The Pharma Innovation Journal 2021; SP-10(12): 1277-1279

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(12): 1277-1279

www.thepharmajournal.com
Received: 06-10-2021
Accepted: 07-11-2021

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Effect of sieve size on seed recovery and yield attributes of Desi and Kabuli Chickpea

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Abstract
The extent of yield is directly proportional to the quality of seed that is being sown. Seed bulk at harvest contains a wide range of seed sizes however, these may not all be of equal value for sowing. It is also important to minimize the loss by adopting proper sieve size according to varieties of the same crop in view of this there is urgent need to standardize the sieve size for grading of different chickpea varieties. This investigation was performed under randomized block design with three replications. Accordingly different varieties of desi and Kabuli chick pea were processed by using different sieve sizes for good recovery. The present study revealed that the seed recovery percentage with recommended sieve size. As the sieve size decreased the seed recovery increased. The highest seed recovery percentage (95.5%) with the reduced sieve size 8:00 mm (R) was recorded by the variety Kripa.

Keywords: Desi and Kabuli Chickpea, seed recovery, field emergence, plant height, no of pods/plant, no of seeds per pod per plant, seed yield

Introduction
Chickpea is cool season crop usually grown as winter season crop or spring crop. There are three groups for seed size with large seeded (>9 mm), medium seeded (9-8 mm) and small seeded (8-7mm) chickpeas. Seed size is an important trait for trade and component of yield and adaptation in chickpea (Upadhyaya *et al*. 2006) [14].
The use of small seed can reduce the production costs of chickpea 15 to 25% by reducing the amount of seed needed per unit area. The seed size had no significant impact on plant growth, development and seed yield of large-seeded crops such as chickpeas. Also, the different chickpea cultivars may have different plant height, seed yield components and seed size distribution, but the size of seed planted had no significant impact on most of these parameters (Gan *et al*., 2003) [5].
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. 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 sieve size recommendations for processing different crop seeds under the IMSCS appear to be more general and not appropriate for all the newer varieties resulting in the poor seed recovery (Anonymous, 1998) [2]. Hence to minimize the loss there is urgent need to standardize the sieve size for grading of different chickpea varieties. In view of these aspects an experiment was conducted for determination of the effect of sieve size on recovery and yield contributes of Desi and Kabuli chick pea.

Material and Methods:
For conduction of the study pure seeds of chickpea variety *viz.*, Desi – Vijay, Vishal, Digvijay and Kabuli-Virat, Kripa were processed with different Sieve sizes. The Kabuli type chick pea variety virat and Kripa were processed with 8.00 mm (Top), 7.00 mm (Bottom) and 9.00 mm (Top), 8.00 mm (Bottom) sieves respectively. The three desi type chick pea varieties viz., Vijay, Vishal and Digvijay were processed with 6.00 mm (Top), 5.50 mm(Bottom), 7.00 mm (Top), 6.50 mm(Bottom) and 6.35 mm (Top), 6.00 mm(Bottom) sieves respectively. The yield contributing characters were analysed by sowing these processed seeds in the field. The field data was analyzed statistically by following the Randomized Block Design (RBD) method as per the procedure given Panse and Sukhamte (1985) [11].

Result and Discussion

The effect of sieve size on seed recovery and yield contributes are presented in the table 1.

There was significant effect of sieve size on seed recovery. The seed recovery of the variety Kripa was the highest (95.5%) with reduced sieve size 8:00mm (R) whereas it was 92% with 9:00mm(R) sieve size. The lowest seed recovery was recorded by the variety Digvijay which recorded 86.7% with 6:35mm (R) sieve size. The difference in per cent seed recovery was mainly due to difference in size of seed. Similar variations in seed recovery with different sieve sizes were also reported by Vishwanath *et al.* (2006) [15] in French bean, Kausal *et al.* (2008) [9] in soybean, Jerlin *et al.* (2010) [8] in olitorius jute seeds and Kumar *et al.* (2014) [10] in green gram.

The variety Digvijay recorded highest field emergence (90.14%) with sieve size 6:00mm(R) whereas it was 88.16% with reduced sieve size 5:50mm(R) sieve size. The increase in field emergence in large seed may be due to additional cotyledonary reserve in larger seeds as reported by Black (1957) [4] in legumes. The plant height of the variety Kripa was the highest (55.91cm) with sieve size 9:00mm(R) whereas it was 55.61cm with reduced 8:00mm(R) sieve size.

