# A REVIEW ON ESTIMATES OF VARIABILITY FOR YIELD AND SOME YIELD ATTRIBUTES IN MUNGBEAN

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**Abstracts:** Mungbean (*Vigna radiata* (L.) Wilczek) (2n=2x=22), is a leading pulse of Asia after chickpea and pigeonpea. It is also called as mung, green gram, moong, mungo, mungbean, chicksaw pea and Oregon pea. It belongs to fabaceae family. It is a short duration legume having wider adaptability, low input requirement and has ability to fix the atmospheric nitrogen (50-109 Kg $ha^{-1}$) in symbiotic association with rhizobium bacteria, which not only enables it to meet its own nitrogen requirement but also benefits the succeeding crops. It is consumed in the form of several food products such as bean sprouts, dhal, soup *etc.* Being rich in nutritional profile, mungbean is an inseperable ingredient in the diets of vast majority of population in Indian sub continent.

**Keywords:** Mungbean, Green gram, Production, Yield

## INTRODUCTION

India is the world's largest producer, consumer and importer of pulses as they are the major protein source in the vegetarian diet. Half of the worldwide mungbean production is generated in India (3 million hectares), followed by China and Myanmar (Nair *et al.*, 2012). In India, it is cultivated in an area of 34.4 lakh hectares with a production of 14 lakh tonnes and with the productivity of 407 $kgha^{-1}$ (Agriwatch, 2010-2011).It is mainly cultivated in the states of Rajasthan, Maharashtra, Karnataka, Andhra Pradesh, Tamilnadu and Gujarat.

**Taxonomy:** Mungbean belongs to the order Leguminosae and Papilionoideae family and its botanical name is *Vigna radiata (L.)*Wilczek syn and earlier name is *Phaseolus radiatus*L., P. aureus Roxb (Wilczek, 1954, Verdcourt, 1970).

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|---|---|
| Kingdom | Plant kingdom |
| Division | Spermatophyte |
| Sub division | Angiospermae |
| Class | Dicotyledonae |
| Oder | Leguminosae |
| Family | Papilionoideae |
| Tribe | Phaseoleae |
| Genus | *Vigna* |
| Sub genus | Ceratotropis |
| species | *radiata* |

Rachie and Roberts (1974), Jain and Mehra (1980).

### Botany

Mungbean is an annual herb, 0.3 to 1.5 m tall. It has deep tap root system with root nodules. Stem is erect or sub erect plant, hallow, sometimes slightly twining at the tips. Leaves are alternate, trifoliolate with long petioles and dark or light green, pulvinate base, stipulate. Leaflets are stipellate, two lateral leaflets are obliquely ovate and terminal leaf let is ovate or obovate. The inflorescence is axillary raceme with 10-20 flowers and peduncle is of 2 to 13 cm long. The flower is yellow, complete and bisexual. Pods are 6 to 10 cm long, slender, short and hairy. At the time of maturity, pods attain black or brown or pale grey colour. Seeds are globose, weight 15 to 85 mg, mostly green but sometimes yellow, tawny brown, black or mottled. The white, flat hilum is not concave; germination is epigeal (Bailey, 1970).

### Genetics variability for Quantitative traits

Mungbean genetic improvement of economically important traits requires availability of genetic variability, adequate knowledge of their inheritance pattern, relative contribution of genetic and non-genetic components in their expression. Many traits of economic importance are inherited in a quantitative fashion and their expression may be affected by both genetic and environmental influences. Variability results due to differences either in the genetic constitution of the individuals of a population or in the environment in which they are grown. Selection is also effective when there is genetic variability among the individuals in a population. Hence, assessment of variability for different yield attributes and the nature of their heritability are the prime requisites for an efficient

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plant breeding programme. Literature on genetic studies of mungbean largely comes from India whereas vast array of researchers work on the crop. With mungbean, genetic studies are sparse compared to other pulse crops like soybean, chickpea due to lesser economic importance of the crop and less funding for research. A brief resume of the work done on variability in mungbean is presented here under (Table-1).

**Heritability for yield and some yield attributes**

**Days to 50% flowering:** Broad sense heritability for days to 50% flowering varied from 3.01 to 97.00. High heritability was reported by Lakshmaiah *et al.* (1989), Kumar *et al.* (1992), Wani *et al.* (2007), Pandey *et al.* (2007), Makeen *et al.* (2007), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012) and Kumar *et al.* (2013).

