Evaluation of Yield and Yield Attributing Characters in Pole Type of Dolichos Bean (*Lablab purpureus* L.)

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**A B S T R A C T**

Field experiment was conducted under AICRP on Vegetable Crops, OUAT, Bhubaneswar, during *Rabi* season of 2018-19 to identify the suitable pole type of dolichos bean genotype(s) under the trial. Fourteen pole type dolichos bean genotypes were evaluated for seventeen characters by adopting randomized block design replicated thrice. Significant differences were recorded for all traits studied. 2016/DOLPVAR-6 was the earliest to flower in 34.27 days. 2016/DOLPVAR-5 recorded highest pod length (16.98 cm) and number of seeds pod⁻¹ (4.67). Pod width was highest in 2016/DOLPVAR-12 (3.79 cm). Pod weight was maximum in 2016/DOLPVAR-12 (14g). Number of pods plant⁻¹ ranged from 30.64 to 119.33, with the maximum in 2016/DOLPVAR-4. Three different pod colors (Green, Butter green and Purple) were recorded. Maximum genotypes had green pods except 2016/DOLPVAR-11 which had purple coloured pods. The genotypes 2016/DOLPVAR-9 (1185.58g), 2016/DOLPVAR-4 (1009g) and 2016/DOLPVAR-12 (905.67g) were found promising for pod yield plant⁻¹ than other genotypes. These high yielding genotypes can serve as potentially useful parents in further breeding programme.

**Keywords**

Pole type, Dolichos bean, Mean performance and genotypes

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**Introduction**

Dolichos bean (*Lablab purpureus* L.) also known as Indian bean or Lablab bean, belongs to family leguminosae (2n=2x=22) is one of the important vegetable crops of Indian origin. Dolichos bean is a multipurpose crop grown for pulse, vegetable and forage crop for livestock. It is sensitive to photoperiods and both short day and long day types are available. It has high nutritive value and possess immense health benefits. The flavonoid ‘Genistein’ found in dolichos bean play a role in the prevention of cancer (Kobayashi *et al.*, 2002)². Although dolichos bean has been originated and cultivated in India since long time, the crop remained underexploited due to low productivity, photosensitivity, flowering irregularity, growth habit and the preference of consumers with respect to pod shape, pod size, pod color, pod aroma. Though wide genetic base exists for breeding programme, very little efforts or work have been made for its genetic improvement of yield and quality attributing characters. The evaluation of potentialities of the existing varieties is essential because it is the genetic diversity of the initial parent
material which helps in further crop improvement. Considering all the above mentioned facts, this experiment was conducted to evaluate the yield and yield attributing characters of 14 genotypes of pole type of dolichos bean for commercial cultivation in Odisha.

**Materials and Methods**

The research work was carried out at All India Co-ordinated Research Project on Vegetable Crops, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India during Rabi season of 2018-19. The experimental material comprised of fourteen genotypes collected from different regions (Table 1). The experiment was laid out in Randomized Block Design with three replications. Bold and healthy seeds were sown in different plots of each replication randomly on 25th September, 2018.

All the recommended cultural practices were adopted uniformly to raise good crop stand. Five plants were selected at random from each plot to record observations on seventeen quantitative characters viz., plant height (cm), number of primary branches plant\(^{-1}\), stem thickness (cm), inter nodal length (cm), average leaf area (cm\(^2\)), average leaf weight (g), inflorescence length (cm), fresh weight of root (g), days to 1st flowering, days to 50% flowering, pod length (cm), pod width (cm), pod weight (g), number of seeds pod\(^{-1}\), pod yield plant\(^{-1}\) (g) and pod yield hectare\(^{-1}\) (q).

**Results and Discussion**

**Vegetative growth and flowering parameters**

The mean performances of 14 genotypes of pole type of dolichos bean for vegetative parameters are presented in Table 2. Plant height range was observed maximum for 2016/DOLPVAR-9 (632.67cm) and was minimum for 2016/DOLPVAR-1 (274.67cm). Maximum number of primary branches plant\(^{-1}\) (2.4) was recorded in 2016/DOLPVAR-1 followed by 2016/DOLPVAR-4 (2.2). Stem thickness was maximum in 2017/BDB-2 (3.93cm) and lowest in Pipili local (3.03cm) with an average of 3.58cm. The data on internodal length indicated wide variations among tested genotypes ranging from 11.67 cm (2016/DOLPVAR-4) to 18.25cm (2016/DOLPVAR-10) with a mean value of 15.74cm. Average leaf area range was recorded maximum for 2016/DOLPVAR-2 (100.48cm\(^2\)) and was minimum for Pipili local (81.17 cm\(^2\)). 2016/DOLPVAR-10 showed maximum average leaf weight (2.7g) and 2016/DOLPVAR-1 recorded the lowest average leaf weight of (1.87g).