The number of pods per plant and number of seeds per pod per plant of the variety Vijay was the highest 55.93 pods and 1.17 seeds with sieve size 6:00 mm (R) whereas it was 50.89 pods and 1.14 seeds with reduced 5:50 mm (R) sieve size.

The seed yield per plant, per plot and per hector of the variety Digviijay was the highest 15.33 g, 0.549 kg and 28.83 qt respectively with sieve size 6:35 mm (R). Whereas, it was 14.97g, 0.536 kg and 28.24 qt respectively with reduced 6:00mm (R) sieve size. The lowest seed yield per plant, per plot and per hector was recorded by the kabuli variety Kripa and was 9.92 g, 0.180 kg and 13.51 qt respectively with sieve size 6:35mm (R) whereas it was 9.68g, 0.177 kg and 12.24 qt. respectively with reduced 6:00 mm (R) sieve size.

The present study revealed that the seed yield was higher with the recommended sieve size however the yield with the reduced sieve size was comparable both recommended sieve size. The highest seed yield/ha was recorded with recommended sieve size where as it was lowered with the reduced sieve size which was also comparable. Seed yield increases with increase in number of pods per plant, number of seeds per pod. This superiority may be due to the high seedling vigour resulting from the extra food reserves present in large seeds (Saxton *et al.* 1994 and Gholami *et al.* 2009) [12, 6]. The recovery and seed yield attributing characters were increased with as the sieve size. Large seed size increased the seed yield. Similar results were also reported by Gnyandev *et al.* (2015) [7] in chickpea, Verma and Bajpai (2002) in pigenopea, Adebisi (2003) [1] in tropical soybean, Stougaard and Xue (2005) [13] in wheat, Bicer (2009) [3] in chickpea and lentil.

Table 1: Effect of sieve size on growth and quality parameters

Varieties of Gram	Sieve size	Seed Recovery (%)	Field Emergence (%)	Plant height (cm)	No of pods/ Plant	No of seed/ pod/ plant	Seed yield /plant g)	Seed yield/ Plot (kg)	Seed yield /ha (q)
Desi									
Vijay	6:00(R)	92.5	90.10	42.38	55.93	1.17	10.82	0.360	24.32
	5:50(R)	93.25	88.27	41.39	50.89	1.14	10.56	0.353	23.83
S.E.±		0.267	0.412	0.139	0.305	0.004	0.036	0.001	0.096
C.D. at 5%		0.775	1.252	0.422	0.925	0.012	0.108	0.004	0.279
Vishal	7:00(R)	90	88.79	49	52.31	1.08	14.97	0.541	25.22
	6:50(R)	92.5	88.14	48.44	49.35	1.05	14.62	0.530	24.71
S.E.±		1.216	0.379	0.163	0.278	0.004	0.049	0.002	0.100
C.D. at 5%		1.783	1.150	0.494	0.844	0.011	0.149	0.006	0.289
Digvijay	6:35(R)	86.7	90.14	53.20	55.02	1.09	15.33	0.549	28.83
	6:00(R)	90.1	88.16	51.96	49.93	1.06	14.97	0.536	28.24
S.E.±		0.569	0.295	0.175	0.272	0.006	0.050	0.002	0.114
C.D.at 5%		1.650	0.855	0.530	0.826	0.019	0.153	0.006	0.330
Kabuli									
Virat	8:00(R)	92.15	63.69	54.32	47.88	1.11	10.82	0.270	14.41
	7:00(R)	94.03	62.03	52.44	45.82	1.06	10.56	0.265	14.12
S.E.±		0.526	0.369	0.269	0.204	0.012	0.036	0.001	0.057
C.D. at 5%		1.526	1.149	0.816	0.619	0.035	0.108	0.003	0.165
Kripa	9:00(R)	92	55.03	58.05	21.51	1.00	9.92	0.180	13.51
	8:00(R)	95.5	51.50	55.61	19.01	0.96	9.68	0.177	12.24
S.E.±		0.462	0.327	0.402	0.175	0.012	0.033	0.003	0.053
C.D. at 5%		1.340	0.949	1.221	0.530	0.035	0.099	0.002	0.155

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