**Days to maturity:** The magnitude of heritability was ranged from 22.90 to 97.00. High heritability was reported by Misra and Sahu (1985), Lakshmaiah *et al.* (1989), Reddy (1997), Dodwad *et al.* (1998), Wani *et al.* (2007), Makeen *et al.* (2007), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012) and Kumar *et al.* (2013)

**Plant height:** A wide range of heritability observed for plant height and varied from 9.40 to 99.60. High heritability was reported by Misra and Sahu (1985), Lakshmaiah *et al.* (1989), Reddy (1997), Dodwad *et al.* (1998), Lavanya (2006), Wani *et al.* (2007), Pandey *et al.* (2007), Makeen *et al.* (2007), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012), Kumar *et al.* (2013) and Jyothsnanand and Anuradha (2013)

**Number of branches per plant:** Heritability for number of branches per plant ranged from 28.81 to 91.70. High heritability was reported by Reddy (1997), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012), Kumar *et al.* (2013) and Jyothsnanand and Anuradha (2013)

**Number of clusters per plant:** Brosd sense heritability was varied from 48.12 to 96.40. High heritability was reported by Misra and Sahu (1985), Lakshmaiah *et al.* (1989), Reddy (1997), Khairnar *et al.* (2003), Srivastava and Singh (2012) and Kumar *et al.* (2013)

**Number of pods per cluster:** The range in number of pods per cluster varied from 42.47 to 78.20. High heritability was reported by Reddy (1997), Wani *et al.* (2007), Pandey *et al.* (2007) and Makeen *et al.* (2007)

**Number of pods per plant:** A range of 36.88 to 98.80 was observed for number of pods per plant. High heritability was reported by Misra and Sahu (1985), Lakshmaiah *et al.* (1989), Reddy (1997), Dodwad *et al.* (1998), Khairnar *et al.* (2003), Lavanya (2006), Wani *et al.* (2007), Makeen *et al.* (2007), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012), Kumar *et al.* (2013) and Jyothsnanand and Anuradha (2013)

**100 seed weight:** Heritability for seed weight ranged from 18.78 to 98.81. High heritability was reported by Lakshmaiah *et al.* (1989), Kumar *et al.* (1992), Dodwad *et al.* (1998), Khairnar *et al.* (2003), Wani *et al.* (2007), Makeen *et al.* (2007), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012) and Kumar *et al.* (2013)

**Pod length:** The magnitude of heritability was ranged from 23.90 to 81.53. High heritability was reported by Misra and Sahu (1985), Reddy (1997), Dodwad *et al.* (1998), Venkateswarlu (2001), Lavanya (2006), Pandey *et al.* (2007) and Kumar *et al.* (2013)

**Number of seeds per pod:** Broad sense heritability estimates for number of seeds per pod ranged from 28.29 to 97.10. High heritability was reported by Misra and Sahu (1985), Venkateswarlu (2001), Khairnar *et al.* (2003), Wani *et al.* (2007), Singh *et al.* (2009), Reddy *et al.* (2011) and Srivastava and Singh (2012)

**Seed yield per plant:** Estimates of broad sense heritability for seed yield per plant ranged from 31.22 to 99.00. High heritability was reported by Misra and Sahu (1985), Lakshmaiah *et al.* (1989), Reddy (1997), Dodwad *et al.* (1998), Venkateswarlu (2001), Khairnar *et al.* (2003), Lavanya (2006), Singh *et al.* (2009), Reddy *et al.* (2011), Srivastava and Singh (2012) and Kumar *et al.* (2013). Several workers reported high heritability coupled with high genetic advance indicating the additive gene action in the inheritance of yield and yield attributes.

**Breeding objectives:**The primary objective is high yield with stable performance. But, yield was regularly affected with biotic and abiotic stresss. So, breeding for biotic stress like sucking pests, pod borer, bruchids, powdery mildew, cercospora leaf spot, MYMV and other regional pests and diseases are considered as main objectives. Further, tolerance to lodging, pod shattering, drought tolerance are some of the regular objectives in mungbean.

