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# Effect of processing of chickpea with different sieve sizes on seed quality parameters

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**Abstract**
To minimize the loss there is urgent need to standardize the sieve size for grading of different chickpea varieties and utilization of sieves as per the variety. The aim of seed grading is to get maximum seed recovery with better seed quality so that uniform seed size can be obtained which results in optimum plant population and higher yield.. In view of this an experiment was conducted to evaluate the effect of seed processing with different sieve types on seed quality parameters of chickpea. The present study revealed that the seed quality parameters greatly affected by processed seeds obtained from different sieve sizes. The highest germination (96.33%), root shoot length (35.33 cm) and vigour index I (3534.44) were recorded in variety Vijay with recommended sieve size of 6:00mm. The lowest moisture content (10.34%) and electrical conductivity (0.195 $dSm^{-1}$) was recorded by the Kripa and Vijay variety with reduced sieve size 8:00mm and 5.50 mm respectively. Vigour index II (188.72) was highest in variety Vishal with recommended sieve size of 7:00 mm (R). The seed quality was highest in the recommended sieves and were comparable with the reduced sieve size. By reducing the sieve size higher recovery could be achieved ultimately area under sowing would increased.

**Keywords:** Chickpea, sieve size, germination (%), moisture content (%), electrical conductivity (dSm-1), root shoot length (cm), seedling dry matter content (g), vigour index I, vigour index II

## Introduction
Seed size is an important parameter of seed vigour as it influences the performance of seed in soil. Seed bulk at harvest contains a wide range of seed sizes but have always realized that necessity of using uniform seed of good viability to obtain high emergence and growth. Scientific seed production recognizes the importance of seed processing to maintain the physical purity of the seeds besides recovery of optimum sized seeds for uniform crop establishment and growth. In generally, there are three groups for seed size with large seeded (>9 mm), medium seeded (9-8 mm) and small seeded (8-7 mm) chickpeas. Generally the seeds are being processed by cleaning and grading on the basis of sieve sizes. During cleaning and grading considerable amount of quality seeds are being lost as undersize due to the use of unsuitable screens. Determination of optimum sieve size and type of screen is one of the criteria in the Indian Minimum Seed Certification Standard (IMSCS) for seed grading. The aim of seed grading is to get maximum seed recovery with better seed quality so that uniform seed size can be obtained which results in optimum plant population and higher yield. In view of this aspects an experiment was conducted for determination of the effect of sieve size on seed quality parameters of Desi and Kabuli Chickpea varieties.

## Material and Methods
Unprocessed seeds of six chickpea varieties *viz*. Virat, Vihar, Kripa, Vijay, Vishal, Digvijay was graded at the seed processing plant, M.P.K.V Rahuri during *kharif*, 2016 by using different sieve sizes. Different varieties of chickpea were processed with different screen sizes were Vijay 6:00 mm (R), Vijay 5:50 mm (R), Vishal 7:00 mm (R), Vishal 6:50 mm (R), Digvijay 6:35 mm(R), Digvijay 6:00 mm (R), Virat 8:00 mm (R), Virat 7:00 mm (R), Kripa 9:00 mm (R) and Kripa 8:00 mm (R).
Seed quality attributes *viz.*, seed germination (%), root shoot length (cm), dry matter content (g), moisture content (%), electrical conductivity ($dSm^{-1}$), Vigour index I and II were studied through laboratory analysis during storage and analysed by Complete Randomized Design (CRD) and FCRD method as per the procedure given Panse and Sukhamte (1985) [4].

## Result and Discussion

The effect of sieve size on seed quality parameters of chickpea are presented in the table 1.

There was significant effect of sieve size on seed quality parameters. The present findings revealed that the germination percent increased with increased in sieve size. Germination percent was higher with the recommended sieve size. The highest germination (%) was recorded in variety Vijay (96.33%) with recommended sieve size of 6:00mm whereas it was 94.82 per cent with reduced sieve size which was also comparable. The higher germination in larger seeds may be due to the higher amount of food reserves and increased activity of redox-enzymes in the seeds helping in breaking down the complex food reserves into simple soluble sugars (Gurbanov and Berth, 1970) [3]. Significantly lowest moisture content (10.34%) was recorded by the Kripa variety with reduced sieve size 8:00mm which was also comparable with moisture content (10.44%) by recommended sieve size 9:00mm. Differences were found in (%) as influenced by different sieve sizes of different varieties. There were significant differences in electrical conductivity ($dSm^{-1}$) due to different sieve sizes of different varieties. Significantly lowest electrical conductivity (0.195 $dSm^{-1}$) was recorded by the Vijay variety with reduced sieve size 5:50mm which was also comparable with electrical conductivity (0.207 $dSm^{-1}$) by recommended sieve size 6:00mm.