Maximum inflorescence length (31.88cm) was recorded in 2017/DOLPVAR-1 among all the other genotypes and lowest of (10.77cm) in 2016/DOLPVAR-9. 2017/BDB-2 showed maximum fresh weight of root of 160.18g followed by 2016/DOLPVAR-8 (133.71g). Similar findings were reported by Bendale et al., (2004)\(^{[1]}\) and Verma et al., (2015)\(^{[6]}\). The genotype 2016/DOLPVAR-6 showed earliness and 1st flower appeared 34.27 days after sowing. Whereas, the genotype 2017/BDB-2 had taken maximum time (67.1 days) for appearance of 1st flower. With respect to days to 50% flowering, genotype 2016/DOLPVAR-6 (39.27 days) recorded earliest, followed by 2016/DOLPVAR-9 (46.28 days) and 2016/DOLPVAR-4 (48.26 days) while genotype 2017/BDB-2 (75.05 days) was found to be late in this respect.

**Yield and yield attributing parameters**

The mean performances of 14 genotypes of pole type of dolichos bean for yield and yield attributing parameters are presented in Table 3 and figure 1.
Table 1 Sources of dolichos bean genotypes (*Lablab purpureus* L.)

| Genotypes | Name                        | Sources (V1-V11x3 seeds received from IIVR)               |
|------------|-----------------------------|---------------------------------------------------------|
| V1         | 2016/DOLPVAR-1              | AVT-2, AICRP on Vegetable crops, OUAT                   |
| V2         | 2016/DOLPVAR-2              |                                                         |
| V3         | 2016/DOLPVAR-4              |                                                         |
| V4         | 2016/DOLPVAR-5              |                                                         |
| V5         | 2016/DOLPVAR-6              |                                                         |
| V6         | 2016/DOLPVAR-8              |                                                         |
| V7         | 2016/DOLPVAR-9              |                                                         |
| V8         | 2016/DOLPVAR-10             |                                                         |
| V9         | 2016/DOLPVAR-11             |                                                         |
| V10        | 2016/DOLPVAR-12             |                                                         |
| V11        | 2017/DOLPVAR-1              |                                                         |
| V12        | Pipili Local                | Local collection from Pipili                            |
| V13        | 2017/BDB-2                  | AICRP on Vegetable crops, OUAT                          |
| V14        | Athgarh Local               | Local collection from Athgarh                          |

Table 2 Mean performance for vegetative and flowering parameters in 14 dolichos bean genotypes

