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Planting geometry and weed management for maize (*Zea mays*)-blackgram (*Vigna mungo*) intercropping system under rainfed *vertisols*

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ABSTRACT

The experiment was conducted during rainy season 2004 and 2005 at Raipur, Chhattisgarh on maize (*Zea mays L.*) + blackgram (*Vigna mungo* L. Hepper) intercropping system in *Vertisols* under rainfed situation. The soil was clayey in texture with medium fertility status and neutral in reaction with pH 7.2. The experiment consisted of five planting geometry, *viz*. sole maize, sole blackgram, maize + blackgram (1:1), maize + blackgram (2:1) and maize + blackgram (2:2) and four weed management practices, *viz*. Weedy check, Hand weeding (HW) at 30 days after sowing (DAS), Alachlor 2.0 kg a.i./ha as pre emergence and Alachlor 1.5 kg a.i./ha as pre emergence + HW at 40 DAS. These treatments were evaluated under split plot design with three replications. The finding revealed that weed population (*viz*. *Alternanthera triandra*, *Cynodon dactylon*, *Cyprus rotundus* and *Cynotis axillaries*) was highest at 75 DAS except *Brachiaria rasoma* and other weeds, thereafter decreased with the advancement in crop age in weedy check. At important growth stages of crop. *i.e.* 50 and 75 DAS and at harvest stage, the maximum reduction in number of total weeds were found with the treatment Alachlor 1.5 kg a.i./ha + HW at 40 DAS and was significantly superior to other treatments. This treatment produced maximum grain and straw yields of maize and blackgram, maize equivalent yield (MEY) and net return. The grain and straw yield of maize, MEY, land equivalent ratio and reduction in total number of weeds at 50 and 75 DAS were highest under maize + blackgram (1:1).

Key words : Blackgram, Intercropping, Maize, Planting geometry, Weed management,

The traditional agriculture aimed at increasing the production through two dimensions, *viz*. expending the cultivated area and increasing the yield per unit area of crop. The modern agriculture adds two more dimensions time and space. In this way attempts are made to use the land area repeatedly within a given time by raising two or more crops and by exploiting the space more efficiently by planting crops of varying architecture. Hence, within a specified time span (a year or season) and unit area of land, productivity is sought to be increased by repeated and/or intensified cropping. Intercropping has been recognized as a beneficial system of crop production. Although intercropping can be a potential biological tool to manage weeds, yet the system by itself would not be able to provide an acceptable and satisfactory level of weed control, especially during early stage of crop growth because the crop canopy is inadequate to check weed growth. Maize is important food crop of the world both in terms of area (139 M/ha) and production (600 Mt). India has occupied 7.77 million ha area and production of 13.85 million tonnes with the productivity of 1783 kg/ha (DES 2007). In Chhattisgarh, it occupies an area of 1.6 lakh ha, with the production of 2.3 lakh tonnes and productivity is 1391 kg/ha (DOA, 2008). Maize being a C_4 plant has tremendous yield potential and responded well to applied input. However, its yield potential could not be explored fully due to uneven and erratic rainfall pattern leading to severe water stress and weed competition. Maize being widely spaced crop and there is ample scope to grow short duration intercrops in the interspaces. Among the major pulse crops grown in India, blackgram (*Vigna mungo* L.) is an important pulse crop of India and occupies an area of 3.15 million ha. In Chhattisgarh, it occupies an area of 1.2 lakh ha, with the production of 0.39 lakh tonnes and productivity is 325 kg/ha (DOA, 2008). In a study, growing of one row of blackgram in between 2 rows of maize gave an increase of about 40 % over the pure crop maize and found to be more economical. The present study is focussed on rainfed technology because Chhattisgarh state is having only about 24 % of irrigated area out of total cultivated area (58 lakh ha). In Chhattisgarh, around 10 lakhs ha area is under upland condition. Out of this 30 % area is under heavy soil

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and 70% is under light soil. In upland heavy soil, maize has gained popularity among the farmers. Maize can prove to be the best option for crop diversification in upland and midland terrains of Chhattisgarh. Blackgram is also grown under the same land situation. In rainfed condition, intercropping of maize and blackgram can not only provide higher productivity but also enhance the over all profitability.