It was observed that there were significant differences in root shoot length (cm) due to different sieve sizes of different varieties. The highest root shoot length (cm) was recorded in variety Vijay (35.33 cm) with recommended sieve size of 6:00mm whereas it was 34.18 cm with reduced sieve size which was also comparable. The higher root shoot length as stated by Singh *et al.* (1972) [9] may be due to reason that the large seeds had greater supply of stored energy to support seedling growth and subsequently affect plant growth and development. As the seed size increased root length also increased. Similar results were reported by Siddig and Idris (2015) [8] in faba bean and Vishwanath *et al.* (2006) [10] in French bean.

The highest seedling dry matter content (g) was recorded in variety Kripa (2.54 g) with recommended sieve size of 9:00mm. Studies of Roozrokh *et al.* (2005) [6] showed that large seeds of chickpea had more seedlings dry weight in compare with the small seeds. There was higher vigour index I and II with the recommended sieve size. The highest seed vigour index I was recorded in variety Vijay (3534.44) with recommended sieve size of 6:00 mm (R) and vigour index II (188.72) was highest in variety Vishal with recommended sieve size of 7:00 mm (R). Larger seeds possessed more vigour than smaller seeds due to the presence of more food material (Pollack and Roos, 1972) [5]. Low seedling vigour in small seeds may be due to mass storage of the nutritive elements in small seeds which decreased the seedling dry weight and produced lower vigorous seedlings.

The present study revealed that the seed quality parameters were higher with the recommended sieve size whereas it was comparable with the reduced sieve size. Similar results were reported by Anuradha *et al* (2009) [1] in chickpea, Siddig and Idris (2015) [8] in faba bean, Chaffai and Brinis (2013) [2] in durum wheat, Shivani and Sreelaksmi (2013) [7] in pigeon pea. The seed with the recommended sieve size also found to be beneficial in increasing germination percentage, moisture content, root-shoot length, vigour index I and II, seedling dry matter content. The seed produced under stress conditions may have small seed size under such conditions processing with reduced sieve size may save good quality which otherwise would have required with recommended sieve size.

**Table 1:** Effect of processing with sieve size on quality parameters of chick pea

| Varieties of Gram | Screen size | Germination (%) | Moisture Content (%) | Electrical conductivity ($dSm^{-1}$) | Root shoot length (cm) | Seedling dry matter content (g) | Vigour Index I | Vigour Index II |
|---|---|---|---|---|---|---|---|---|
| Vijay | 6:00(R) | 96.33 | 11.2 | 0.207 | 35.33 | 1.73 | 3534.44 | 166.65 |
| | 5:50(R) | 94.82 | 10.58 | 0.195 | 34.18 | 1.70 | 3479.04 | 165.12 |
| S.E.± | | 0.282 | 0.188 | 0.002 | 0.392 | 0.007 | 10.37 | 1.14 |
| C.D. at 5% | | 0.819 | 0.545 | 0.199 | 1.137 | 0.022 | 30.06 | 3.32 |
| Vishal | 7:00(R) | 95.33 | 11.2 | 0.243 | 33.45 | 1.96 | 3095.64 | 188.72 |
| | 6:50(R) | 94.62 | 10.63 | 0.235 | 30.82 | 1.94 | 2897.86 | 182.77 |
| S.E.± | | 0.254 | 0.167 | 0.002 | 0.375 | 0.007 | 36.17 | 0.883 |
| C.D. at 5% | | 0.731 | 0.486 | 0.006 | 1.087 | 0.021 | 104.80 | 2.559 |
| Digvijay | 6:35(R) | 95.86 | 11.89 | 0.233 | 30.76 | 1.95 | 2908.67 | 187.99 |
| | 6:00(R) | 94.62 | 11.07 | 0.216 | 29.79 | 1.92 | 2868.93 | 181.84 |
| S.E.± | | 0.272 | 0.152 | 0.003 | 0.280 | 0.001 | 8.57 | 1.111 |
| C.D.at 5% | | 0.788 | 0.442 | 0.009 | 0.813 | 0.031 | 24.84 | 3.219 |
| Virat | 8:00(R) | 93.33 | 10.17 | 0.231 | 33.83 | 1.43 | 3234.01 | 133.75 |
| | 7:00(R) | 91.78 | 10.13 | 0.220 | 32.03 | 1.36 | 3183.3 | 125.06 |
| S.E.± | | 0.273 | 0.009 | 0.003 | 0.402 | 0.013 | 9.49 | 1.244 |
| C.D. at 5% | | 0.791 | 0.026 | 0.009 | 1.165 | 0.039 | 27.50 | 3.065 |
| Kripa | 9:00(R) | 53.33 | 10.44 | 0.226 | 27.59 | 2.54 | 1471.19 | 135.33 |
| | 8:00(R) | 51.84 | 10.34 | 0.211 | 26.69 | 2.39 | 1382.2 | 124.27 |
| S.E.± | | 0.282 | 0.017 | 0.003 | 0.306 | 0.046 | 16.48 | 2.492 |
| C.D. at 5% | | 0.817 | 0.049 | 0.010 | 0.888 | 0.135 | 47.75 | 7.220 |

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