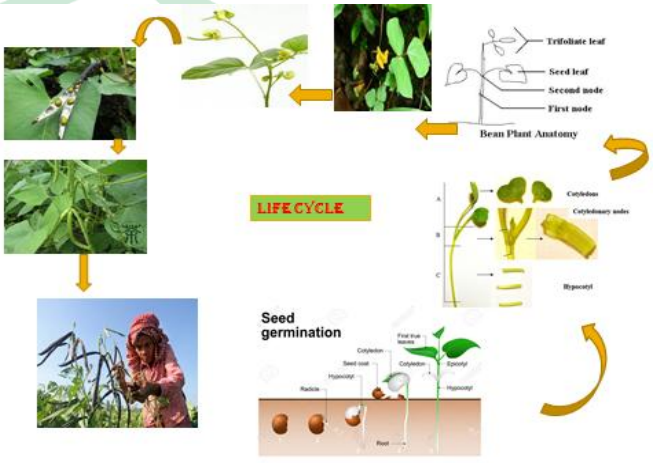
The mungbean (*Vigna radiata*), alternatively known as the green gram, mash, moong, monggo, or munggo is a plant species in the legume family. The mung bean is mainly cultivated in East Asia, Southeast Asia and the Indian subcontinent. Mungbean was primarily domesticated in Persia (Iran) where its progenitor (*Vigna radiate* subspecies sublobata) occurs. In india there were signs of its cultivation in the eastern zone of the Harappan civilization in Punjab and Haryana (4500 years). In south India (Karnataka) where finds date back more than 4000 years. Scientific classification of Mungbean is given in table below. Recently family and genus has changed as shown in the table.It is used as an ingredient in both savoury and sweet dishes.

Scientific classification

	Older	Newer
Kingdom:	Plantae	-
Order:	Fabales	-
Family:	Fabaceae	Leguminaceae
Genus:	*Phaseolus*	*Vigna*
Species:	***V. radiata***	-

Binomial name
Vigna radiata(L.) R. Wilczek

India is the largest producer with more than 50% of world production but consumes almost its entire production (FAO, 2014). Soil and climatic requirements for mungbean production are given below-



Sowing: Seed rate is 30 kgs per hactare

Spacing:

- ✓ Between rows- 30 cm to 40 cm
- ✓ Between plants- 10 cm

Depth of the seedling: 1 to 1.5cm

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Rainfall: 600 mm-1000 mm

Soil: Well drain sandy to loam soil

pH range: 6-7

Temperature: 25^0C-35^0C (depends)

Irrigation

Water supply should be done

- ✓ 4 day interval
- ✓ 7 day interval (21 DAS)
- ✓ No irrigation (pod maturity)

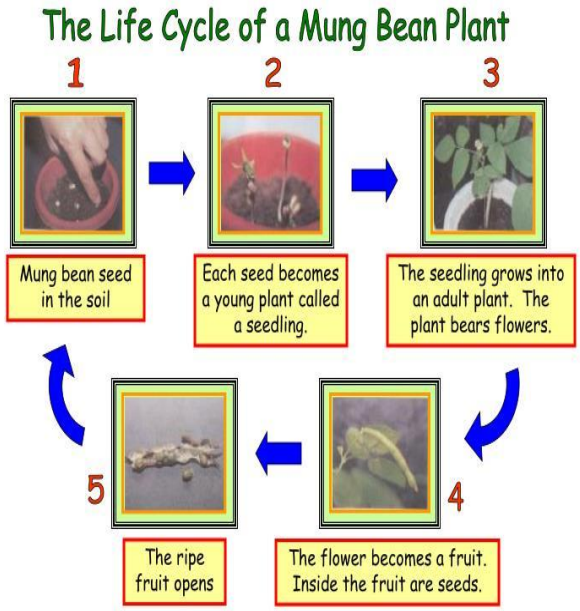
Sufficient moisture is essential during

- ✓ Germination
- ✓ Flowering
- ✓ Seed filling stage

Harvesting: when 80 % pods matures

2 picking (weekly intervals

- ❖ It grows 45-120 cm tall



The mung bean resembles the black gram (*Vigna mungo* L.) with two main differences: the corolla of *Vigna mungo* is bright yellow while that of *Vigna radiata* is pale yellow; mungbean pods are pendulous whereas they are erect in black gram. Mung bean is slightly less hairy than black gram. Some morphological traits of mungbean are discussed here.

Roots

- ✓ Deep rooted plant

Lateral branches of roots contains nodules

Stem

- ✓ Herbaceous
- ✓ Branching at the base
- ✓ Covered with short, fine, brownish hair

Leaf

- ✓ Alternate
- ✓ Trifoliate with long petioles

Flowers:

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- ✓ Greenish to bright yellow

Fruit: pod

Seed:

- ✓ Small
- ✓ Slightly flattened
- ✓ Globular with green, yellow, black or brown testa

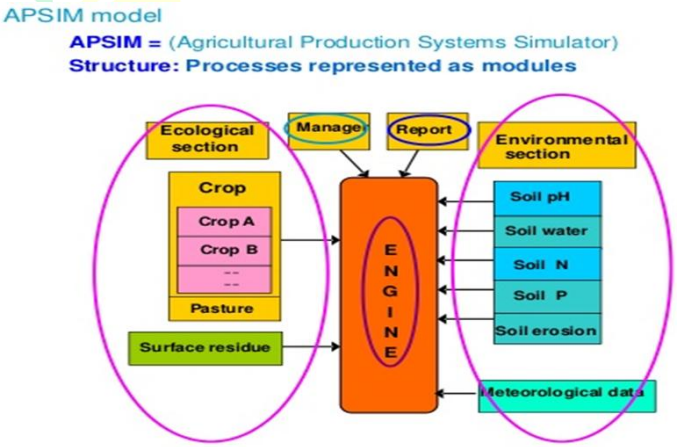
Growth stages of mungbean

Vegetative (V) stages

- ➢ V_0 (cotyledonary node)
- ➢ V_1 (1 nodes on the main stem)
- ➢ V_n (trifoliate leaf sufficiently expanded unfolded and flat in appearance)

Reproductive (R) stages

- ➢ R1 (first open flower)
- ➢ R2 (first pod)
- ➢ R3 (start of seed growth)
- ➢ R4 (full seed)
- ➢ R5 (first mature pod)
- ➢ R6 (1st harvest)
- ➢ R7 (2nd harvest)



Models for Mungbean

- ✓ Describes processes of crop growth and development as a function of weather conditions, soil conditions, and crop management.
- ✓ Currently crop modules are available for barley, canola, chickpea, cotton, cowpea, hemp, fababean, lupin, maize, millet, mucuna, mungbean, navybean, peanut, pigeon pea, sorghum, soybean, sunflower, wheat and sugarcane.
- ✓ As calibrated and validated crop models are not available for khesari (Lathyrus), mung bean and lentil. Yield impacts on these crops were approximated using those of gram.
- ✓ ICISAT also has no strong modeling group at present that too for mungbean they will not develop any model as it is not their mandate crop. In ICAR system only it has to be developed by forming multi institutional and multi-disciplinary group.

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- ✓ Agricultural Production Systems Simulator (APSIM) is a modelling framework that is used for yield forecasting of mungbean, developed by the Agricultural Production Systems Research Unit (APSRU), a collaborative group made up from CSIRO(the Commonwealth Scientific and Industrial Research Organization) and Queensland State Government agencies.
- ✓ The initial stimulus to develop APSIM came from a perceived need for modelling tools that provided accurate predictions of crop production in relation to climate, genotype, soil and management factors, whilst addressing long-term resource management issues in farming systems.