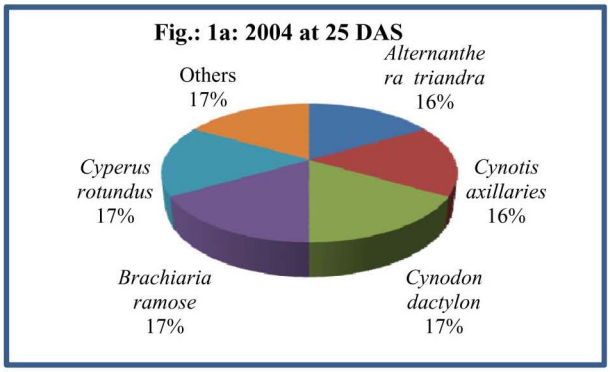
MATERIALS AND METHODS

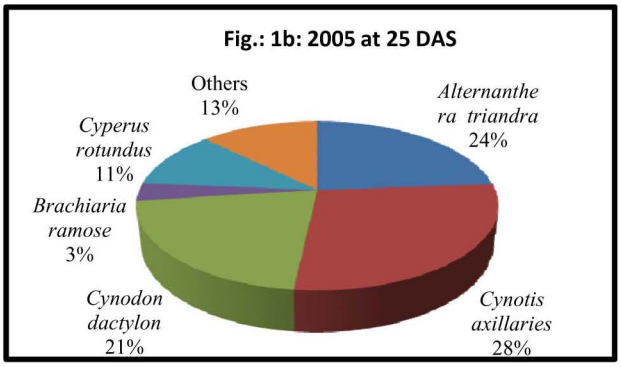
Raipur is situated in the central part of Chhattisgarh and lies between $21^0$16' N latitude and $81^0$36' E longitude with an altitude of 290 m above mean sea level. The experimental site, Raipur comes under the seventh agro climatic region of India *i.e.* Eastern plateau and hills which is termed as sub humid with hot summer and cold winter. It has an annual rainfall of 1326 mm (based on 80 years mean), with a coefficient of variation of 23.4% and most of the rainfall (85%) received between middle of June to end of September with occasional showers in winter. The maximum temperature during summer months reaches as high as 46^0C and minimum temperature is 6^0C during winter months. Relative humidity varies between 70-90% from middle June to January end. The total rainfall of 646 mm was received during *kharif* 2004 and 1236 mm during *kharif* 2005. The maximum temperature ranged in *kharif* 2004 and 2005 were 27.2^0C to 32.7^0C and 28.1^0C to 33.5^0C, respectively. The minimum temperatures during the same season of respective years were 16.0^0C to 24.9^0C and 21.3 to 25.9^0C. The other weather parameters were normal during rainy season (*kharif*) season of both the years. Field experiments were conducted at Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during *kharif* season of 2004 and 2005 under split plot design with three replications. The experiment consisted of five planting geometry, *viz*. sole maize cm), sole blackgram, maize + blackgram (1:1), maize + blackgram (2:1) and maize + blackgram (2:2) in main-plots and four weed management practices, *viz*. Weedy check, hand weeding (HW) at 30 DAS, Alachlor 2.0 kg a.i./ha as pre emergence and Alachlor 1.5 kg a.i./ha as pre emergence + HW at 40 DAS in sub-plot. Maize and blackgram crop was sown at 45 cm and 30 cm row spacing as sole crop respectively. In 1:1 row ratio, blackgram was sown in between 45 cm row spacing of maize. In 2:1 row ratio, one row of blackgram was accommodated in 30 cm spacing of maize. In 2:2 row ratios, two rows of blackgram were accommodated by skipping 2 rows of maize sown in 30 cm apart. The soil was clayey (*Vertisols*) with pH 7.2, EC 0.12 ds/m and available N, P and K of 216, 12.10 and 366 kg/ha, respectively. The application of fertilizer in sole maize was 100:60:40 kg N: P_2O_5:K_2O /ha, whereas in case of sole blackgram, application of fertilizer was 20:40:20 kg N: P_2O_5:K_2O /ha. The composite 'Navjot' maize and 'TAU 2' blackgram was sown. Herbicides were applied as per the treatments. Weedy plots remained infested with native population of weeds till the harvesting of crops. The test herbicide is an aniline herbicide used to control annual grasses and broadleaf weeds in field corn, blackgram and other crops. It is a selective systemic herbicide, absorbed by germinating shoots and by roots. It works by interfering with a plant's ability to produce protein and by interfering with root elongation. Alachlor was applied as per treatment. The amount of herbicide and water (500 l/ha) required was calculated on the basis of land area to be sprayed. The crops (maize and blackgram) were sown on 12 July 2004 and 13 July 2005. The blackgram was harvested on 4 to 7 October 2004 and 7 to 10 October 2005, whereas maize was harvested on 17 to 22 October 2004 and 21 to 25 October 2005.

