Original Research Article

Study of Different Qualitative Traits in Dolichos Bean (Dolichos lablab L., Var. typicus Prain) Germplasm

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A B S T R A C T

Thirty five genotypes of dolichos bean germplasm lines were evaluated for different qualitative traits at Vegetable Research Station, Agriculture Research Institute, Rajender nagar, Hyderabad during August, 2016 to March, 2017. Quality traits revealed that there is a considerable variability in dolichos bean germplasm for most of the traits like stem colour (green, dark green and purple), leaf vein colour (light green and green, purple), leaf density (sparse and intermediate), flower colour (purple, white and dark purple), growth habit (pole and bush), pod shape (straight, curved and intermediate), pod colour dark purple in IC-446584, pod beak (long, short and medium), pod suture (green, dark green and purple), pod curvature (straight and curved), pod surface (smooth and wrinkled), seed colour (black, brown and cream) and seed shape (flat, round and oblong). Whereas there was no variability observed in traits like leaf vein colour, pod suture and pod beak colour. These characters can be utilized as morphological markers in selections and breeding programmes.

Keywords

Dolichos bean (Dolichos lablab L. var. typicus Prain), Phaseolinae

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Introduction

Dolichos bean (Dolichos lablab L. var. typicus Prain) (2n=2x=22) belongs to family Leguminaceae sub-family Faboideae, tribe Phaseoleae and sub-tribe Phaseolinae which is commonly known as Indian bean, Hyacinth bean, sem, Egyptian kidney bean, bonavist bean, avarai and avari chikkudu is one of the most popular traditional vegetables extensively cultivated in India. The pods are naturally rich in carbohydrates, proteins, fat and fibers, as well as minerals which include Ca, P and Fe (Naeem et al., 2009).

The protein content of pods and seeds ranges from 10-19% and 15-25% respectively. Among the legumes, dolichos bean
constituents an important source of therapeutic agents used in the modern as well as traditional system of medicine (Morris, 2009). In fact it is considered as a multipurpose crop since it is used for forage, soil improvement, soil protection and weed control (Mass, 2005).

**Materials and Methods**

Thirty five dolichos bean germplasm lines along with the three checks were grown in Randomized Block Design with two replications.

Thirty five genotypes viz., IC-261010, IC-383197, IC-384066, IC-413709, IC-413710, IC-424813, IC-426988, IC-427424, IC-427428, IC-427436, IC-427462, IC-446571, IC-446573, IC-446581, IC-446583, IC-446584, IC-446591, IC-546349, IC-546376, IC-546387, IC-546388, IC-565181, IC-598467, NSB-2010/029, NSJ/NAIP/192, PSR-13183, PSRJ-13039, PSRJ-13114-2, RJR-03, RJR-387, SGD136, SNJ-11-068, RND-1 (check), Arka Jay(check) and Arka Vijay (check)

The data on qualitative characters were recorded as per minimal descriptors of NBPGR (Srivastava et al., 2001). Qualitative data on 13 traits were recorded on ten randomly selected plants in each genotype and the details of trait, classification and stage of scoring are presented in Table 1.

**Results and Discussion**

Thirty five genotypes of dolichos bean germplasm under present investigation were characterized based on 13 qualitative traits (Table 2) and (Plate 1.1 and 1.2). The present observations are similar with the findings of Chattopadhyay and Dutta (2010) and Chaitanya et al., (2014). Stem colour revealed that one genotype exhibited dark green stem colour, four genotypes showed purple stem colour and 30 genotypes showed green stem colour. Leaf vein colour of 28 genotypes exhibited light green in colour, five genotypes showed purple colour and 2 genotypes are green in colour. Leaf density of 30 genotypes was found to be intermediate and the remaining five genotypes showed sparse leaf density. Plant growth habit revealed that 33 genotypes were pole type plant growth habit and remaining two genotypes were found to be bush type plant growth habit.

Flower colour revealed that 25 genotypes exhibited white flower colour, nine genotypes showed purple flower colour and one genotype showed dark purple flower colour. Pod colour of 25 genotypes was found to be green in colour, three genotypes showed dark green in colour, five genotypes showed light green in colour, one genotype showed purple colour and remaining one genotype showed dark purple colour. Pod shape of six genotypes was straight, two genotypes were curved and remaining 27 genotypes were intermediate with respect to it.

