



P-ISSN: 2349-8528  
 E-ISSN: 2321-4902  
[www.chemjournal.com](http://www.chemjournal.com)  
 IJCS 2020; 8(3): 1249-1251  
 © 2020 IJCS  
 Received: 13-03-2020  
 Accepted: 16-04-2020

**RDS Yadav**

Department of Genetics and  
 Plant Breeding, Acharya  
 Narendra Deva University of  
 Agriculture and Technology,  
 Kumarganj, Ayodhya,  
 Uttar Pradesh, India

**RK Singh**

Department of Genetics and  
 Plant Breeding, Acharya  
 Narendra Deva University of  
 Agriculture and Technology,  
 Kumarganj, Ayodhya,  
 Uttar Pradesh, India

**Vineet Dheer**

CSA University of Agriculture  
 and Technology, Kanpur,  
 Uttar Pradesh, India

**RM Tripathi**

Department of Genetics and  
 Plant Breeding, Acharya  
 Narendra Deva University of  
 Agriculture and Technology,  
 Kumarganj, Ayodhya,  
 Uttar Pradesh, India

**Corresponding Author:****Vineet Dheer**

CSA University of Agriculture  
 and Technology, Kanpur,  
 Uttar Pradesh, India

## Effect of harvest stages on seed yield and its quality in chickpea (*Cicer arietinum* L.)

RDS Yadav, RK Singh, Vineet Dheer and RM Tripathi

DOI: <https://doi.org/10.22271/chemi.2020.v8.i3q.9371>

**Abstract**

Seven maturity stages on the basis of visual inspection of seeds by cracking open pods on each main fruiting branch *i.e.*, seed turn yellow to brown from bottom to progressive *viz.*, (i) 50 to 60% (ii) 61- 70% (iii) 71-80% (iv) 81-90% (v) 91-99% (vi) one week after v stage and (vii) two week after v stage were studied in order to optimize harvest stage for maximum quality seed production in chickpea cv. Pusa 362. The maximum harvest yield, seed recovery, germination, seedling length, vigour index and least insect infestation during storage prior to sowing were observed when 91-99% of seed (around 21-22% seed moisture content) on each main fruiting branch have turned totally yellow to brown and rest seed on progressive top were drying down *i.e.*, turning in yellow. Pod dropping and weathering effect on harvest after one/two weeks field maturity were also pronounced. Therefore, these attributes need to be utilized for proper harvesting of chickpea crop leading to its high seed quality production and maintenance till the next season sowing.

**Keywords:** harvest stage, quality seed, storability, chickpea

**Introduction**

Chickpea ( $2n=16$ ) is the third most important food legume grown globally. It is cultivated on over 10 million hectares in the world with total marked production of around 15 million tonnes. In India, chickpea has recorded a highest ever production of 11.23 mt at a record productivity level of 1063 kg/ha in an area of 10.56 million ha, contributing to around 70% of the world's total production. However, the indeterminate growth habit of chickpea varieties led the seed mature progressively from the bottom to the top of the plant. Thus creates difficulty to reckon the various stages of seed maturity even on individual plant as well variability in seed quality (Yadav *et al.*, 2005) [7]. Chickpea is considered ready to harvest when the majority of the plants are yellow and most pods are mature (*yellow to brown*). At this stage, the crops may have still green seed (Khatun *et al.*, 2010) [3]. However, if the plants are left standing too long following maturity there is a risk of pod drop and also seed weathering. Thus proper harvesting of crop is very important from both yield as well quality points of view (Avelar *et al.*, 2018; Mehta *et al.*, 1993; Yadav and Srivastava, 2004; Yadav *et al.*, 2019) [1, 4, 5, 6]. The present investigation was therefore undertaken to standardize the optimum harvest stage for realizing the maximum seed yield and its quality parameters in chickpea cv. Pusa 362.

**Material & Methods**

During the course of foundation seed production of chickpea cv. Pusa 362, two hundred plants of similar type were tagged and 25 plants were categorized each in seven maturity stages on the basis of visual inspection of seeds by cracking open pods on each main fruiting branch *i.e.*, seed turn yellow to brown from bottom to progressive *viz.*, (i) 50 to 60% (ii) 61- 70% (iii) 71- 80% (iv) 81-90% (v) 91-99% (vi) one week after v stage and (vii) two week after v stage. Twenty five plants of each above categorized stage wise were harvested separately and dried in shadow and threshed gently by hand stick beating. Seeds of each maturity stage were treated with Carbendazim @2.5g/kg seed, kept in gunney bag and stored under ambient condition. Seed quality parameters were determined at interval of 2 months and/ or prior to sowing following ISTA Rules (1999) [2].

## Results and Discussion

Effects of different harvest stages on spectrum of seed colour, pod drop, seed moisture content and test weight in chickpea cv. Pusa 362 are presented in Table 1. The percentage of green pod was decreased significantly as harvest stages progressed by 81-90 per cent. There was no significant difference for green seed percentage between the harvest stages of 81-90% and 91-99%. In contrary to this, the percentage of yellow/golden seed was increased rapidly by 71-80% and later on comparatively in decreasing trend. Further, the percentage of brown seed was consistently

increased as harvest stages progressed even to after two week of field maturity. There was no pod drop by 91-99% harvest stage but it was observed, although meagre, at one/two week after field maturity. The seed moisture content was decreased as harvest stages were progressed. The test weight was increased as harvest stages were progressed. The maximum 1000 seed weight was observed 261 g when its moisture attained around 21-22% at 91-99% harvest stage. Thereafter, the seed weight started to decline which might be due to the weathering effect.