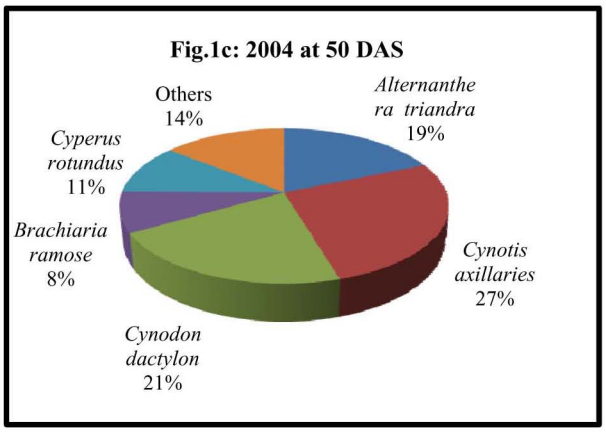
RESULTS AND DISCUSSION

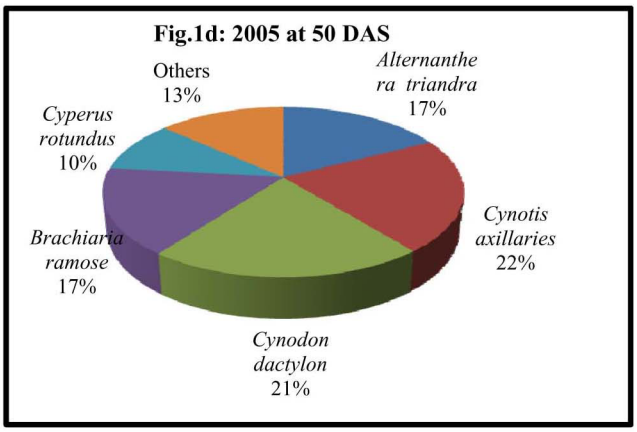
Effect on weed flora

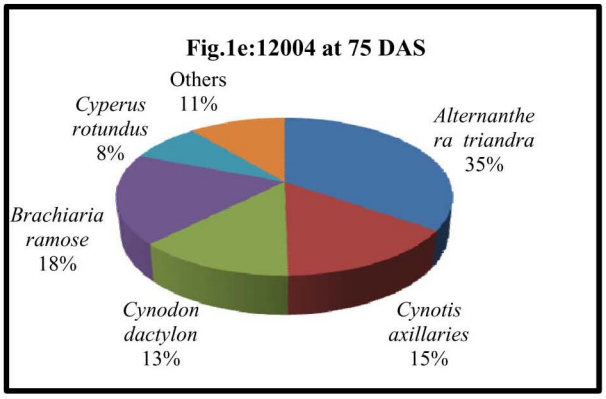
Out of seven weed species, *Alternanthera triandra* and *Cyperus rotundus* among sedges, *Cynodon dactylon* among grasses and in broad leaf weeds *Cynotis axillaries* were predominant weeds (Fig.1a to 1h). In general, total weed population was highest at 75 DAS and thereafter decreased with the advancement in crop age in weedy check (Table 1). Differences in number of total weeds due to planting geometry and weed management were found significant during both the years at all the growth stages. Lowest weed population was recorded with the maize + blackgram (1:1) treatment at 25, 50 and 75 DAS. Whereas, at harvest, sole blackgram recorded lowest weed population which was significantly superior than others. This was probably due to more shading effect of blackgram canopy owing to more number of blackgram plants per unit area. The findings also confirms by Pandey and Prakash (2002). All the weed management treatments decreased the weed population significantly than the weedy check at all the growth stages during both the years, except first year at 25 DAS. Lowest total weed population was recorded in Alachlor 1.5 kg a.i./ha + HW at 40 DAS treatment and was significantly superior to other treatments at 50, 75 DAS and at harvest during both the years. The total dry weight of weeds was recorded highest in sole maize crop (116 and 116 g/m^2) during both the years of experimentation. Among the intercropping, the lowest total dry matter of weeds (78 and 79 g /m^2) was observed under maize + blackgram (1:1). In respect to weed management practices, the highest total dry matter of weed (155 and 150 g/m^2) was recorded in weedy check treatment and lowest was observed under Alachlor 1.5 kg a.i./