Pod surface of 28 genotypes had smooth pod surface and remaining seven genotypes had wrinkled pod surfaces. Pod curvature of thirty genotypes showed curved pod curvature and remaining five genotypes showed straight pod curvature. Pod beak revealed that 19 genotypes were with short pod beak, 13 genotypes had medium pod beaks and remaining three genotypes with long pod beaks. Pod suture colour of thirty genotypes showed green colour pod suture and remaining five genotypes showed cream colour pod suture. Seed colour of sixteen genotypes seeds were found to be brown in colour, eight genotypes showed black colour seeds and remaining 11 genotypes seeds were cream in colour. Seed shape of 25 genotypes was found oblong, five genotypes were round in shape and remaining five genotypes were flat in shape.
Plate 1 Variations in pods of 35 genotypes of dolichos bean including checks
Plate 2 Variations in seeds of 35 genotypes of dolichos bean including checks
| S. No. | Qualitative trait         | Classification                                      | Stage of scoring                                      |
|-------|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| 1.    | Plant growth habit        | Bush, Semi pole and Pole                            | At flowering stage                                    |
| 2.    | Leaf vein colour          | Light Green, Green and Purple                       | Fully developed primary leaves on inner surface       |
| 3.    | Leaf density              | Sparse, Intermediate and Dense                      | Vegetative growth stage                               |
| 4.    | Stem colour               | White, Light green, Green, Dark green, Purple, Dark purple and Greenish purple | Vegetative growth stage                               |
| 5.    | Flower colour             | White, Cream, Purple, Dark purple and Blue          | Fully developed flower bud before it start anthesis   |
| 6.    | Pod shape                 | Straight, Intermediate and Curved                   | Fresh matured pod                                     |
| 7.    | Pod colour                | White, Cream, Light green, Green Dark green, Light purple, Purple and Dark purple | Fresh matured pod                                     |
| 8.    | Pod beak                  | Short, Medium and Long                              | Fresh matured pod                                     |
| 9.    | Pod curvature             | Straight, Curved and Highly curved                  | Fresh matured pod                                     |
| 10.   | Pod suture colour         | White, Cream, Green and Purple                      | Fresh matured pod                                     |
| 11.   | Pod surface               | Smooth and Wrinkled                                 | Fresh matured pod                                     |
| 12.   | Seed colour               | Black, Brown, Cream, Yellow, Purple, Brick red, Brown yellow and Mottled | Dry matured pod                                       |
| 13.   | Seed shape                | Cylindrical, Round, Flat, Square, Oblong and Elliptical | Dry matured pod                                       |
**Table 2** Qualitative traits of 35 genotypes of dolichos bean

