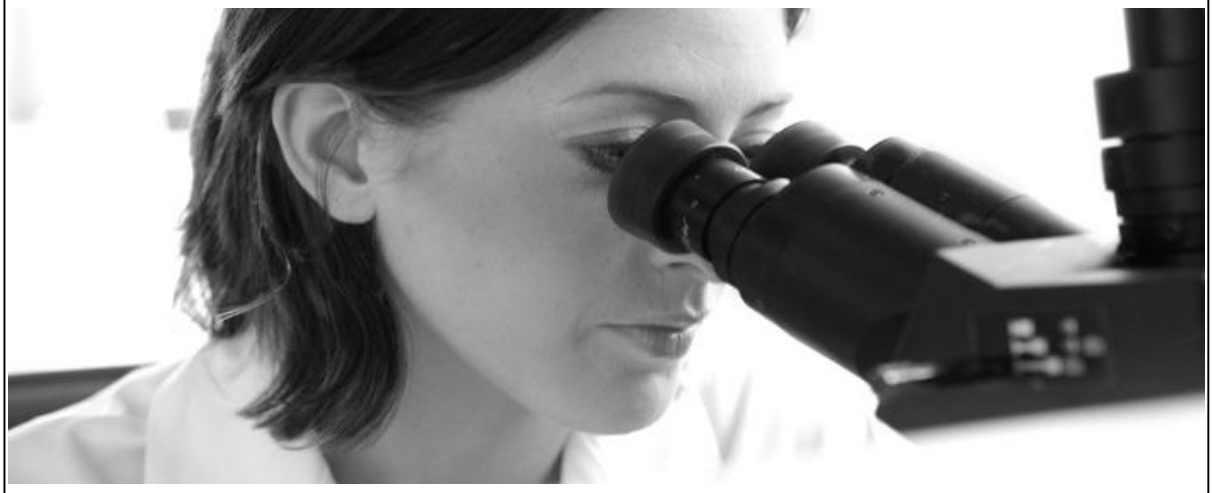
ISSN: 0976-3031

International Journal of Recent Scientific Research

Impact factor: 5.114

EFFECT OF EXTENDED SOWING DATES ON GROWTH AND YIELD OF CHICKPEA



Pawar Nandu B

Volume: 6 Issue: 10

THE PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH
http://www.recentscientific.com
E-mail: recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 6, Issue, 10, pp. 6884-6887, October, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

EFFECT OF EXTENDED SOWING DATES ON GROWTH AND YIELD OF CHICKPEA

Pawar Nandu B

Department of Botany, Mahatma Gandhi Vidyamandir's, Loknete Vyankatrao Hiray Arts, Science & Commerce College, Panchavati, Nashik

ARTICLE INFO

Article History:

Received 16th July, 2015
Received in revised form 24th August, 2015
Accepted 23rd September, 2015
Published online 28st October, 2015

Key words:

Chickpea, extended sowing dates, meteorological week

ABSTRACT

The field experiment was conducted in *rabi* season at Nashik. The experiment was laid out in randomized block design (factorial) with three replications. There were thirty six treatment combinations formed due to four sowing dates *viz.* 45 MW, 46 MW, 47 MW, 48 MW and three chickpea varieties *viz.* Vijay, Vishal, Digvijay. The crop sown in 46th MW was recorded significantly higher plant height, number of branches, plant spread, number of pods per plant, dry matter per plant, weight of grain and straw per plant. Among the varieties plant height, dry matter per plant was the highest in 'Vishal' variety but the highest value of number of branches and plant spread was recorded in 'Vijay' variety followed by 'Digvijay' variety. The yield contributing characters *viz.* number of pods per plant, weight of pods per plant and weight of straw per plant were found significantly higher in the 'Digvijay' variety. While, test weight was found significantly higher in the 'Vishal' variety. The grain yield and straw yield were found significantly more in 'Digvijay' variety. The chickpea crop should be sown at 46 MW and the most suitable variety for extended sowing time (46 MW) is Digvijay or Vijay based on grain yield

INTRODUCTION

Chickpea is cool season crop. It's yield and quality is mostly depend on climatic parameters and time of sowing. It is a short durational crop and requires relatively low temperature for its optimum growth. In India, mid October to mid November is the ideal period for sowing chickpea. Any deviation from this period causes conspicuous reduction in yield (Dumbre and Deshmukh, 1983).

