

# Comparative study of Seed and Pod Morphology in *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata*.

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## Abstract:

The present investigation was carried out in total 22 accessions of the three bean genera including ten in *Dolichos lablab* and six each from *Mucuna pruriens* and *Canavalia gladiata* cultutres procured from NBPGR, New Delhi. Further, out of the above mentioned accessions of three bean genera, the detail morphological and molecular investigation was carried out only in selected accessions manifesting more varied characteristics regarding seed and pod morphology. Further, *Dolichos lablab* being common and economically most important bean genera out these three, so more emphasis in the present investigation was given to characterization of *Dolichos lablab*.

## Introduction:

The family Leguminosae is one of the largest families of flowering plants with about 690 genera and 18,000 species of herbs, shrubs, trees and climbers. The sub-family Papilionoideae has about 480 genera and 12,000 species distributed throughout the world (Pursglove, 1968) and the three bean genera *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata* which are known as poor man's pulses belong to this family. The three bean genera *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata* had been unprivileged legumes and not much work has been done despite of their immense utility as food, fodder, medicine, green manure and conservation in tropical environments with a summer rainfall etc. On the basis of study of leguminous crops reported that genus *Dolichos* includes about sixty species of mostly large trailing plants distributed throughout the tropics. The most important is *Dolichos lablab* which occurs in India (Cobley, 1956).

## Review literature:

Harland (1920) was the first to study general growth habit and inheritance of flowers, seed and node colour in *Dolichos lablab* along with that of cow pea. He reported that the determinate and indeterminate growth habit constitute a simple allelomorphic pair of characters with complete dominance of indeterminate habit. The Mendalian factors governing flower, seed and node colour were studied. Ayyangar and Nambiar (1935) reported four types of seeds colour in *Dolichos lablab* and used these characters as key to identification of various *Dolichos lablab*. Pursglove (1968) described the two species of *Dolichos* viz *Dolichos unifloris* Lam. (sym *Dolichos biflorus*) as horse gram *Dolichos lablab* as hyacinth bean on the basis of morphology of pod. Vadival *et al.* (1997) investigated the agro-botanical characteristics in eight accessions of sword bean (*Canavalia gladiata* (Jacq.) DC.) collected from eight agro climatic regions of Tamil Nadu,

India. Vadivel and Janardhanan (2000) studied six accessions of itching beans (*Mucuna pruriens* var. *pruriens*) and evaluated for agro botanical traits and chemical compositions. . Sathyanarayan *et al.* (2012) studied genetic diversity and relatedness among 31 wild and nine cultivated *Mucuna pruriens* accessions collected from diverse eco-climatic regions in India and evaluated using 30 morph-agronomical characters.

### Material and Methods:

The land was prepared for sowing of *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata* cultivars by ploughing to ensure moisture conservation and ruling out sheltering to pests and termites. The seeds of beans, especially of *Canavalia gladiata* were very large and needed proper tilling and intermediate moisture conditions. One plot of size 8.5-3.5 meter square was prepared to accommodate all the twenty two bean genera. All the genotypes were sown in five rows; each containing five accessions with spacing of 45 cm. Plant to plant distance of 10 cm was maintained.

Qualitative parameters in seeds & pods were observed and recorded for ten randomly selected samples from the seed/pod lots in different accessions of *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata*.

#### I Seeds Characteristics:

The seed shape of the mature seeds was observed and recorded for ten randomly selected seed samples. Seed colour was recorded of mature seeds of randomly

#### II. Pods Characteristics:

Pod shape was observed and recorded for five randomly selected pods. Pod curvature was observed and recorded for ten randomly selected pods. Pod beak was observed and recorded for ten randomly selected pods. Ten randomly selected pods were observed to record the constriction of pods. Pod colour was recorded for ten randomly selected plants using standard seed colour charts.

### Results and Discussion:

Various macroscopic traits like seed colour, seed shape, seed surface texture, pod colour, pod shape, pod curvature, pod beak, pod constriction and pod texture were studied in *Dolichos*, *Mucuna* and *Canavalia* genotypes and identified significant variation among the different accessions and could be used as identification tools.

In *Dolichos*, *Mucuna* and *Canavalia* genotypes among the seed related parameters, seed colour was found to be most variable trait (Tables 1a, 1 b &c). Mottled seed colour in *Dolichos* and *Mucuna* genotypes and pale yellow colour in *Dolichos* genotypes was uncommon and could be used as morphological marker. Other than it 100 seeds weight also showed significant variation in the accessions of all the three bean genera and could also be used as identification tool. According to Rangaswamy Ayyangar and Nambiar (1935) pattern of seed colour in a specific genotype is a genetically inherited trait. This has been observed in the genotypes of the three genera under present investigation. The similar work has also been initiated by Chowdhury and Buth (1970), Gupta *et al.* (1985), Namwongpron and Supapum (1982), Idu *et al.* (2000), Patel, J.D. (2002) and Dada *et al.* (2013) in various leguminous seeds.

The pod characteristics in *Dolichos*, *Mucuna* and *Canavalia* genotypes were also observed for important morphological markers (Tables 2a, 2b & 2c). In *Dolichos lablab* both the pod colour and pod shape showed high degree of variation but in *Canavalia gladiata* pod shape remained identical in all the accessions. In *Mucuna pruriens* pod texture was significant character and name of the genus is given 'Velvet bean' on the basis of presence of peculiar velvety hair (trichomes) on the surface of the pods. It is obvious that out of all pod related traits, only pod colour and the pod shape showed significant variation among accessions of *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata* at the genetic level and in *Dolichos lablab* at varietal level and could be used as morphological markers. Some work on these lines was also initiated by Pandey and Dubey (1972), Ewanisha *et al.* (2007) and Mohan *et al.* (2009) on Hyacinth bean and by Mamatha *et al.* (2009) and Sathyanarayan *et al.* (2012) on Velvet bean.

