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Effect of Sowing Dates on Growth and Yield of Chickpea in South Coastal Conditions of Andhra Pradesh

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ABSTRACT

A field experiment was conducted during *rabi* 2007-08 on black clay loamy soils of Bapatla to study the effect of sowing date on growth and yield of chickpea in south coastal conditions of Andhra Pradesh. The results revealed that the chickpea variety JG-11 recorded higher leaf area (593.8 cm^2 $plant^{-1}$), more number of pods per plant (15.3), higher total drymatter (3178 kg ha^{-1}) and seed yield (846 kg ha^{-1}) among the three varieties. November 18th sown crop recorded more number of branches per plant (5.3), leaf area (543.4 cm^2 $plant^{-1}$), more number of pods per plant (16.6), more 100 seed weight (29.13 g), higher total dry matter (3019 kg ha^{-1}) and higher seed yield (1194 kg ha^{-1}).

Key words : Chickpea, Cultivar, Sowing date, Yield, Yield attributes.

Chickpea (*Cicer arietinum* L.) is one of the major pulse crop throughout the world. Area under chickpea and its production in India account for about 79 percent of world acerage and 74 percent of world production. In Andhra Pradesh it occupies 3, 41, 339 ha of area and the out turn is 3, 45,410 tonnes. In the present agricultural scenario, the input cost to benefit ratio place a vital role in the selection of crop for cultivation. Chickpea being a crop of low input requirement replaced the rice cultivation in some coastal Andhra Pradesh. However, the production and productivity appear rather low when compared to other field crops (Yadav *et al.,* 1998). Information pertaining to the optimum date of sowing and the variety suited were lacking for coastal Andhra Pradesh and hence the present investigation was undertaken at Agricultural college farm, Bapatla.

MATERIAL AND METHODS

A field experiment was conducted during *rabi*, 2007-08 at Agricultural college farm, Bapatla, Acharya N.G. Ranga Agricultural University, A P. The soil under study was black with clay loam in texture with pH 7.4, with available nitrogen (280 kg ha^{-1}) and available P_2O_5 (35 kg ha^{-1}) and K_20 (460 kg ha^{-1}). The experiment was laid out in split plot design replicated thrice with three varieties (KAK-2, JG-11 and Annegiri) sown at four different dates (November 8th, November 18th, November 28th and December 8th). The crop was supplied with recommended dose of fertilizer *i.e.,* 20 kg ha^{-1} of Nitrogen and 50 kg ha^{-1} of P_2O_5in the form of urea and single super phosphate as basal dose. The seeds were sown by dibbling 2 to 3 seeds per hill with a spacing of 30 cm between rows and 10 cm between plants within the row. Later, the crop was thinned to single plant per hill. A pre sowing irrigation, one irrigation at pre flowering and another during pod development stage was given to all treatments. Chlorpyriphos @ 2.5ml lit^{-1} water for effective control of *Helicoverpa armigera* during pod formation stage and carboxychloride @ 3mg lit^{-1} to prevent the wilt disease at early stages of crop growth in all the treatments. The observations recorded at 15 days interval on plant height, number of branches per plant, number of effective branches per plant, leaf area, dry matter accumulation and its partitioning (g $plant^{-1}$), number of pods per plant, test weight (g) and seed yield (kg ha^{-1}).

RESULTS AND DISCUSSION

Effect of varieties:

The varieties differed significantly with regard to growth, yield attributes and yield (Table 1.). At all stages of plant growth KAK-2 was superior to JG-11 and Annegiri in respect to plant height, number of branches. These results were in agreement with that reported by Sahu *et al*., 2007 in chickpea. JG-11 recorded higher yield (1194 kg ha^{-1}) because of more leaf area, leaf area index and drymatter accumulation in leaves while these attributes were low in KAK-2 and Annegiri. KAK-2 recorded higher number of pods (16.6) per plant which was on par

Table 1. Growth, yield attributes and yield of chickpea varieties as influenced by different sowing dates.

