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Growth and yield of Chickpea in Vertisols of Krishna Zone of Andhra Pradesh

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ABSTRACT

A field experiment was conducted during *rabi* 2018 on vertisols of Agriculture College, Bapatla to study the effect of different sowing dates on growth, yield and yield attributes of chickpea varieties. The experiment was laid out in Randomized Block Design with factorial concept with three varieties (V_1-NBeG-47, V_2 - NBeG-49 and V_3 - NBeG-119) and five dates of sowing (2nd fortnight of October, 1st fortnight of November, 2nd fortnight of November, 1st fortnight of December and 2nd fortnight of December) and replicated thrice. Results revealed that the chickpea crop showing during 2nd fortnight of October recoded significantly highest plant height, drymatter, yield attributes, grain yield and haulm yield compared to other dates of sowing. Among the varieties tested, NBeG-119 recorded significantly highest drymatter, yield attributes, grain yield and haulm yield compared to the other two varieties NBeG-47 and NBeG-49.

Keywords: *Chickpea, Dates of sowing, Varieties.*

Chickpea is the premium pulse crop of India cultivated mainly on remnant monsoon preserved moisture under rainfed conditions on marginal lands and semi arid regions.In Andhra Pradesh chickpea is the major pulse crop cultivated during *rabi* season with an area of 4.71 lakh hectares with a production of 5 lakh tonnes and productivity of 1062 kg ha^{-1} (www.indiastat.com, 2015-16). Among the various agronomic practices, optimum planting time is the most important non-monetary input as it has a crucial role in fully utilizing the genetic potentiality and provides the best possible growing conditions such as light, temperature, rainfall, soil moisture and humidity and having profound influence on crop growth, phenological development, occurrence of pests and crop productivity.

The plant environment such as temperature, photoperiod, sunshine hours etc. is significantly changed with the time of sowing. Early as well as delayed sowing decreases yield of chickpea. Early sowing induces excessive vegetative growth and seedling mortality on account of high temperature, humidity and results in poor pod set. The delayed sowing restricts vegetative growth, pod bearing branches, decreases biological nitrogen fixation and may lead to forced maturity as well as increased incidence of pests. Scientific information on optimum weather conditions and appropriate variety for coastal agro-ecosystem of Andhra Pradesh is lacking for chickpea crop. Hence, the present investigation was carried out to find out the performance of different chickpea varieties under different planting dates.

MATERIAL AND METHODS

A field experiment was carried out at Agriculture College, Bapatla during *rabi* 2018 in Randomized Block Design with factorial concept with three Nandyal varieties (V_1 - NBeG-47, V_2 - NBeG-49 and V_3 - NBeG-119) and five dates of sowing (D_1 - 2nd fortnight of October, D_2 - 1st fortnight of November, D_3 - 2nd fortnight of November, D_4 - 1st fortnight of December and D5 - 2nd fortnight of December) and replicated thrice. The soil of experimental site was clay in texture, low in organic carbon (0.5%), available nitrogen (227 kg ha^{-1}), medium in available phosphorus (22.3 kg ha^{-1}) and high in available potassium (265.6 kg ha^{-1}). Recommended dose of nitrogen (20 kg ha^{-1}) was applied in the form of urea and entire dose of phosphorus (40 kg ha^{-1}) was applied in form of single super phosphate in all the treatments. Recommended agronomic practices and plant protection measures were followed.

RESULTS AND DISCUSSION

Drymatter production

Data revealed that dates of sowing had a significant effect on drymatter production, whereas the varieties had significant effect only at 60 DAS and at maturity. The interaction was found non-significant.

Drymatter production was gradually increased with the increased duration of the crop and decreased with delayed sowing. Among different dates of sowing at maturity, the highest drymatter production was obtained with 2nd fortnight of October (D_1) (3801 kg ha^{-1}) sowing which was significantly superior to all other dates of sowing. The lowest drymatter

Table 1. Variation in drymatter accumulation (kg ha^{-1}) at maturity and yield attributes, and yield of chickpea influenced by varieties and dates of sowing.