Due to global warming, temperature is increasing day by day, also the rainfall pattern is disturbed and the rainy season is extended up to first fortnight of November. As a result, duration of winter season is reduced. In such condition, there is a need to adjust the sowing date with suitable cultivars of chickpea for obtaining higher yields.

MATERIAL AND METHODS

The field experiment was conducted in *rabi* season at Nashik Region. The experiment was laid out in randomized block design (factorial) with three replications. There were thirty six treatment combinations formed due to four sowing dates *viz.* 45 MW, 46 MW, 47 MW, 48 MW and three chickpea varieties *viz.* Vijay, Vishal, Digvijay.

The soil of experimental field was clayey in texture, very low available nitrogen (175 kg/ha), slightly high available phosphorus (14.85 kg/ha) and high available potassium (560 kg/ha) and slightly acidic in reaction (pH 6.6). The gross and net plot size were 4.00 x 3.00 m^2 and 3.20 x 2.40 m^2, respectively. The chickpea crop was sown as per treatment by dibbling by one seed per hill at spacing of 30 x 10 cm^2. The full dose of nitrogen and phosphorus was applied as basal dose. The optimum plant population was maintained by gap filling and the crop was irrigated as per requirements. Normal cultural operations and plant protection measures were carried out as and when required.

RESULT AND DISCUSSION

Growth and yield contributing characters

Effect of sowing dates: Significantly more plant height was observed in the crop sown in 45 MW over 48 MW treatments but it was at par with crop sown in 46 MW and 47 MW sowing dates. The similar result have been reported by Kabir *et al.* (2009) and Shamsi (2010). Significantly the highest mean plant spread was recorded in 46 MW crop sown over rest of the treatments but at 70 DAS it was at par with 47 MW treatments. Similar result have been reported by Ramteke *et al.* (1996) and Kabir *et al.* (2009).

Corresponding author:* ***Pawar Nandu B*
Department of Botany, Mahatma Gandhi Vidyamandir's, Loknete Vyankatrao Hiray Arts, Science & Commerce College, Panchavati, Nashik

Table 1 Effect of extended sowing dates and varieties on growth and yield contributing characters of chickpea during *rabi* 2012-13

Treatment	Plant height (cm)	Plant spread (cm)	Number of branches	Dry matter (g)	No. of pods/ plant	Weight of pods /plant (g)	Weight of straw /plant(g)	Test weight(g)
A. Sowing dates								
S_1 : 45th MW	49.9	45.8	6.7	32.0	45.3	12.7	16.9	220.0
S_2 : 46th MW	49.7	49.7	6.7	37.5	45.6	13.3	14.3	222.2
S_3 : 47th MW	47.7	46.5	6.6	33.5	38.5	13.3	13.6	224.4
S_4 : 48th MW	34.7	35.3	5.4	20.7	29.6	10.7	9.6	210.0
S.E.±	0.8	0.8	0.05	0.2	0.1	0.1	0.9	1.1
C.D. at 5%	2.2	2.4	0.1	0.6	0.4	0.4	2.9	3.2
B. Varieties								
V_1 : Vijay	41.5	49.4	6.7	28.6	38.7	11.9	13.2	181.6
V_2 : Vishal	50.1	39.5	6.0	34.0	37.0	13.6	14.6	255.0
V_3 : Digvijay	44.7	44.0	6.3	30.2	43.5	12.1	13.0	220.8
S.E.±	0.7	0.9	0.06	0.2	0.1	0.1	0.8	1.2
C.D. at 5%	2.2	2.8	0.18	0.6	0.4	0.5	N.S.	3.7
C. Interaction (S X V)								
S.E.±	1.5	1.6	0.10	0.4	0.2	0.3	1.7	2.2
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	0.8	N.S.	N.S.	6.5
General mean	45.4	44.3	6.3	10.3	39.7	12.5	13.6	219.1

Table 2 Effect of extended sowing dates and varieties on yield contributing characters and yield of chickpea during *rabi* 2012-13

