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Assessment of growth & yield component of soybean revalidated seed lots

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Abstract

The experiment was laid out in RCBD with three replications and nine treatments (seed lots) with a view to assessment different variety for growth & yield component was significantly higher germination % was recorded in JS 335 A/1 fresh seed lot (84.1), C/1 fresh seed lot of JS 93-05 showed the significantly higher seedling length (24.4) and JS 335 A/1 fresh seed lot found higher value (17.0) in shoot length. The maximum root length was found in JS 93-05 C/1 fresh seed lot (7.8) and the maximum seedling dry weight was noted in JS 93-05 C/3 revalidated seed lot (1.3). The results showed that JS 93-05 C/1 fresh seed lot (6.6) had higher number of branches plant⁻¹ over remaining the seed lots. However, JS 95-60 B/3 revalidated seed lot (4.9) noted minimum branches plant⁻¹. JS 335 A/1 fresh seed lot was noted highest (74.7) number of pods plant⁻¹ and (223.6) number of seeds plant⁻¹. The variety JS 95-60 B/3 revalidated seed lot (12.0) recorded higher 100 seed weight. Among these soybean variety studies, better performance in terms of growth & yield was found promising for higher yield in Madhya Pradesh.

Keywords: Soybean, growth, yield, seed and variety

Introduction

Soybean (*Glycine max* (L.) Merrill) belongs to the family Leguminaceae or “Papilionace” has been called “Golden bean” and “yellow jewel” of the twentieth century. Soybean is the “numerouno” oilseed crop in India and world. It is a major crop grown during the kharif, or monsoon, season (July-October) in the rainfed (dry land) areas of central and peninsular India. It is a drought tolerant multipurpose crop grown for edible oil, industrial use, human food, livestock feed and as a source of bio-energy (Myaka *et al.*, 2005) [8]. It is one of the most important protein and oil seed crop and occupied third place both in seed and oil production throughout the world. Soybean occupies covered place with top rank among the oil seed crops of the world which is an economically important leguminous crop for oil and food products. Its oil is the largest component of the world's edible oils and its protein is composed of ten properly balanced amino acids. At present, it has been established as a most important oilseed crop of India and MP. Soybean has unprecedented expansion in India by recording 15-20% annual growth rate. It contributes around 25% of total edible oil pool of the country. The crop is of a high commercial value as it contains about 40-45% protein, 20-22% oil, 20-26% carbohydrate, a high amount of Ca, P and Vitamins (Rahman *et al.*, 2011) [11]. Processed soybean products such as flour, oil, soya milk, soya beverage, snacks and chunks have a long shelf life and soybean milk is important for feeding babies with lactose intolerance (Karuga and Gachanja 2004) [6]. Moreover, the promiscuous dual purpose soybean varieties have been proven to improve soil fertility through nitrogen fixation under Kenyan conditions (Vanlauwe *et al.*, 2003) [12]. The credit for such a big boost in the production of soybean in the country goes to Madhya Pradesh popularly known as “soya bowl” of the country. It is now the second largest oilseed in India after groundnut. The main soybean producing states in India are Madhya Pradesh (53%), Maharashtra (34%) and Rajasthan (8%). In India, area, production and productivity under soybean was recorded during kharif 2016 as 11604.54 ha⁻¹, 8569.80 mt and 738 kg/ha⁻¹ respectively. It also occupied 54.010 ha⁻¹ area from which the production & productivity is 57.170 mt, 1058 kg ha⁻¹ respectively in Madhya Pradesh.

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Materials and Methods

The present research experiment entitled “Assessment of growth & yield component of soybean revalidated seed lots” was conducted during the *Kharif* season of the year 2017 at Research Farm - Adhartal, Department of Plant Breeding & Genetics and plant physiology, JNKVV, Jabalpur (M.P.). The research experiment was laid-out in a Randomize Completely Block Design with three replications and nine treatments (seed lots) viz., V1 JS 335- A/1 (Fresh Seed Lot), A/2 (Revalidated Seed Lot after 9 month), A/3 (Revalidated Seed Lot after 6 month), V2 JS 95-60- B/1 (Fresh Seed Lot), B/2 (Revalidated Seed Lot after 9 month), B/3 (Revalidated Seed Lot after 6 month), V3 JS 93-05- C/1 (Fresh Seed Lot), C/2 (Revalidated Seed Lot after 9 month), C/3 (Revalidated Seed Lot after 6 month). The experiment details - distance between row to plot - 45x45 cm, distance between replication to replication - 1.5 m, gross plot size - 5.0 m x 1.80 m, net plot size - 4.0 m x 1.35 m, total experimental area -18.0 m x 19.80 m (356.4 m²), number of plot - 27, recommended dose of fertilizer - 20:80:20:20 NPKS kg ha⁻¹, number of varieties viz., JS 335, JS 95-60 & JS 93-05 and seed rate - 80 kgha⁻¹.