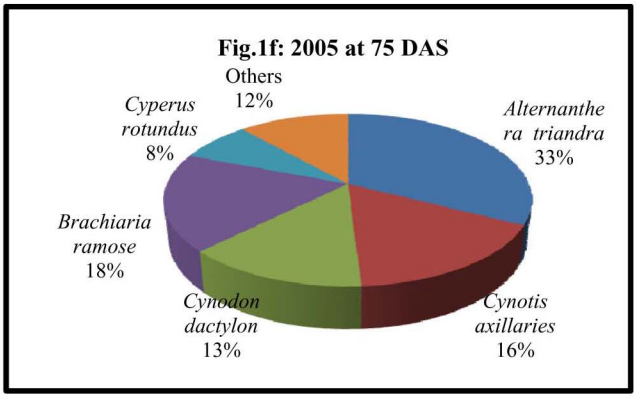


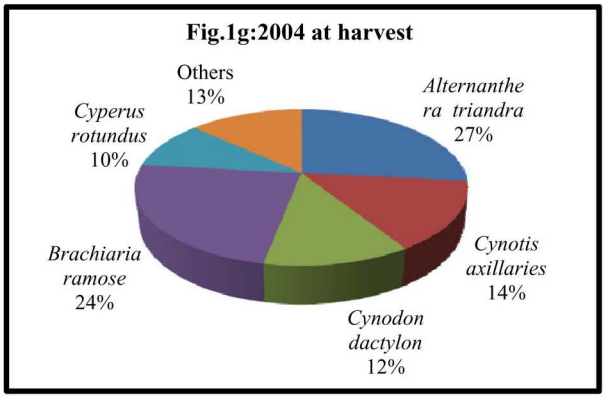












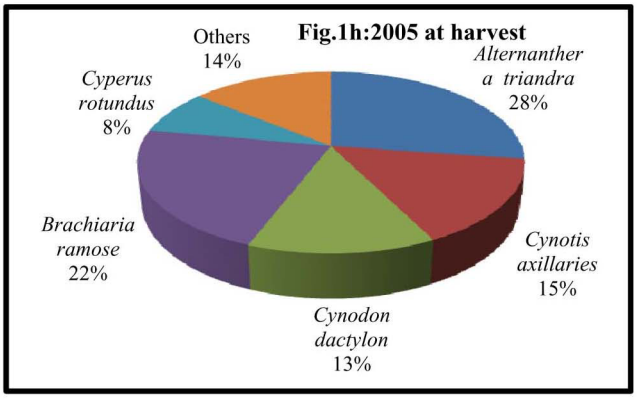


Fig. 1a to 1h. Per cent composition of the major weed species in weedy check treatment at different stages of crop growth

ha + HW at 40 DAS (22 and 26 g/m^2) during both the years.