Treatment	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})	Harvest index (%)	Cost of cultivation (Rs ha^{-1})	Gross monetary return (Rs ha^{-1})	Net monetary return (Rs ha^{-1})	Benefit: cost ratio
A. Sowing dates							
S_1 : 45th MW	27.3	29.8	47.8	35134	74441	39307	2.1
S_2 : 46th MW	28.6	31.4	47.6	35134	77962	42828	2.2
S_3 : 47th MW	27.8	30.3	47.9	35134	75756	40622	2.1
S_4 : 48th MW	21.7	24.4	47.1	35134	59296	24162	1.6
S.E.±	0.08	0.06	0.06		179.6	179.6	
C.D. at 5%	0.23	0.17	0.18		525.9	525.9	
B. Varieties							
V_1 : Vijay	27.2	29.8	47.6	35134	74202	39068	2.1
V_2 : Vishal	24.4	26.9	47.5	35134	66530	31396	1.8
V_3 : Digvijay	27.5	30.2	47.6	35134	74859	39725	2.2
S.E.±	0.07	0.05	0.07		207.4	207.4	
C.D. at 5%	0.20	0.15	N.S.		607.2	607.2	
C. Interaction (S X V)							
S.E.±	0.14	0.10	0.12		359.3	359.3	
C.D. at 5%	0.40	0.31	0.36		1051.8	1051.8	
General mean	26.4	29.0	47.6	35134	71864	36730	1.9

Table 3 Effect of extended sowing dates and varieties on meteorological parameters of chickpea during *rabi* 2012-13

Treatment	Growing degree days	Hydrothermal unit	Photothermal unit	Albedo	PAR (mol m^{-2})	Canopy temperature (°c)
A. Sowing dates						
S_1 : 45th MW	882	49795	21508	0.37	462	30.1
S_2 : 46th MW	851	45103	20671	0.39	437	31.4
S_3 : 47th MW	832	44512	20986	0.38	463	31.4
S_4 : 48th MW	682	43989	18758	0.37	463	31.5
S.E.±	0.4	24.6	32.3	0.0023	0.6	0.03
C.D. at 5%	1.3	72.0	94.6	0.0069	1.8	N.S.
B. Varieties						
V_1 : Vijay	812	44270	20452	0.38	456	31.0
V_2 : Vishal	812	44276	20520	0.38	456	31.1
V_3 : Digvijay	812	44348	20470	0.38	456	31.1
S.E.±	0.5	28.4	37.3	0.0027	0.7	0.04
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
C. Interaction (S X V)						
S.E.±	0.9	49.2	64.6	0.0047	1.2	0.07
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
General mean	812	44298	20481	0.38	456	31.3

At 45MW and 46MW recorded higher number of branches per plant which was on par with 47 MW and significantly superior over 48 MW. The significantly higher mean total dry matter per plant was recorded in 46MW treatment at rest of the treatments. The lowest value of mean dry matter per plant was recorded in 48 MW treatments. Similar results have been reported by Saini and Faroda (1997) and Anwar *et al*. (2003).

Significantly the highest mean number of pods per plant (45.6) at harvest was recorded in crop sown at 46MW followed by 45MW sowing date and both treatments are at par with each other. The late sown crop i.e. 48th MW found significantly lower number of pods per plant (29.6) followed by 47 MW sowing date. The highest mean weight of pods per plant (13.3g) was recorded from both 46MW and 47MW sowing dates over

rest of the treatments. The lowest weight of pods per plant (10.7 g) was recorded in 48MW sowing date. Significantly the higher mean weight of straw per plant (16.9 g) was recorded in 45MW sowing date over rest of the treatments. The more weight of straw is due to favorable climatic conditions for vegetative growth. The 46 MW sowing date was next best treatment and was at par with 45 MW sowing date. The investigation showed that each delay in sowing time decreased the 1000 seeds weight. The high temperature particularly during pod formation and pod development stages interfere with normal development of grain cause shriveling of grain. Thus, reduction in test weight was caused due to smaller size of grains. Similar result has been reported by Saini and Faroda (1997),

Effect of varieties*:* The differences in the mean plant height were statistically significant due to varieties. The variety Vishal was significantly recorded the highest plant height over other varieties tried in the experiment during all the growth stages. Significantly the highest value of mean plant spread was recorded by Vijay variety than rest of the varieties. The mean number of branches was significantly varied with different varietal treatments. Variety Vijay produced significantly more number of branches per plant over rest of the varieties, but was followed by variety Digvijay. Variety Vishal having significantly less number of branches per plant. The significant difference was found in mean total dry matter (g) due to different varieties. The highest mean total dry matter was recorded by Vishal variety at rest of the varieties and followed by Digvijay variety.

