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Research Paper

Screening of chickpea (*Cicer arietinum* L.) varieties for augmenting the grain yield in groundnut - chickpea cropping system

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ABSTRACT

A field investigation for augmenting the production of chickpea (*Cicer arietinum* L.) on sandy loam soils under late sown condition was conducted during winter seasons of 2002-03 and 2003-04 at C.S. Azad University of Agriculture and Technology, Kanpur under National Agricultural Research Project, Mainpuri. Nine genotypes of chickpea were tested, sown in the first fortnight of December during two experimental seasons after digging of groundnut. Amoung the bold, medium and small grain size genotypes, KPG 59 (Udai) gave significantly higher yield (24.24 q/ha). Likewise, in small seeded genotypes, two genotypes *viz*. KBG 2 (19.74 q/ha) and KPG 142-1 (19.63 q/ha) yielded statistically at par. Genotype Sadabahar gave 19.09 q/ha as against Pragati, yielded 12.54 q/ha.

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Key words : Screening, Cropping system, Genotype, Late sown, Udai

INTRODUCTION

Numerous studies show that the last week of October to first week of November appears to be the optimum sowing time of chickpea for different genotypes. Any delay beyond this is not desirable as temperatures during December in the north are too low to obtain the optimum growth. As a result of late planting, poor plant growth reduces the total biomass as well as grain yield per unit area. A recently developed genotype at Kanpur in the name of KPG 59 or Udai can survive well under cold climate with already developed late sown technology. This genotype is recommended for cultivation in the eastern parts of U.P. after rice under late sown conditions.

The feedback received from the fields that the cultivation of chickpea after digging of groundnut is not in vogue, farmers raise low value crop with least management and whatever yield available from this they satisfy or leave the field vacant during winter season. In U.P. 0.91 lakh hectare area is under groundnut cultivation with low productivity of 6.74 q/ha. This area may be shifted to late sown chickpea by adaptation of improved cultivation technology which will enhance the total productivity of groundnut-chickpea cropping system.

However, not much published work is available on late sown chickpea after groundnut. Therefore, the present investigation was carried out to find out the suitable genotype of chickpea under late sown condition for groundnut -chickpea cropping system.

MATERIALS AND METHODS

Field trail was conducted for two years during the winter (*Rabi*) season of 2002-03 and 2003-04 at C.S.Azad University of Agriculture and Technology, Kanpur under National Agricultural Research Project, Manipuri. The soil of the experimental site was sandy loam having pH 8.7, organic carbon 0.37%, total nitrogen 0.03%, available phosphorus 10 kg/ha and available potash 296 kg/ha. For assessing the suitable genotype of gram, nine genotypes, out of which one bold, four medium, two small seeded and two Kabuli genotypes were tested in a field trial (Table1). A common dose of $N_{25}+P_{50}+S_{15}+Ca_{30}$ kg/ha was given at sowing. The sulphur (15 kg/ha) and calcium (30 kg/ha) were supplied through gypsum. The trial was carried out in Randomized Block Design with three replications. The crop was planted in rows 45 cm apart using 100 kg seed/ha. Three irrigations were given to crop at flower

initiation, pod formation and pod filling stages. The crop was sown on 6th December, harvested after 130-135 days on 15th to 20th April during both experimental years. The other recommended agronomical practices were applied. The winter rains received in crop period was 17.6 mm and 98.8 mm during 2002-03 and 2003-04, respectively. The harvested crop was sun dried, threshed, winnowed and weighed for recording the grain yield. The yield attributes were recorded at the time of harvest.

RESULTS AND DISCUSSION

The experimetal findigs as influenced by different parameters are discussed below :

Growth attributes:

Genotypes did not differ significantly for branches, pods and pods weight/plant and grains/pod but better pod development was found in genotype KPG 59 closely followed by Avrodhi among all the bold, medium and small seeded and Kabuli genotypes. The significantly taller plant was measured in genotype K 850 over the other genotypes. Likewise, significantly minimum plant height was recorded in genotype Sadabahar (Table 1). The better pod development may be attributed due to excellent survival of genotypes under favorable temperatures. This is in agreement with the findings of Arvadia and Patel (1988).