Weed control efficiency at 75 DAS for blackgram and at harvest of maize

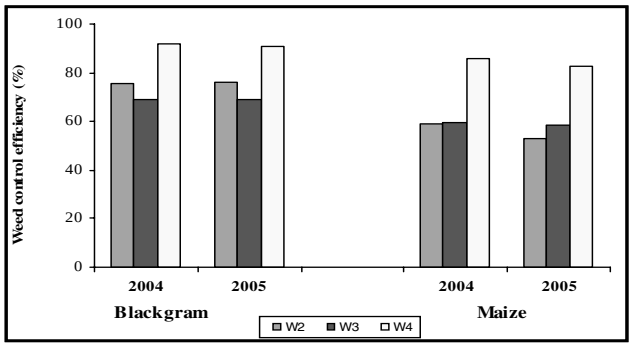
At 75 DAS for blackgram, the highest weed control efficiency was observed under Alachlor 1.5 kg a.i./ha + HW at 40 DAS (92 and 91%) which was followed by HW at 30 DAS treatment (75 and 76%) and Alachlor 2.0 kg a.i./ha (69 and 69%) during both the years (Fig. 2). Weed management had pronounced effect on weed control efficiency at harvest of maize during both the years. All the weed management treatments resulted in increase of weed control efficiency over the weedy check during both the years of the experimentation. In case of maize, the highest weed control efficiency was observed under Alachlor 1.5 kg a.i./ha + HW at 40 DAS (86 and 83%) which was followed by Alachlor 2.0 a.i. kg/ha (60 and 59%) and HW at 30 DAS (59 and 53%) during both the years.

Weed smothering efficiency

Data on weed smothering efficiency at harvest of maize are presented Fig. 3. Weed smothering efficiency was appreciably influenced by planting geometry at harvest of maize during both the years. The highest weed smothering efficiency was obtained under maize + blackgram (1:1) which was remarkably higher over maize + blackgram (2:2) and maize + blackgram (2:1) during both the years.

Yield and yield attributes of maize

Among the planting geometry, maize + blackgram (2:1) recorded higher plant population of maize crop at maturity stage as compared to other planting geometry (Table 2). Whereas, different planting geometry resulted non-significant difference with regard to yield attributing characters of maize. Various weed management practices failed to



W2 - Hand weeding at 30 DAS
W3 - Alachlor @ 2.0 kg a.i./ha
W4 - Alachlor @ 1.5 kg a.i./ha + HW at 40 DAS

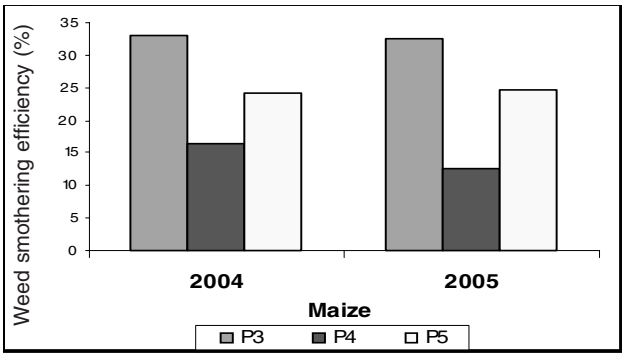
Fig. 2. Weed control efficiency (%) at 75 days of blackgram and at 105 DAS of maize as influenced by weed management in maize + blackgram intercropping system

Table 1. Total plant population of weeds (no./m^2) and total dry wt. of weeds (g/m^2) as influenced by planting geometry and weed management in maize + blackgram intercropping system