Treatments	Drymatter accumulation	Number of branches per plant	Number of pods per plant	Seed index (g)	Seed yield (kg ha^{-1})	Haulm yield (kg ha^{-1})
VARIETIES (V)						
(V_1) NBeG – 47	2456	13	33	25.3	1212	1968
(V_2) NBeG – 49	2767	12	37	26.6	1372	2272
(V_3) NBeG -119	2972	14	39	37.6	1418	2013
SEm±	88	0.7	1.4	1	44	38.2
CD (P=0.05)	257	NS	4.2	2.9	127	110.7
DATES OF SOWING (D)						
(D_1) 2nd fortnight of October	3801	17	46	34.2	1869	2157
(D_2) 1st fortnight of November	3096	14	41	30.7	1515	2127
(D_3)2nd fortnight of November	2791	13	38	28.7	1334	2069
(D_4) 1st fortnight of December	2059	11	32	27.1	1013	2030
(D_5)2nd fortnight of December	1911	10	25	27	939	2037
SEm±	113.5	0.8	1.9	1.3	56.8	49.3
CD (P=0.05)	329	2.2	5.4	3.7	164	NS
Interaction (V × D)						
SEm±	196.6	1.31	3.22	2.2	98.3	85.4
CD (P=0.05)	NS	NS	NS	NS	NS	NS
CV%	12.5	17.1	15.2	13.2	12.8	7.1

production was observed during 2nd fortnight of December (D_5) (1911 kg ha^{-1}).

The higher drymatter production with 2nd fortnight of October (D_1) sowing could be attributed to cumulative effect of more plant height and optimum weather conditions like more bright sunshine hours coupled with optimum day length, which might have increased photosynthesis and in turn drymatter production. These findings are in conformity with those of Ali *et al*. (2018). These findings are in conformity with those of Singh *et al.* (2012), Kumar *et al.* (2006) and Anwar *et al*. (1999).

Among the three varieties tested, maximum drymatter accumulation (2972 kg ha^{-1}) was recorded in chickpea variety NBeG-119 (V_3) and was significantly superior to NBeG-49 (V_2) (2767 kg ha^{-1}) and NBeG-47 (V_1) (2456 kg ha^{-1}).

Yield Attributes

Maximum number of branches per plant, pods per plant and maximum seed index were recorded when chickpea crop sown during 1st fortnight of October (D_1) and was significantly superior to all the other dates of sowing tested. Number of branches per plant recorded from 1st fortnight of November (D_2), 2nd fortnight of November (D_3), 1st fortnight of December (D_4) and 2nd fortnight of December sowings were comparable with each other. More branching occurred during early sowing which might be due to the exposure of crop to optimum temperatures prevailed during the crop growth period. (Kiran and Chimmad, 2018).Among the varieties, maximum number of pods per plant (39) was recorded in NBeG-119 (V_3) chickpea variety and was on par with NBeG-49 (V_2) (37) and significantly superior to NBeG-47 (V_1) (33).

Among the varieties tested, maximum seed index (37.6 g) was recorded in NBeG-119 (V_3) chickpea variety which was significantly superior to both NBeG-47 (V_1) (25.3 g) and NBeG-49 (V_2) (26.6 g).

Among the dates of sowing, maximum seed index (34.2 g) was obtained with 2nd fortnight of October (D_1) which was on par with 1st fortnight of November (D_2) (30.7 g) and significantly superior to remaining sowing dates. Seed index recorded during 2nd fortnight of November (D_3), 1st fortnight of December (D_4) and 2nd fortnight of December (D_5) sowings was comparable with each other.

Yield (kg ha^{-1})

Among the varieties, NBeG-119 (V_3) variety produced significantly higher seed yield of 1418 kg

ha^{-1} over NBeG-49 (V_2) which yielded 1372 kg ha^{-1} and lowest yield was recorded with NBeG-47 (V_1) which yielded 1212 kg ha^{-1}.

Among the different dates of sowing, maximum seed yield of 1869 kg ha^{-1} was recorded with 2nd fortnight of October (D_1) sown chickpea crop which was significantly superior to 1st fortnight of November (D_2) (1515 kg ha^{-1}) and 2nd fortnight of November (D_3) (1334 kg ha^{-1}), 1st fortnight of December (D_4) (1013 kg ha^{-1}) and 2nd fortnight of December (D_5) (939 kg ha^{-1}) sowings. However, lowest seed yield was recorded when the crop was sown during 2nd fortnight of December (D_5) (939 kg ha^{-1}). The results are in accordance with Raghavendra *et al.* (2017), Agarwal and Upadhyay (2009) and Tripathi *et al*. (2009) who reported that maximum seed yield obtained during 2nd fortnight of October is due to the maximum partitioning efficiency at 2nd fortnight of October and with advancing sowing dates from November to December, partitioning efficiency was reduced due to receding soil moisture which affects source and sink partitioning.

There was no interaction between varieties and dates of sowing for all the parameters studied.

CONCLUSION

Among the chickpea varieties, NBeG-119 (V_3) performance was superior to NBeG-47 (V_1) and NBeG-49 (V_2) as it has responded well to the changes in sowing window by utilizing weather elements as non-monetary inputs in producing potential yields (1418 kg ha^{-1}). Among the five dates of sowings tested, 2nd fortnight of October (D_1) recorded higher values of growth parameters, yield attributes and yield of chickpea followed by 1st fortnight of November sowing (D_2).

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