| Genotypes         | Plant Height (cm) | Number of primary branches | Stem thickness (cm) | Internodal length (cm) | Average leaf Area (cm²) | Average leaf weight (g) | Inflorescence length (cm) | Fresh weight of root (g) | Days to first flowering | Days to 50% Flowering |
|-------------------|-------------------|----------------------------|--------------------|------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|
| 2016/DOLPVAR-1    | 274.67            | 2.40                       | 3.51               | 14.94                  | 91.71                   | 1.87                     | 22.91                    | 97.90                    | 44.53                    | 52.10                  |
| 2016/DOLPVAR-2    | 382.20            | 1.67                       | 3.45               | 14.88                  | 100.48                  | 2.09                     | 21.18                    | 115.79                   | 53.67                    | 58.28                  |
| 2016/DOLPVAR-4    | 603.50            | 2.20                       | 3.91               | 11.67                  | 92.68                   | 1.93                     | 20.85                    | 90.74                    | 43.33                    | 48.26                  |
| 2016/DOLPVAR-5    | 401.67            | 2.07                       | 3.67               | 15.03                  | 84.05                   | 2.07                     | 22.33                    | 83.29                    | 62.60                    | 69.56                  |
| 2016/DOLPVAR-6    | 410.27            | 2.07                       | 3.83               | 13.11                  | 88.78                   | 2.00                     | 14.55                    | 73.18                    | 34.27                    | 39.27                  |
| 2016/DOLPVAR-8    | 392.33            | 1.53                       | 3.69               | 17.85                  | 93.65                   | 2.40                     | 16.13                    | 133.71                   | 61.13                    | 65.26                  |
| 2016/DOLPVAR-9    | 632.67            | 2.07                       | 3.59               | 16.83                  | 90.46                   | 2.10                     | 10.77                    | 73.62                    | 41.15                    | 46.28                  |
| 2016/DOLPVAR-10   | 596.67            | 1.47                       | 3.73               | 18.25                  | 98.07                   | 2.70                     | 17.37                    | 115.32                   | 64.53                    | 70.26                  |
| 2016/DOLPVAR-11   | 527.33            | 1.47                       | 3.51               | 16.32                  | 96.63                   | 2.26                     | 16.66                    | 102.54                   | 54.73                    | 62.20                  |
| 2016/DOLPVAR-12   | 564.40            | 2.02                       | 3.47               | 16.13                  | 84.49                   | 2.13                     | 14.11                    | 96.41                    | 44.70                    | 52.80                  |
| 2017/DOLPVAR-1    | 402.00            | 1.73                       | 3.41               | 17.11                  | 99.49                   | 2.09                     | 31.88                    | 93.93                    | 51.70                    | 63.20                  |
| Pipili Local      | 380.21            | 1.67                       | 3.03               | 14.15                  | 81.17                   | 2.15                     | 17.92                    | 84.91                    | 60.20                    | 69.40                  |
| 2017/BDB-2        | 456.97            | 1.33                       | 3.93               | 16.50                  | 83.59                   | 2.07                     | 12.61                    | 160.18                   | 67.10                    | 75.05                  |
| Athgarh Local     | 397.18            | 1.20                       | 3.35               | 17.59                  | 89.37                   | 1.93                     | 12.71                    | 87.36                    | 53.33                    | 61.59                  |
| SE(m)             | 24.33             | 0.08                       | 0.11               | 0.70                   | 5.93                    | 0.18                     | 0.66                     | 4.71                     | 1.95                     | 2.28                   |
| CD(0.05)          | 70.73             | 0.23                       | 0.32               | 2.04                   | 17.96                   | 0.54                     | 1.92                     | 13.70                    | 5.66                     | 6.63                   |
| CV(%)             | 9.19              | 7.74                       | 5.38               | 7.74                   | 11.29                   | 14.62                    | 6.37                     | 8.11                     | 6.41                     | 6.63                   |
Table 3 Mean performance for yield and yield attributing parameters in 14 dolichos bean genotypes

| Genotypes | Pod length (cm) | Pod width (cm) | Pod weight (g) | Number of pods per plant | Number of seeds per pod | Pod yield per plant (g) | Pod yield per hectare (q) |
|-----------|----------------|----------------|----------------|--------------------------|------------------------|------------------------|--------------------------|
| 2016/DOLPVAR-1 | 13.12 | 2.14 | 8.13 | 89.33 | 4.25 | 492.21 | 54.69 |
| 2016/DOLPVAR-2 | 15.34 | 2.82 | 10.97 | 67.67 | 4.26 | 561.06 | 62.34 |
| 2016/DOLPVAR-4 | 6.54 | 2.61 | 7.30 | 119.33 | 3.45 | 1009.00 | 112.12 |
| 2016/DOLPVAR-5 | 16.98 | 2.19 | 11.63 | 58.17 | 4.67 | 561.06 | 62.34 |
| 2016/DOLPVAR-6 | 12.50 | 2.63 | 7.83 | 54.00 | 4.00 | 603.27 | 67.03 |
| 2016/DOLPVAR-8 | 13.20 | 2.44 | 8.60 | 34.00 | 4.00 | 456.66 | 50.74 |
| 2016/DOLPVAR-9 | 15.61 | 2.45 | 11.50 | 105.00 | 4.37 | 1009.00 | 112.12 |
| 2016/DOLPVAR-10 | 13.80 | 2.58 | 11.67 | 51.67 | 4.50 | 622.17 | 69.13 |
| 2016/DOLPVAR-11 | 12.45 | 3.49 | 11.80 | 71.00 | 4.08 | 639.54 | 71.60 |
| 2016/DOLPVAR-12 | 11.41 | 3.79 | 14.00 | 74.67 | 4.23 | 905.67 | 100.63 |
| 2017/DOLPVAR-1 | 12.37 | 2.31 | 9.67 | 46.97 | 4.01 | 409.33 | 45.48 |
| Pipili Local | 10.07 | 2.05 | 7.83 | 30.64 | 2.98 | 266.42 | 29.60 |
| 2017/BDB-2 | 13.13 | 2.46 | 9.08 | 66.61 | 4.07 | 492.47 | 54.71 |
| Athgarh Local | 7.10 | 2.18 | 4.68 | 60.94 | 2.92 | 268.80 | 29.86 |