| ACCESSION NO | Stem colour | Leaf vein colour | Leaf density | Plant growth habit | Flower colour | Pod colour | Pod shape | Pod surface | Pod curvature | Pod beak colour | Pod suture colour | Seed colour | Seed shape |
|---------------|-------------|-----------------|--------------|-------------------|---------------|------------|----------|------------|--------------|----------------|-----------------|-------------|------------|
| IC-261010     | Green       | Light green     | Intermediate | Pole              | Purple        | Dark green | straight | Smooth     | Long          | Green          | Black           | Oblong      |            |
| IC-383197     | Green       | Light green     | Intermediate | Pole              | Purple        | Green      | Curved   | Wrinkled   | Short         | Green          | Brown           | Flat        |            |
| IC-384066     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Curved   | Wrinkled   | Short         | Green          | Brown           | Flat        |            |
| IC-435709     | Green       | Light green     | Intermediate | Pole              | White         | Light green| Intermediate| Smooth     | Curved        | Long            | Cream          | Black       | Oblong     |
| IC-413710     | Purple      | Purple          | Intermediate | Pole              | Dark purple   | Purple     | Intermediate| Smooth     | Curved        | Medium         | Cream          | Black       | Flat       |
| IC-424813     | Green       | Light green     | Intermediate | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Black       | Oblong     |
| IC-429984     | Green       | Light green     | Sparse       | Pole              | White         | Green      | Intermediate| Wrinkled   | Curved        | Medium         | Green          | Cream       | Oblong     |
| IC-427424     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Straight  | Wrinkled   | Curved        | Short           | Green          | Brown       | Oblong     |
| IC-427428     | Green       | Light green     | Intermediate | Pole              | White         | Dark green | Intermediate| Smooth     | Curved        | Short           | Green          | Brown       | Oblong     |
| IC-427436     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Straight  | Wrinkled   | Curved        | Short           | Green          | Brown       | Oblong     |
| IC-427462     | Green       | Light green     | Intermediate | Pole              | White         | Light green| Intermediate| Smooth     | Curved        | Short           | Green          | Brown       | Round      |
| IC-446571     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Cream          | Green       | Flat       |
| IC-446573     | Green       | Purple          | Intermediate | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Black       | Round      |
| IC-446581     | Green       | Light green     | Intermediate | Pole              | White         | Light green| Straight  | Smooth     | Straight      | Medium         | Green          | Cream       | Round      |
| IC-446583     | Green       | Light green     | Sparse       | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Brown       | Oblong     |
| IC-446584     | Purple      | Purple          | Intermediate | Pole              | Purple        | Dark purple| Intermediate| Smooth     | Curved        | Short           | Cream          | Brown       | Oblong     |
| IC-446591     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Round      |
| IC-456349     | Green       | Light green     | Sparse       | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Cream       | Oblong     |
| IC-456376     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
| IC-456387     | Green       | Light green     | Intermediate | Pole              | White         | Light green| Intermediate| Smooth     | Curved        | Short           | Green          | Brown       | Oblong     |
| IC-456388     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
| IC-556181     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
| IC-559467     | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
| NSB-2018/029  | Green       | Light green     | Intermediate | Pole              | White         | Light green| Intermediate| Smooth     | Curved        | Short           | Cream          | Brown       | Oblong     |
| NSI/NAIP/192  | Green       | Light green     | Intermediate | Pole              | White         | Light green| Intermediate| Smooth     | Curved        | Short           | Cream          | Brown       | Oblong     |
| ACCESSION NO  | Stem colour | Leaf vein colour| Leaf density | Plant growth habit| Flower colour | Pod colour | Pod shape | Pod surface | Pod curvature | Pod beak colour | Pod suture colour | Seed colour | Seed shape |
|---------------|-------------|-----------------|--------------|-------------------|---------------|------------|----------|------------|--------------|----------------|-----------------|-------------|------------|
| PSR-13183     | Purple      | Purple          | Intermediate | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Black       | Oblong     |
| PSRJ-13039    | Green       | Light green     | Intermediate | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Brown       | Flat       |
| PSRJ-13114-2  | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Brown       | Oblong     |
| RJR-93        | Green       | Light green     | Intermediate | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Brown       | Oblong     |
| RJR-387       | Purple      | Purple          | Intermediate | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Medium         | Green          | Black       | Oblong     |
| NGD-136       | Green       | Light green     | Intermediate | Pole              | Green        | Intermediate| Smooth     | Curved        | Short           | Green          | Brown       | Oblong     |
| NJ-11-068     | Green       | Light green     | Intermediate | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | medium         | Green          | Black       | Oblong     |
| RND-016       | Green       | Light green     | Sparse       | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
| ARKA JAY©     | Green       | Light green     | Sparse       | Pole              | Purple        | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
| ARKA VIJAY©   | Green       | Light green     | Sparse       | Pole              | White         | Green      | Intermediate| Smooth     | Curved        | Short           | Green          | Cream       | Oblong     |
Quality traits revealed that there is a considerable variability in dolichos bean germplasm for most of the traits like stem colour (green, dark green and purple), leaf vein colour (light green and green, purple), leaf density (sparse and intermediate), flower colour (purple, white and dark purple), growth habit (pole and bush), pod shape (straight, curved and intermediate), pod colour (green in IC-383197, IC-384066, IC-424813, IC-426988, IC-427424, IC-427436, IC-446571, IC-446573, IC-446583, IC-446591, IC-546349, IC-546376, IC-546388, IC-565181, IC-598467, NSB-2010/029, PSR-13183, PSRJ-13114-2, RJR-03, RJR-387, SGD-136, SNJ-11-068, RND-01, ARKA JAY and ARKA VIJAY); light green in IC-413709, IC-427462, IC-446581, IC-546387 and NSJ/NAIP/192, dark green in IC-261010, IC-427428 and PSRJ-13039, purple in IC-413710, dark purple in IC-446584, pod beak (long, short and medium), pod suture (green, dark green and purple), pod curvature (straight and curved), pod surface (smooth and wrinkled), seed colour (black, brown and cream) and seed shape (flat, round and oblong). Whereas there was no variability observed in traits like leaf vein colour, pod suture and pod beak colour. Dolichos bean genotypes exhibited high variability for all traits like plant growth characters, leaf characters, flower characters, pod characters, seed characters and quality characters.

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