Yield attributes:

The different genotypes did not affect the grain yield/ plant significantly but genotype KPG 59 yielded higher grains (12.83 g/plant) followed by Avrodhi (11.99 g/plant). The minimum grain weight/plant was weighed in genotype Sadabahar (9.33 g). The significantly highest 100-grain weight (28.49 g) was found in K 850 followed by KPG 173-4 (26.83 g) and Pragati (26.83 g) in comparison to other genotypes. The significantly lowest 100-grain weight was weighed in Sadabahar (13.66 g) during both years

Table 1 : Growth attributes of chickpea as influenced by genotypes

Genotype	Plant height/plant			Branches /plant			Pods/plant			Pods weight/plant (g)		
	2002-03	2003-04	Av.	2002-03	2003-04	Av.	2002-03	2003-04	Av.	2002-03	2003-04	Av.
K 850	45.10	44.44	44.77	21.80	20.80	21.30	40.13	36.81	38.47	16.66	14.66	15.66
KPG 59	37.44	36.88	37.16	21.80	21.13	21.46	48.66	45.33	46.99	18.00	16.66	17.33
KPG 173-4	44.10	43.44	43.77	20.47	19.47	19.97	40.00	42.00	41.00	16.66	15.00	15.83
Avrodhi	37.44	36.77	37.10	22.80	22.13	22.46	47.33	44.00	45.66	17.66	15.66	16.66
Radhey	38.66	38.00	38.33	23.53	22.67	23.10	40.13	39.40	39.76	16.00	14.33	15.16
KBG 2	38.33	37.66	37.99	24.40	23.73	24.06	46.26	39.00	42.63	15.00	13.66	14.33
KPG 142-1	38.44	37.77	38.10	22.27	21.27	21.77	44.73	39.40	42.06	14.66	14.00	14.33
Pragati	38.97	38.33	38.66	23.47	22.47	22.97	34.93	35.66	35.29	13.33	12.66	12.99
Sadabahar	34.88	34.22	34.55	19.93	18.93	19.43	46.40	38.33	42.36	12.66	10.00	11.33
C.D. (P=0.05)	0.95	1.13	-	N.S.	N.S.	-	N.S.	N.S.	-	N.S.	N.S.	-

NS=Non-significant

Table 2 : Yield attributes and grain yield of different genotypes of chickpea

Genotype	Grains/pod			Grain weight/plant (g)			100- grain weight (g)			Grain yield (q/ha)		
	2002-03	2003-04	Av.	2002-03	2003-04	Av.	2002-03	2003-04	Av.	2002-03	2003-04	Av.
K 850	1.66	1.66	1.66	12.00	10.66	11.33	28.66	28.33	28.49	20.16	13.25	16.70
KPG 59	2.00	1.66	1.83	13.33	12.33	12.83	23.00	22.66	22.83	27.36	21.12	24.24
KPG 173-4	2.00	1.66	1.83	12.00	11.00	11.50	27.00	26.66	26.83	16.87	18.50	17.68
Avrodhi	1.66	1.66	1.66	12.66	11.33	11.99	22.00	21.66	21.83	23.66	20.24	21.95
Radhey	2.00	2.00	2.00	12.00	10.66	11.33	22.33	22.00	22.16	18.31	15.72	17.01
KBG 2	2.00	2.00	2.00	12.33	11.33	11.83	17.00	16.33	16.66	20.98	1850	19.74
KPG 142-1	2.00	2.00	2.00	11.66	11.33	11.49	16.00	15.33	15.66	20.16	19.11	19.63
Pragati	2.00	2.00	2.00	10.00	9.33	9.66	27.00	26.66	26.83	12.14	12.95	12.54
Sadabahar	2.00	2.00	2.00	10.33	8.33	9.33	14.00	13.33	13.66	23.86	14.33	19.09
C.D. (P=0.05)	NS	NS	--	NS	NS	--	4.32	3.50	--	2.81	4.13	--

NS=Non-significant

(Table 2) . The favourable temperatures at flowering and pod filling stages increased the grain weight/plant in genotype KPG 59. This support the earlier findings of Arvadia and Patel (1988) and Paikaray and Misra (1992).

Grain yield:

The genotype KPG 59 registered higher grain yield (24.24 q/ha) over the bold, medium and small seeded and Kabuli genotypes. The significant reduction in grain yield under medium and bold seeded genotypes was found by a margin of 7.23 q/ha or 42.50% and 7.54 q/ha or 45% due to raising of Radhey and K 850, respectively, under late sown condition compared with KPG 59. Small grain size genotypes *viz.,* KBG 2 and KPG 142-1 yielded statistically at par. Genotypes Sadabahar gave higher yield than Pragati by a margin of 6.55 q/ha or 52.23% (Table 2). The variation in grain yield can be attributed to genetical differences among the chickpea genotypes (Patel, 1994). The highest grain yield of genotype KPG 59 may be due to better pod development and grain formation under favourable temperatures.

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