Results and Discussion

The present investigation was under taken during *Kharif* 2017 in the Department of Plant Breeding & Genetics and plant physiology, JNKVV Jabalpur the result obtained from the experimental findings were discussed under the following head in the light of the available literature.

Growth components

Germination%

The higher germination % was recorded in JS 335 A/1 fresh seed lot (84.1), while JS 95-60 B/3 revalidated seed lot indicated the minimum germination % (79.6). The similar findings were also reported by Camargo and Vanghan (1973)^[1] that Speed of germination was significantly higher in fresh seeds in comparison to the revalidated seeds of respective crops.

Seedling length (cm)

C/1 fresh seed lot of JS 93-05 showed the significantly higher seedling length (24.4), while minimum value recorded under JS 335 A/3 revalidated seed lot (19.9). The similar findings were also noted by Kulkarni and Eshanna (1988)^[7] who reported that fresh seeds recorded significantly higher vigour index in all the crops. Reduced seedling vigour in revalidated seeds was due to the reduction in percentage germination and seedling length.

Shoot length (cm)

Soybean variety JS 335 A/1 fresh seed lot found higher value (17.0), whereas, JS 93-05 C/3 revalidated seed lot (15.2) noted lowest value. Joshi *et al.* (1980)^[5] reported that soaking of dormant groundnut seeds in water improved the germination but had negative effect on the germinability of non-dormant seeds stored at 24°C. Likewise, soaking of sunflower seeds in water for two hours followed by drying recorded effective control in the loss of vigour and viability associated with increased germination, root length and shoot length.

Root length (cm)

The maximum root length was found in JS 93-05 C/1 fresh seed lot (7.8); however, the lowest value was noted in JS 335 A/3 revalidated seed lot (3.3). The results corroborate with the findings of Chatterjee *et al.* (1985)^[2], reported that seed yield of

sesame increased by 22% with the use of seeds pre-soaked in water and dried for four hours in shade. The increase in yield was the result of better shoot and root growth, more capsules plant⁻¹ and higher test weight of seeds.

Seedling dry weight (g)

The maximum seedling dry weight was noted in JS 93-05 C/3 revalidated seed lot (1.3) and minimum value was recorded in JS 93-05 C/1 fresh seed lot (1.0).

Yield components

Number of branches plant⁻¹

The results showed that JS 93-05 C/1 fresh seed lot (6.6) had higher number of branches plant⁻¹ over remaining seed lots. However, JS 95-60 B/3 revalidated seed lot (4.9) noted minimum branches plant⁻¹. Patil *et al.* (2014)^[10] observed that the number of branches was maximum in D1 (2-8 July) date of sowing and in D4 (23-29 July) date of sowing.

Number of pods plant⁻¹

JS 335 A/1 fresh seed lot (74.7) noted highest number of pods plant⁻¹. JS 335 A/3 revalidated seed lot (70.5) registered minimum value for no. of pods. These findings are also in agreement with the work of Desclaux *et al.* (2000)^[3] considerable abortion of flowers and pods due to water stress in flowering and pod set stages is the main reason for reducing number of pods and seeds plant⁻¹.

Number of seeds plant⁻¹

The number of seeds plant⁻¹ is the major contributing traits for higher yield in soybean. The soybean variety JS 335 A/1 fresh seed lot (223.6) exhibited highest number of seeds plant⁻¹. However, lowest number of seed plant⁻¹ was recorded in JS 335 A/3 revalidated seed lot (211.3). The similar results were also noted by Obaidullah *et al.* (2006)^[9] recorded that the seeds plant⁻¹ exhibited positive and significant association with pods/plant and seeds/pod. Seeds pod⁻¹ exhibited positive and significant association with pods plant⁻¹ whereas, harvest index exhibited negative association with yield plant⁻¹.