Treatment	Total plant population of weeds (no./m^2)								Total dry wt. of weeds at harvest (g/m^2)	
	25 DAS		50 DAS		75 DAS		At harvest			
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Planting geometry										
Maize sole	4.91 (24.60)*	5.00 (25.51)	4.29 (23.56)	4.36 (24.07)	6.28 (46.10)	6.17 (43.34)	7.62 (66.26)	7.62 (65.35)	24.25 (116.47)	24.73 (116.47)
Blackgram sole	4.21 (18.18)	4.27 (18.79)	3.57 (17.20)	3.47 (15.32)	5.15 (31.86)	5.10 (31.34)	1.01 (0.79)	1.01 (0.78)	15.44 (48.02)	15.02 (45.02)
Maize + blackgram (1:1)	4.05 (16.71)	4.12 (17.58)	3.52 (16.14)	3.46 (15.69)	5.07 (30.88)	4.95 (29.22)	6.17 (42.16)	8.41 (77.47)	19.82 (78.14)	20.12 (78.76)
Maize + blackgram (2:1)	4.54 (21.07)	4.55 (21.31)	3.97 (19.95)	3.94 (20.02)	5.79 (39.53)	5.85 (40.31)	7.20 (57.76)	7.44 (61.13)	22.17 (97.46)	22.96 (101.72)
Maize + blackgram (2:2)	4.29 (18.90)	4.38 (19.86)	3.75 (17.94)	3.73 (17.91)	5.33 (33.86)	5.41 (34.86)	6.78 (51.35)	6.79 (51.59)	21 (88.2)	21.28 (87.82)
SEm ±	0.089	0.090	0.061	0.060	0.100	0.102	0.122	0.151	0.372	0.393
CD (P=0.05)	0.292	0.296	0.201	0.197	0.328	0.333	0.398	0.494	1.231	1.286
Weed management										
Weedy check	5.33 (28.07)	5.49 (29.77)	7.06 (49.54)	6.92 (47.73)	9.52 (90.69)	9.36 (87.45)	8.70 (92.13)	8.76 (93.30)	27.09 (155.3)	26.72 (149.68)
Hand weeding at 30 DAS	5.36 (28.41)	5.48 (29.67)	2.89 (7.92)	2.88 (7.96)	4.37 (18.88)	4.35 (18.67)	5.27 (32.77)	5.27 (32.88)	17.49 (63.78)	18.48 (70.43)
Alachlor 2.0 kg a.i./ha	3.28 (10.36)	3.35 (10.85)	4.24 (17.66)	4.29 (18.02)	5.38 (28.61)	5.41 (29.35)	5.70 (38.37)	5.71 (38.61)	17.58 (62.8)	17.58 (61.81)
Alachlor 1.5 kg a.i./ha + HW at 40 DAS	3.62 (12.72)	3.54 (12.14)	1.08 (0.71)	1.09 (0.69)	2.83 (7.61)	2.86 (7.77)	3.36 (11.37)	5.26 (40.26)	10.99 (22.31)	11.9 (25.87)
SEm±	0.059	0.060	0.065	0.064	0.087	0.086	0.094	0.103	0.286	0.284
CD (P=0.05)	0.172	0.175	0.188	0.186	0.253	0.250	0.273	0.298	0.826	1.596

*Figure in parenthesis are original value

give significant impact on plant population of maize, but, significantly highest numbers of cobs/plant and grains/cob were obtained under Alachlor 1.5 kg a.i./ha + HW at 40 DAS. Significantly the lowest number of cobs/plant and grains /cob was obtained under weedy check. In case of grain yield of maize, maize + blackgram (2:1) gave significantly highest grain yield, however, it was found at par with maize + blackgram (1:1) during both the years (Table 3). The reason for maximum grain yield in paired row planting may be due to decreased competition between plants because of equivalent spatial arrangement of plant. Similar findings were also reported by Maitra *et al.* (2000). The total dry matter accumulation / plant at later stage are very important source that contributes to the development of sink. Application of Alachlor 1.5 kg a.i./ha + HW at 40 DAS registered significantly higher grain yield in comparison to other weed management treatments during both the years. The lowest grain yield was noted under weedy check during both the years. The grain yield of maize was severely reduced due to the crop-weed competition. On an average 38.87 % reduction in grain yield of maize took place due to weeds in weedy check when compared with Alachlor 1.5 kg a.i./ha + HW at 40 DAS which recorded significantly highest grain yield. It is an established fact that least crop-weed competition during critical phase of crop growth exerts an important regulative function on complex process of yield formation due to better availability of light, water, space and nutrients to the crop plant. It also helps in improving aeration and nutrient uptake by plants resulting in higher metabolic activity (Lalitha Bai and Sinha, 1993).



P_3 - Maize + blackgram (1:1)
P_4 - Maize + blackgram (2:1)
P_5 - Maize + blackgram (2:2)

Fig. 3. Weed smothering efficiency (%) at 105 DAS of maize as influenced by planting geometry in maize + blackgram intercropping system

Yield and yield attributes of blackgram

Sole cropping of blackgram recorded significantly higher plant population of blackgram as compared to other planting geometry at maturity stage during both the years of crop growth. Significantly highest numbers of pods/ plant and grains/pod were observed under sole blackgram. Similarly these yield attributes were significantly highest under Alachlor 1.5 kg a.i./ha + HW at 40 DAS. Results revealed that sole blackgram produced significantly higher grain yield over other treatments of planting geometry during both the years (Table 3). Application of Alachlor 1.5 kg a.i./ha + HW at 40 DAS registered significantly higher grain yield in comparison to other weed manage-