Table 4 Leaf and pod characteristics

| Varieties | LEAF CHARACTERISTICS | POD CHARACTERISTICS |
|-----------|----------------------|---------------------|
|           | Leaf Shape | Leaf Colour | Petiole colour | Shape & Size | Colour |
| 2016/DOLPVAR-1 | Ovate | Light Green | Purple | Round, Long | Green with purple edge |
| 2016/DOLPVAR-2 | Ovate | Green | Green | Round, Long | Green |
| 2016/DOLPVAR-4 | Ovate | Light Green | Purple | Flat, Short | Green with purple edge |
| 2016/DOLPVAR-5 | Ovate | Light Green | Light Green | Round, Long | Butter Green |
| 2016/DOLPVAR-6 | Ovate | Green | Light Green | Flat, Long | Green |
| 2016/DOLPVAR-9 | Ovate | Green | Green | Flat, Long | Green with purple edge |
| 2016/DOLPVAR-10 | Ovate | Green | Light Green | Round, Long | Green |
| 2016/DOLPVAR-11 | Ovate | Light Green | Purple | Flat, Medium | Purple |
| 2016/DOLPVAR-12 | Ovate | Light Green | Purple | Flat, Medium | Butter Green with purple edge |
| 2017/DOLPVAR-1 | Ovate | Green | Light Green | Round, Long | Green |
| Pipili Local | Ovate | Green | Green | Round, Long | Green |
| 2017/BDB-2 | Ovate | Green | Light Green | Round, Long | Green |
| Athgarh Local | Ovate | Green | Light Green | Flat, Short | Green |
Pod length was found to be maximum for 2016/DOLPVAR-5 (16.98 cm) whereas it was minimum for 2016/DOLPVAR-4 (6.54 cm). Data recorded on pod width showed maximum for 2016/DOLPVAR-12 (3.79 cm) while that of lowest in Pipili local (2.05 cm).

Maximum pod weight of 14 g was recorded in 2016/DOLPVAR-12 and lowest pod weight was recorded in Athgarh local (4.68 g).

Highest number of pods plant⁻¹ was observed in 2016/DOLPVAR-4 (119.33) and that of lowest in Pipili local (30.64). The range for number of seeds pod⁻¹ was varied from 2.92 (Athgarh local) to 4.67 (2016/DOLPVAR-5) with a mean value of 3.98. The genotype, 2016/DOLPVAR-9 recorded maximum pod yield (plant⁻¹ and ha⁻¹) i.e. 1185.58g and 131.73 q followed by 2016/DOLPVAR-4 (1009g and 112.12 q) and 2016/DOLPVAR-12 (905.67g and 100.63q). On the other hand genotype Pipili local gave minimum pod yield (plant⁻¹ and ha⁻¹) of 266.42g and 29.6q. These findings are in conformity with the reports of Mohan et al., (2009) [3], Parmar et al., (2013) [4] and Sharma et al., (2014) [5].

Leaf and pod characteristics

Morphological characters like leaf shape, leaf colour, petiole colour, pod shape, pod size, pod colours of all genotypes are given in Table 4. All the fourteen genotypes were found to be ovate in leaf shape.

Out of the 14 genotypes, 5 genotypes had leaves of light green in colour and rest had green coloured leaves. 5 genotypes had purple coloured petiole, 6 genotypes had light green petioles and 3 genotypes had green petioles. Out of 14 genotypes, pod shape was round in 7 genotypes and flat in 7 genotypes and pod size was long in 10 genotypes, medium and short in 2 genotypes each. Three different pod colours (Green, Butter green and Purple) were recorded. Maximum genotypes had green pods except 2016/DOLPVAR-11 which had purple coloured pods.
It may be concluded from the present investigation that genotype, 2016/DOLPVAR-9, 2016/DOLPVAR-4 and 2016/DOLPVAR-12 showed significantly higher pod yield per plant. Therefore these genotypes can be used in breeding programme as high yielding genotype after having multi-locational yield trial in Odisha and may be recommended for their commercial utilization. These genotypes can also be used as donor parent for improvement in pod and yield trait in further dolichos bean improvement programmes.

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