**Table 1:** Effects of harvest stages on spectrum of seed colour, pod drop, moisture content and test weight in chickpea cv. Pusa 362.

Harvest stages based on progressive maturity (%)	Green seed (%)	Yellow/Golden Seed (%)	Brown seed (%)	Pod drop (%)	Seed moisture content (%)	1000 seed weight (g)
50 - 60	52.43	25.36	22.21	0.00	42.44	171
61- 70	44.75	32.25	23.00	0.00	37.41	185
71-80	21.56	41.16	37.28	0.00	32.36	224
81-90	10.45	37.55	52.00	0.00	26.31	257
91-99	02.45	31.64	65.91	0.00	21.26	261
1 WAFM	00.00	10.34	89.66	0.35	15.17	258
2 WAFM	00.00	05.78	94.22	0.82	13.14	253
CD at 5%	9.38	8.52	23.56	-	10.56	35.78

WAFM= Week after field maturity

The seed yields in the terms of both raw seed as well as processed seed were increased as harvest stages progressed. Similarly, the percentage of seed recovery was also increased. The seed quality parameters viz., seed germination, seedling length and seedling vigour index were also recorded in increasing trend as harvest stages progressed. Besides, the weathering effect of harvest after one/two week of field

maturity was also realised (Table 2). The percentage of seed damaged by storage insects-pest prior to sowing was significantly higher by the 71-80% harvest stage. Besides, there was no significant difference for percentage of seed damaged by storage insects-pest within other harvest stages, though the lowest percentage of insect-pest seed damage was exhibited by 91-99% harvest stage.

**Table 2:** Effects of harvest stages on seed yield, seed quality parameters and storability in chickpea cv. Pusa 362.

Harvest stages based on progressive maturity (%)	Raw seed (q/ha)	Processed Seed (q/ha)	Seed recovery (%)	Germination (%)	Seedling length (cm)	Vigour index	Insects-pest damaged seed (%)
50 - 60	12.67	9.18	72.45	61	11.56	705	10.62
61- 70	18.26	14.43	79.03	70	12.34	864	05.37
71-80	21.04	18.85	89.59	82	15.23	1249	02.20
81-90	24.95	23.34	93.94	86	17.21	1480	00.11
91-99	25.54	24.58	96.24	89	18.68	1663	00.06
1 WAFM	24.68	22.95	92.99	85	17.12	1455	00.10
2WAFM	23.95	22.08	92.19	81	16.46	1333	00.15
CD at 5%	6.43	5.14	9.46	8.58	2.86	275.85	2.52

WAFM= Week after field maturity

The present study clearly revealed that harvesting stages significantly affected the seed yield, seed quality parameters and storability even after seed treatment. The weathering effect was also pronounced if the crop was harvested after optimum harvest stage. These findings are in very close conformity to earlier reports either in chickpea (Avelar *et al.*, 2018; Khatun *et al.*, 2010; Mehta *et al.*, 1993; Yadav *et al.*, 2005) [1, 3, 4, 7] or in other crops (Yadav and Srivastava, 2004; Yadav *et al.*, 2019) [5, 6].

## Conclusion

Keeping above findings in view, it is concluded that the 91-99 per cent seed turn yellow to brown (21-22% seed moisture content) from bottom to progressive would be considered the optimum harvest stage for obtaining the maximum seed yield, seed recovery, germination, seed vigour and least insects-pest infestation prior to sowing in chickpea.

## Acknowledgement

Authors are thankful to Indian Council of Agricultural Research, New Delhi for financial assistance.

## References

1. Avelar RIS, Costa CAda, Junior Dda SB, Paraiso, HA and Nascimento WM. Production and quality of chickpea seeds in different sowing and harvest periods. *Journal of Seed Science*. 2018, 40(2), doi.org/10.1590/2317-1545v40n2185719.
2. ISTA. International rules for seed testing. *Seed Science and Technology*. 1999; 27:285-297.
3. Khatun A, Bhuiyan, MAH, Nessa A, Hossain SMB. Effect of harvesting time on yield and yield attributes of chickpea (*Cicer arietinum* L.). *Bangladesh Journal of Agricultural Research*. 2010; 35(1):143-148.
4. Mehta CJ, Kuhd MS, Sheoran IS, Nandwal AS. Studies on seed development and germination in chickpea cultivars. *Seed Research*. 1993; 21(2):89-91.
5. Yadav RDS, Srivastava JP. Studies on seed development and maturation in hybrid rice. *Research on Crops*. 2004; 5(1):14-17.
6. Yadav RDS, Singh RK, Purushottam, Rai M. Studies on seed development and harvesting stages and their impact

for the maintenance of seed vigour in rice (*Oryza sativa* L.). International Journal of Chemical Studies. 2019; 7(4):1135-1138.

7. Yadav SK, Yadav S, Kumar PR, Kant K. A critical overview of chickpea seed technological research. Seed Research. 2005; 33(1); 1-15.