Table 2. Plant population (at maturity) and yield attributing characters of maize and blackgram as influenced by planting geometry and weed management in maize + blackgram intercropping system

Treatment	Plant population (000/ha) at maturity				Maize				Blackgram			
	Maize		Blackgram		Cobs/ plant		Grains/ cob		Pods/ plant		Grains/ pod	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Planting geometry												
Maize sole	104.3	104.1	-	-	1.09	1.08	321.4	306.1	-	-	-	-
Blackgram sole	-	-	283.2	283.5	-	-	-	-	19.1	20.1	5.9	5.9
Maize + blackgram (1:1)	104.8	104.4	185.7	185.0	1.18	1.10	322.4	309.8	13.9	16.5	5.5	5.6
Maize + blackgram (2:1)	155.3	154.5	138.8	139.5	1.23	1.10	334.0	330.6	11.3	14.7	5.0	5.2
Maize + blackgram (2:2)	78.2	77.7	186.4	187.4	1.11	1.08	311.2	307.4	11.6	15.2	5.3	5.4
SEm±	4.8	4.8	7.4	7.4	0.05	0.05	14.2	14.1	0.5	0.7	0.2	0.04
CD (P=0.05)	16.7	16.6	25.6	25.7	NS	NS	NS	NS	1.9	2.5	0.8	0.2
Weed management												
Weedy check	108.3	107.8	197.6	198.2	1.03	1.03	282.3	273.1	12.1	13.9	5.1	5.2
Hand weeding at 30 DAS	111.1	110.3	197.9	197.7	1.19	1.14	330.5	316.5	14.5	16.1	5.4	5.6
Alachlor 2.0 kg a.i./ha	110.7	109.8	199.3	200.0	1.11	1.00	318.3	314.8	13.8	16.7	5.4	5.5
Alachlor 1.5 kg a.i./ha + HW at 40 DAS	112.5	112.9	199.3	199.5	1.28	1.19	357.9	349.5	15.5	19.9	5.7	5.8
SEm±	3.7	3.7	6.5	6.5	0.04	0.03	10.3	10.1	0.5	0.5	0.2	0.1
CD (P=0.05)	NS	NS	NS	NS	0.11	0.10	30.1	29.4	1.3	1.6	0.5	0.2

ment treatments. Lowest grain yield was noted under weedy check during both the years, which was found significantly inferior to Alachlor 1.5 kg a.i./ha + HW at 40 DAS, Alachlor 2.0 kg a.i./ha and HW at 30 DAS. Pandey and Prakash (2002) reported that maize and legume intercropped either as paired rows + two rows of legume or one row of legume in between two rows of maize adversely affected the weed growth and caused 22.4 and 31.9% weed growth suppression as compared with sole maize, respectively. Pandey *et al.* (1999) also reported similar findings. However, planting geometry alone is not sufficient to overpower weeds during *kharif* season because rains provide a congenial environment for weeds.

Land equivalent ratio (LER)

Differences in LER were significant due to various planting geometry during both the years (Table 3). Compared with the sole cropping, planting geometry of maize + blackgram intercropping resulted in greater LER. Planting geometry of maize + blackgram (1:1) recorded significantly highest LER and registered its superiority over other planting geometry. All the weed management practices recorded non-significant differences LER during both the years.

Maize equivalent yield (MEY)

Various planting geometry and weed management practices brought significant difference in MEY during both the years (Table 3). Maize + blackgram (1:1) gave significantly higher MEY than rest of planting geometry during both the years. Next in superiority order was maize + blackgram (2:2) which registered higher MEY over maize + blackgram (2:1) during both the years. All the weed management practices recorded higher values of MEY over weedy check during both the years. Alachlor 1.5 kg a.i./ha + HW at 40 DAS gave significantly higher MEY over others during second year. Although in first year, it was found at par to Alachlor 2.0 kg a.i./ha and HW at 30 DAS. Chalka and Nepalia (2005) evaluated the effect of weed control on production potential and economics of maize (*Zea mays* L.) – legume intercropping system. Cowpea and soybean as intercrops reduced the weed dry matter and significantly increased maize equivalent yield.