**Table No. 1a : Showing seed characteristics in *Dolichos lablab*.**

Accession No.	Colour	Seed shape	Seed Texture
IC- 446560	Light brown	Ovate	Smooth and Dull
IC- 446570	Dark brown	Oblong	Smooth and Dull
IC- 383091	Dark Brown	Ovate	Smooth and Dull

**Table No. 1b : Showing seed characteristics in *Mucuna pruriens*.**

Accession No.	Colour	Seed shape	Seed Texture
IC-25333	Light grey	Elliptical	Smooth and glossy and slightly ridged
IC- 202969	Grey mottled	Rectangular	Smooth and glossy
IC- 24680	Black streaked	Elliptical	Smooth and glossy and ridged

Table No. 1c : Showing seed characteristics in *Canavalia gladiata*.

Accession No.	Colour	Seed shape	Seed Texture
IC- 44599	Dark tan brown	Oblong	Rough shiny & slightly ridged
IC- 44618-B	Light tan brown	Ovate	Rough shiny & slightly ridged
IC- 44591	Tan brown	Ovate	Rough shiny & slightly ridged

Table No. 2 a: Showing pod characteristics in *Dolichos lablab*.

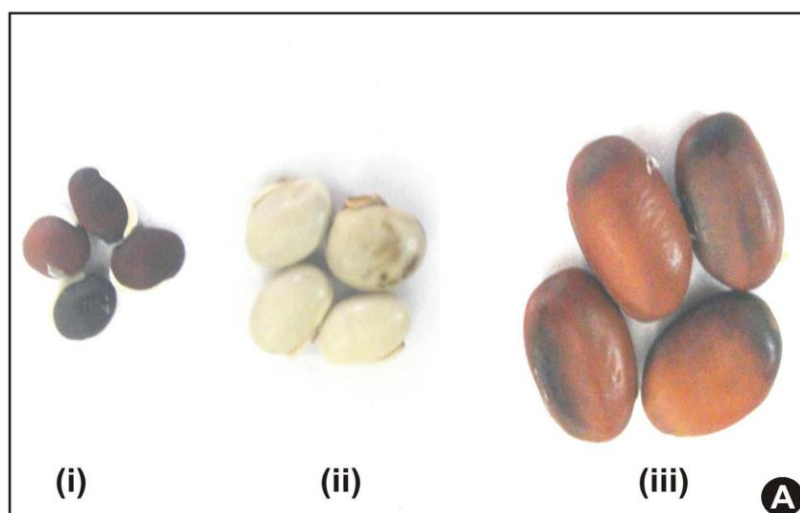
Accession No.	Pod Color	Pod Shape	Pod Beak	Pod Constriction	Pod texture
IC- 446560	Green	Inflated and curved	Medium	Constricted	Shiny & rough
IC- 426570	Mottled	Flat and slightly curved	Long	Slightly constricted	Shiny & rough
IC- 383091	Green	Flat and Slightly curved	Thick	Slightly constricted	Shiny & rough

Table No.2b : Showing pod characteristics in *Mucuna pruriens*.

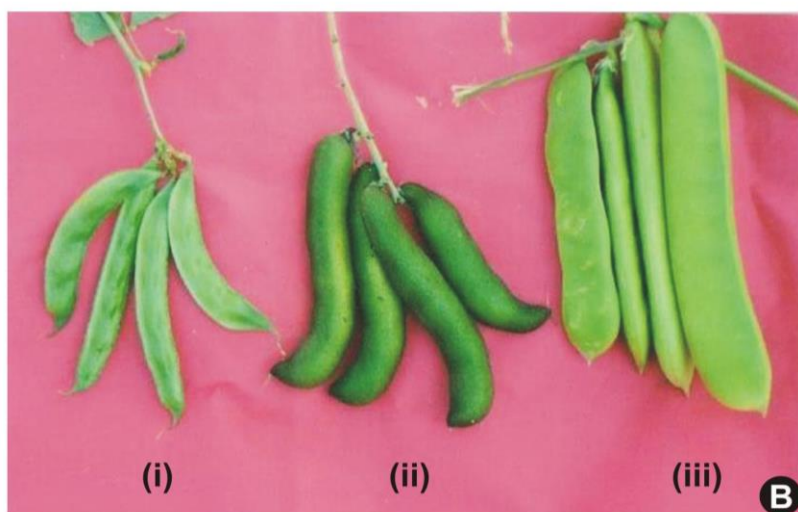
Accession No.	Pod Color	Pod Shape	Pod Beak	Pod Constriction	Pod texture
IC-25333	Light brown	Cylindrical and curved	Pointed	Slightly constricted	Rough and light brown velvety hair are present
IC- 202969	Light brown	Cylindrical and Slightly curved	Pointed	Slightly constricted	Rough and light brown velvety hair are present
IC- 24680	Green	Cylindrical and curved	Short and Recurved	Slightly constricted	Rough and green velvety hair are present

Table No.2c: Showing pod characteristics in *Canavalia gladiata*.

Accession No.	Pod Colour	Pod Shape	Pod Beak	Pod Constriction	Pod texture
IC- 44599	Lush Green	Sword shape	Pointed	Slightly constricted	Rough, dull & slightly ridged
IC- 44618-B	Light green	Sword shape	Pointed	Slightly constricted	Rough, dull & slightly ridged
IC- 44591	Lush Green	Sword shape	Pointed	Slightly constricted	Rough, dull & slightly ridged



**Fig. 1. Comparative morphology of Seeds of *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata***



**Fig. 2. Comparative morphology of Seeds Pods of *Dolichos lablab*, *Mucuna pruriens* and *Canavalia gladiata***

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