At harvest, significantly the highest mean number of pods per plant (43.5) was recorded in Digvijay variety followed by Vijay and Vishal variety. It showed that Digvijay variety produced more number of pods under extended or late sowing conditions. Significantly the highest mean weight of pods per plant (13.6 g) was recorded in Vishal variety over rest of the varieties. The lowest mean weight of pods per plant was recorded in Vijay variety. There was no significant effect of varieties on weight of straw per plant under extended sowing dates. Significantly maximum mean 1000 seeds weight (255.0 g) was recorded in Vishal variety over rest of the varieties, but was followed by Digvijay variety. The lowest 1000 seeds weight was recorded by Vijay variety (181.6).

Interaction effect : The interaction effect between sowing dates and varieties were found to be non significant at all the growth and yield contributing characters except in number of pods per plant and thousand seed weight it was significant.

Yield and economics

Effect of sowing dates*:* The significantly maximum seed yield (28.6 q ha^{-1}) was recorded in crop sown at 46MW over rest of the sowing dates and it was followed by 47 MW sowing date. The significantly lower grain yield (21.7 q ha^{-1}) was recorded in 48MW sowing date. The reduction in grain yield caused due to sowing dates was primarily because of difference in temperature. Crop sown at 46 MW was favorable to high grain production because post anthesis period coincide with relative low temperature. However, late sowing was unfavorable to grain yield. Similar result has been reported by Arvadia and Patel (1986), Dhingra *et al*. (1986), and Kabir *et al*. (2009).

There was significant variation in mean straw yield due to sowing dates. The highest mean straw yield was recorded by crop sown at 46MW treatment over rest of the sowing dates due to pronounced plant growth. The lowest value of straw yield (24.4 q ha^{-1}) was recorded in 48MW treatment. Similar results have been reported by Badani *et al.* (2010) and Shamsi (2010). There was significant variation in mean harvest index due to sowing dates treatments. The highest mean harvest index was recorded in 47MW treatment followed by 45 MW and it was at par with each other. The lowest value of harvest index (47.1%) was recorded in 48MW sowing date.

The total cost of cultivation was same for all treatments. It was Rs 35134/ha. The gross monetary returns were significantly influenced by different sowing dates. Significantly higher gross monetary return (Rs 77962/ha) was obtained by crop sown at 46 MW over rest of the sowing dates. The lowest value of gross monetary return (Rs 59296/ha) was obtained in 48 MW sowing treatment. The net monetary return was significantly influenced with sowing dates. The highest net monetary return (Rs 42823/ha) was recorded in 46 MW sowing date at rest of the sowing dates. The highest benefit: cost ratio (2.2) was recorded in 46 MW sowing date. The lowest value was recorded in 48 MW sowing treatment.

Effect of varieties*:* There was statistically significant variation in seed yield due to varieties. Digvijay variety of chickpea recorded significantly higher seed yield (27.5 q/ha) over rest of the varieties but was followed by Vijay.The lowest yield (24.4 q ha^{-1}) was recorded by Vishal cultivar. The highest straw yield was recorded by Digvijay variety than rest of the varieties; it was followed by Vijay variety. Data pertaining to mean harvest index revealed that there was no statistically significant variation due to varieties. Digvijay variety recorded 47.6 % harvest index.

The cost of cultivation for all varieties, was Rs. 35134/ha. Significantly higher gross monetary return (Rs 74859/ha) was obtained from Digvijay variety as compared to remaining varieties. The highest net monetary return (Rs 39725/ha) was recorded by Digvijay variety over rest of the varieties. The highest benefit: cost ratio (2.2) was recorded in Digvijay variety at rest of the varieties. The lowest value of benefit: cost ratio (1.8) was recorded in Vishal variety of chickpea.

Interaction effect: The interaction effect between sowing dates and varieties were found to be significant in grain yield, straw yield, harvesting index, gross monetary and net monitory returns.