Treatment	Plant height (cm)	No. of branches plant^{-1} at maturity	No. of effective branches plant^{-1} at maturity	Leaf area (cm^2 plant^{-1})	No. of pods plant^{-1}	100 seed weight (g)	Seed yield (kg ha^{-1})	Total drymatter (kg ha^{-1})
Varieties								
KAK-2	33.02	5.10	4.63	327.0	16.65	34.83	674	2459
JG-11	29.02	4.22	3.86	593.8	15.33	26.21	846	3178
Annegiri	27.98	4.62	4.18	497.6	14.38	19.05	617	1747
SEm$\pm$	0.71	0.24	0.24	0.5	0.96	0.93	39	12
CD (p=0.05)	2.14	0.72	0.74	0.7	NS	2.80	117	36
Dates of sowing								
November 8th	32.70	4.96	4.42	473.2	15.62	27.56	663	2703
November 18th	28.13	5.31	4.91	543.4	16.62	29.13	1194	3019
November 28th	30.52	4.22	3.91	450.8	15.28	25.86	534	2295
December 8th	29.28	4.09	3.66	423.6	14.28	24.22	459	1828
SEm$\pm$	1.05	0.29	0.26	0.6	0.05	0.39	32	11
CD (p=0.05)	3.62	1.01	0.90	1.9	0.17	1.33	112	37

with JG-11. The higher yield with JG-11 was attributed to more leaf area, leaf area index, drymatter accumulation in leaves and number of seeds per pod compared to other varieties. The leaf area development in JG-11 was 18.3 percent higher over Annegiri and 79.2 percent over KAK-2. Similarly, in blackgram the significant variation in leaf area index was reported by Yadahalli *et al.*, 2006. Higher amount of total drymatter production in JG-11 could be attributed to initial higher leaf surface area where more photosynthesis could take place and pod weight.

Effect of dates of sowing:

The crop sown on November 8th recorded the highest plant height (32.7 cm) compared to the subsequent sowing dates. Chaitanya and Chandrika (2006) observed the maximum plant height in chickpea with earlier and late sowings. Number of branches, number of effective branches, leaf area, leaf area index, total drymatter production was higher in case of second date of sowing *ie.,* on 18th November. Delayed sowings beyond and before November 18th decreased the number of days to maturity. Hastening of maturity with delay in soiwngs might be due to increase in temperatures during reproductive phase of crop (Aziz and Rahman, 1994).

The grain yield decreased drastically by delayed sowing. In comparision to the yield obtained from the crop sown on 18th November, the reduction in yield under first sowing was 44 percent, under third 55.3 percent and under fourth 61.5 percent. The drastic reduction in grain yield (44 - 61.5%) compared to the reduction in total drymatter (10.4-39.4%) under first, third and fourth date of sowing indicates that time of sowing affects the partitioning efficiency. The higher pod yield in November 8th dates of sowing is due to higher pod production and seeds pod. The yield reduction in chickpea when sown earlier or later than November 18th the optimal date of sowing was also observed by Saini and Faroda (1997). Sowing on November 18th recorded highest haulm yield and it can be attributed to higher number of branches and effective branches per plant (Table 1).

Effect of interaction on seed yield:

The interaction between varieties and dates of sowing, revealed that JG-11 recorded highest yield (1229.6 kg ha^{-1}) at second dates of sowing (November 18th), which was on par with KAK-2 variety at second dates of sowing (November 18th). Less yield was recorded by Annegiri at both third (288.9 kg ha^{-1}) and fourth (377.7 kg ha^{-1}) dates of sowing (November 28th and December 8th respectively) (Table 2). Similar interaction was also observed by Kaul and Sekhon (1976). Hence, it can be concluded that under coastal conditions of Andhra Pradesh, sowing of chickpea during 3rd week of November would give better productivity and JG-11 is more suitable for this area.

Table 2. Interactiive effect of sowing dates and varieties on seed yield of chickpea (kg ha^{-1}).

Treatments	Dates of sowing				Mean
	November 8^{th}	November 18^{th}	November 28^{th}	December 8^{th}	
KAK-2	470.3	1203.7	577.7	444.4	674.0
JG-11	866.6	1229.6	733.3	555.5	846.2
Annegiri	651.8	1148.1	288.9	377.7	616.6
Mean	662.9	1193.7	533.2	459.2	
SEm$\pm$	55.4				
CD (D x V)	166.2				

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