100 Seed weight (g)

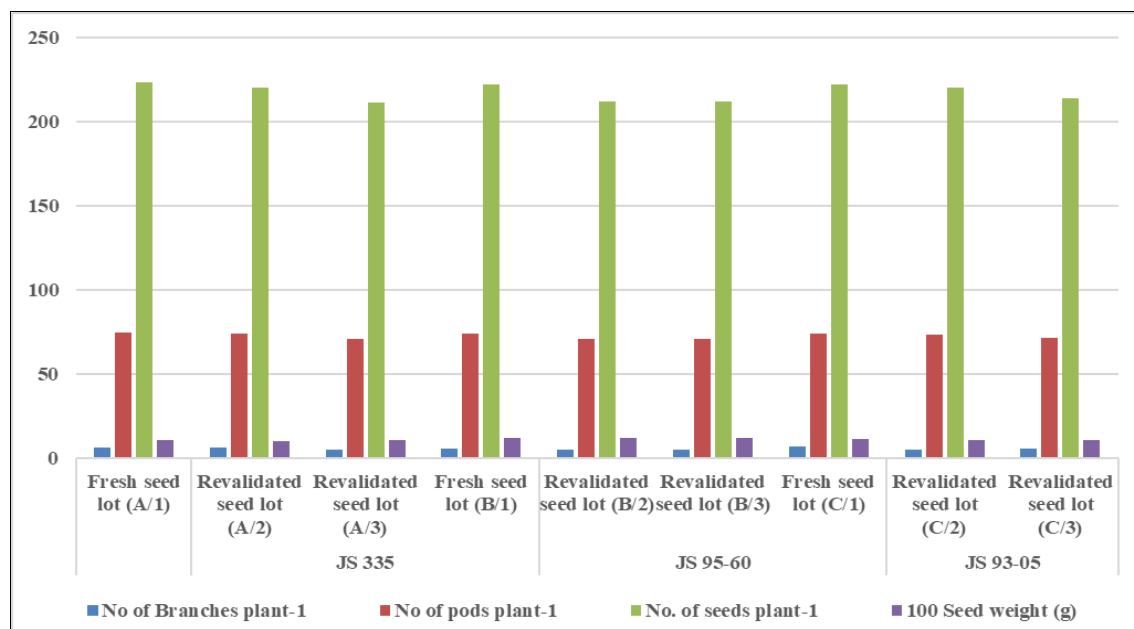
Soybean variety JS 95-60 B/3 revalidated seed lot (12.0) recorded higher 100 seed weight. However, JS 335 A/2 revalidated seed lot (10.1) recorded the minimum 100 seed weight. These findings more also in conformity with the results of Diuz and Valazquez (1986)^[4] reported that 100 seed weight and number of pods plant⁻¹ had the closest genotype correlation, while the phenotypic correlations were between heights plant⁻¹, between pod plant⁻¹ and seeds plant⁻¹.

Summary

The lab studies carried out in the experimental lab, thus the result showed that JS 335 A/1 fresh seed lot showed highest germination % (84.1) and shoot length (17.0 cm). Improvement in structural yield attributing components resulted in maximum realization of productivity potential of soybean seed lots. The variations were noted among soybean seed lots with respect to their components of yield. Number of pods plant⁻¹ (74.7), number of seeds plant⁻¹ (223.6), pod length (5.01 cm), pod width (0.5 cm), hence, seed lot of certified seed of soybean variety JS 335 found efficient variety for various traits including standard germination and find suitable for seed production at the field of farms in Madhya Pradesh.

Table 1: Assessment of yield component of different soybean revalidated seed lots

| Variety | Seed lots | No of Branches plant ⁻¹ | No of pods plant ⁻¹ | No. of seeds plant ⁻¹ | 100 Seed weight (g) |
|----------|----------------------------|------------------------------------|--------------------------------|----------------------------------|---------------------|
| JS 335 | Fresh seed lot (A/1) | 6.07 | 74.78 | 223.63 | 10.51 |
| | Revalidated seed lot (A/2) | 5.92 | 73.61 | 220.49 | 10.17 |
| | Revalidated seed lot (A/3) | 5.20 | 70.54 | 211.30 | 10.69 |
| JS 95-60 | Fresh seed lot (B/1) | 5.27 | 74.11 | 222.33 | 11.99 |
| | Revalidated seed lot (B/2) | 5.13 | 70.70 | 212.10 | 11.92 |
| | Revalidated seed lot (B/3) | 4.97 | 70.61 | 211.83 | 12.04 |
| JS 93-05 | Fresh seed lot (C/1) | 6.60 | 74.09 | 221.93 | 11.02 |
| | Revalidated seed lot (C/2) | 5.11 | 73.47 | 220.40 | 10.82 |
| | Revalidated seed lot (C/3) | 5.56 | 71.33 | 213.98 | 10.85 |
| Mean | | 5.53 | 72.58 | 217.55 | 11.11 |
| SE(m)± | | 0.362 | 0.434 | 1.294 | 0.452 |
| C.D.5% | | 0.551 | 1.312 | 3.912 | 0.935 |

**Fig 1:** Assessment of yield component of different soybean revalidated seed lots

Conclusion

It is concluded from the present investigation certified seed of soybean variety JS 335 A/1 fresh seed lot of had maximum seed quality parameters viz., germination%, shoot length (cm), number of pod plant⁻¹, number of seed plant⁻¹, pod length (cm), pod weight (cm), hence present investigation showed that soybean variety seed lot is found superior in performance, followed by JS 93-05 seed lot. This will be helpful to reduce the storage of soybean seeds in the Madhya Pradesh and country as well, because the availability of seeds was also increase. This investigation will be boon to the farmers to boost up the production of soybean in the state also.

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