Economics

The highest net return (₹17,493/ha) was recorded under maize + blackgram (1:1) which again registered the superiority of this planting geometry (Table 3). It was followed by maize + blackgram (2:1) (₹13,500/ha). All intercropping combinations gave higher net return than

Table 3. Grain and straw yield, LER, MEY, Cost of cultivation, Net return and B:C ratio as influenced by planting geometry and weed management in maize + blackgram intercropping system

Treatment	Maize				Blackgram				Land equivalent ratio		Maize equivalent yield (t/ha)		Cost of cultivation ($\times 10^3$ ₹/ha)		Net return ($\times 10^3$ ₹/ha)		B:C ratio	
	Grain yield (t/ha)		Straw yield (t/ha)		Grain yield (t/ha)		Straw yield (t/ha)											
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Planting geometry																		
Maize sole	2.94	2.14	6.35	4.84	-	-	-	-	1.00	1.00	2.94	21.4	7.91	8.10	12.44	7.57	1.57	0.93
Blackgram sole	-	-	-	-	0.63	0.67	1.41	1.37	1.00	1.00	2.44	26.6	6.52	6.71	9.60	11.61	1.47	1.72
Maize + blackgram (1:1)	3.08	2.24	6.73	5.01	0.38	0.45	0.82	0.95	1.65	1.77	4.55	40.5	12.31	12.61	18.78	16.20	1.52	1.28
Maize + blackgram (2:1)	3.14	2.31	6.82	5.11	0.19	0.33	0.45	0.73	1.37	1.59	3.87	36.3	12.65	12.95	13.99	13.01	1.10	1.00
Maize + blackgram (2:2)	2.36	1.74	5.02	3.80	0.29	0.41	0.68	0.89	1.27	1.43	3.49	33.8	12.47	12.77	11.32	11.25	0.90	0.88
SEm+	0.05	0.04	0.05	0.04	0.02	0.01	0.01	0.01	0.03	0.02	0.06	0.04	-	-	-	-	-	-
CD (P=0.05)	0.16	0.15	0.17	0.13	0.08	0.04	0.03	0.03	0.12	0.09	0.19	0.15	-	-	-	-	-	-
Weed management																		
Weedy check	2.12	1.54	4.91	3.74	0.27	0.25	0.65	0.65	1.32	1.37	2.51	20.4	11.41	11.69	10.1	6.64	0.88	0.56
Hand weeding at 30 DAS	3.10	2.22	6.78	4.89	0.41	0.49	0.90	1.03	1.32	1.41	3.73	33.4	13.34	13.62	18.50	16.04	1.38	1.17
Alachlor 2.0 kg a.i./ha	2.93	2.06	6.46	4.76	0.40	0.52	0.87	1.03	1.33	1.32	3.58	33.0	12.07	12.37	18.45	16.89	1.52	1.36
Alachlor 1.5 kg a.i./ha+ HW at 40 DAS	3.37	2.61	6.77	5.38	0.43	0.60	0.95	1.22	1.32	1.33	4.01	40.2	13.88	14.18	20.25	21.35	1.45	1.50
SEm+	0.02	0.04	0.08	0.06	0.01	0.02	0.01	0.01	0.04	0.03	0.05	0.57	-	-	-	-	-	-
CD (P=0.05)	0.07	0.13	0.22	0.17	0.04	0.05	0.04	0.04	NS	NS	0.13	0.17	-	-	-	-	-	

their sole stands. Similar facts are also cited by many workers (Ramteke *et al*., 1995; Quayyum and Maniruzzaman, 1995 and Singh, 2000). The maximum net return (₹20,803 /ha) was obtained from Alachlor 1.5 kg a.i./ha + HW at 40 DAS and Alachlor 2.0 kg a.i./ha was next in order which was followed by HW at 30 DAS. Pandey *et al.,* 2001 also concluded that the chemical control of weeds is more economical than hand weeding. The higher values of net return established the superiority of Alachlor use along with hand weeding.

The results confirmed that at important growth stages of crop, *i.e.* 50 and 75 DAS, the maximum reduction in number of total weeds were found with maize + blackgram (1:1) intercropping system. The grain and straw yields of maize, MEY, LER and net return were highest under maize + blackgram (1:1). Use of alachlor 1.5 kg a.i./ha + HW at 40 DAS recorded maximum grain and straw yield of maize and blackgram, MEY and net returns.

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