Meteorological Parameters

Effect of sowing dates: The value of GDD increased with the growth stages of crop. The highest value of GDD was recorded in the 45 MW sowing treatment over rest of the sowing dates. The lowest value of GDD was recorded in 48 MW sowing. The result of experiment showed that accumulation of GDD greatly varied with sowing time. Delayed sowing enhances maturity

due to high sunlight and temperature. Similar result has been reported by Agrawal *et al*. (2002) and Chand *et al*. (2010). Significantly the highest value of cumulative hydrothermal and photothermal unit was recorded in 45 MW sowing treatment over rest of the treatments. Significantly superior value of cumulative albedo was recorded in 46 MW sowing treatment at rest of the treatments. Significantly the highest value of cumulative PAR was recorded in 47 MW sowing treatment at rest of the sowing dates. Significantly the highest value of ambient temperature was recorded in 45 MW sowing treatment at rest of the treatments.

Effect of varieties*:* There is no significant difference in different chickpea varieties for accumulation of GDD. There is significant difference in hydrothermal unit on different chickpea varieties. Significantly maximum hydrothermal unit was recorded by Vishal variety followed by Digvijay variety. Significantly the highest value of photo thermal unit was recorded in Vishal variety at rest of the varieties. There was no significant difference in cumulative albedo amongst different chickpea varieties at critical growth stages. There was no significant difference in cumulative PAR amongst different chickpea varieties. There is no significant difference in canopy temperature for different chickpea varieties.

Interaction effect: For all the meteorological characters the interaction effect between sowing dates and varieties was found to be non-significant.

The chickpea crop should be sown at 46 MW and the most suitable variety for extended sowing time (46 MW) is Digvijay or Vijay based on grain yield

References

Agrawal, K.K., Upadhyay, A.P., Shankar, U. and Gupta, V.K. 2002. Photothermal effects on growth, development and yield of gram genotypes. Indian J. Agril. Sci. 72(3): 169-170.

Anwar, M.R., Mckenzie, B.A. and Hill, G.D. 2003. The effect of irrigation and sowing date on crop yield and yield components of *Kabuli* chickpea in a cool-temperate subhumid climate. J. Agric. Sci. 141(3-4): 259-271.

Arvadia, M.K. and Patel, Z.G. 1986. Response of gram to date of sowing and fertility level. Indian J. Agron. 31(4): 398-400.

Chand, M., Singh, D., Ray, N., Kumar, V. and Singh, R.B. 2010. Effect of growing degree days on chickpea production in Bundelkhand region of UttarPradesh. J. Food. Leg. 23(1): 41-43.

Dhingra, K.K., Dhillon, M.S. and Grewal, D.S. 1986. Effect of plant population and row spacing on light interception and grain yield of chickpea under late sown condition. Indian J. Trop. Agri. 4(3): 245-250.

Dumbre, A.D. and Deshmukh, R.B. 1983. Yield of gram varieties as affected by sowing dates, fertilizer application and irrigation. J. Maharashtra Agric. Univ. 8(3): 300.

Kabir, A.H.M.F., Bari, M.N., Abdul K.M.D., Khaliq Q.A. and Ahmed J.U. 2009.
Effect of sowing time and cultivars on the growth and yield of chickpea under rainfed condition. Bangladesh J. Agril. Res. 34(2): 335-342.

Ramteke, S.D., Chetti, M.B. and Salimath, P.M. 1996. Heat unit requirement of chick-pea genotypes for various phenological stages during *kharif* and *rabi* season. Ann. Plant Physiol. 10(2): 176-181.

Shamsi, K. 2010. The effect of sowing dates and row spacing on yield and yield components on Hashem chickpea variety under rainfed condition. African J. Biotech. 9(1): 7-11.

Saini, S.S. and Faroda, A.S. 1997. Effect of sowing time , it's pattern and seedrate on growth and yield of 'H 86-143' chickpea. Indian J. Agron 42(4: 645-649).

How to cite this article:

Pawar Nandu B *et al.*2015, Effect of Extended Sowing Dates on Growth And Yield of Chickpea. *Int J Recent Sci Res.* 6(10), pp. 6884-6887.

****

International Journal of Recent Scientific Research

ISSN 0976-3031