**Table 1.** Estimates of broad sense heritability and genetic advance for seed yield and some yield attributes in mungbean

| Reference | Days to 50% flowering | Days to maturity | Plant height | Number of branches per plant | Number of clusters per plant | Number of pods per cluster | Number of pods per plant | 100 seed weight | Pod length | Number of seeds per pod | Seed yield per plant |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Misra and Sahu (1985) | | 80.10 (7.60) | 86.60 (28.20) | | 81.40 (34.00) | | 85.80 (33.90) | | 67.80 (9.00) | 72.40 (8.20) | 74.30 (21.10) |
| Lakshmaiah *et al.* (1989) | 97.00 (14.41) | 97.00 (5.25) | 97.00 (38.83) | | 88.00 (39.58) | | 85.00 (23.20) | 78.00 (10.46) | | 52.00 (6.29) | 85.00 (24.84) |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kumar *et al.* (1992) | 90.29 (10.98) | 14.38 (21.41) | 54.21 (18.36) | | | | 50.22 (31.19) | 95.21 (16.60) | | | 31.22 (13.81) |
| Reddy (1997) | | 88.90 (16.17) | 77.84 (37.26) | 71.93 (66.44) | 66.78 (39.39) | 62.50 (38.22) | 70.07 (41.27) | 41.28 (15.20) | 75.03 (11.58) | 53.81 (10.21) | 65.90 (46.41) |
| Dodwad *et al.* (1998) | | | | | | 42.47 (20.36) | 66.28 (45.67) | 98.81 (59.23) | 59.82 (17.92) | 28.29 (6.13) | 66.67 (54.97) |
| Venkateswarlu (2001) | 25.60 (3.01) | 48.46 (3.64) | 33.08 (9.57) | | 48.12 (21.05) | | 36.88 (21.48) | 18.78 (1.52) | 25.63 (4.06) | 84.10 (19.27) | |
| Khairnar *et al.* (2003) | 8.70 (0.35) | 22.90 (2.48) | 9.40 (1.72) | | 96.40 (59.92) | | 78.30 (37.29) | 90.00 (20.80) | | 74.20 (12.47) | 92.10 (38.57) |
| Lavanya (2006) | | 45.51 (11.67) | 75.64 (39.36) | 28.81 (17.76) | 55.93 (43.74) | 52.15 (38.60) | 65.54 (45.82) | 35.94 (12.04) | 81.53 (32.57) | | 74.55 (55.53) |
| Wani *et al.* (2007) | 69.54 (7.08) | 66.57 (6.01) | 75.62 (23.32) | | | 73.44 (27.09) | 61.44 (36.05) | 71.76 (17.02) | 53.75 (6.14) | 69.63 (9.96) | 59.57 (59.46) |
| Pandey *et al.* (2007) | | 57.10 (10.50) | 79.70 (33.14) | 39.70 (13.44) | | 78.20 (33.29) | | 58.80 (11.43) | 67.01 (10.24) | 56.70 (8.49) | 48.80 (42.68) |
| Makeen *et al.* (2007) | 69.54 (7.08) | 66.57 (6.01) | 75.62 (23.32) | | | 73.44 (27.09) | 61.44 (36.05) | 71.76 (17.02) | 53.75 (6.14) | 59.63 (9.96) | 59.57 (59.46) |
| Singh *et al.* (2009) | 84.30 (13.13) | 96.80 (17.58) | 99.60 (32.36) | 91.70 (21.43) | | | 98.80 (99.07) | 96.00 (57.59) | | 97.10 (39.25) | 99.00 (79.38) |
| Reddy *et al.* (2011) | 88.00 (26.22 ) | 84.00 (15.40) | 93.00 (46.58) | | | | 79.00 (46.31) | 94.00 (27.29) | | 86.00 (24.47) | 93.00 (86.82) |
| Srivastava and Singh (2012) | 83.90 (8.22) | 80.30 (5.22) | 67.50 (4.10) | 51.70 (17.25) | 68.90 (12.22) | 54.80 (18.73) | 96.60 (19.14) | 63.70 (18.55) | 34.70 (5.48) | 60.40 (17.28) | 92.90 (35.92) |
| Kumar *et al.* (2013) | 73.30 (10.57) | 83.10 (16.91) | 75.20 (18.07) | 37.50 (16.09) | 61.20 (24.16) | | 78.40 (56.35) | 89.90 (28.64) | 88.20 (25.26) | 46.40 (7.37) | 53.50 (09.18) |
| Jyothsnanand and Anuradha (2013) | 28.80 (4.41) | 32.20 (3.82) | | 30.60 (12.05) | | | 76.10 (59.73) | 28.30 (7.74) | 23.90 (8.48) | 56.20 (23.30) | 34.50 (24.43) |

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