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Effect of Row Arrangements and Weeding Intervals on Growth and Yield of Maize-Watermelon Intercrop in Semi Arid Zone of Maiduguri

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***Abstract**: Intercropping is a traditional agricultural practice with significant potential for enhancing crop productivity and resource utilization. In this study, we investigated the impact of row arrangements and weeding regimes on the growth and yield of maize-watermelon intercrop in the semi-arid zone of Maiduguri, Nigeria. Field experiments were conducted, employing a factorial Split Plot Design with three row arrangements (1:1, 1:2, 2:1) and four weeding regimes (weedy check, hoe weeding once at 3 weeks after sowing (WAS), hoe weeding twice at 3 and 6 WAS, and weed-free). Both maize and watermelon were included as sole crops for comparison. Results revealed significant interactions between row arrangements and weeding regimes on various growth and yield parameters. Notably, the 1:2 row arrangement combined with two hoe weedings emerged as optimal for both maize and watermelon yields, maximizing fruit weight, number of fruits per plant, and overall yield per hectare. Additionally, this configuration significantly reduced weed prevalence and dry matter production. Conversely, the 2:1 row arrangement with weed-free treatment demonstrated superior performance for maize yield specifically. Our findings underscore the importance of strategic crop arrangement and weed management practices in optimizing yield and resource utilization in intercropping systems. For farmers seeking to maximize returns from maize-watermelon intercropping, adopting a 1:2 row arrangement alongside efficient weed management, such as two hoe weedings, is recommended. Further research is warranted to explore cost-effective weed management strategies in conjunction with the 2:1 row arrangement to enhance maize yield while minimizing inputs. This study contributes valuable insights for enhancing agricultural sustainability and productivity in semi-arid regions, offering practical recommendations for small-scale farmers in similar agroecological contexts.*

INTRODUCTION

Intercropping is the growing of two or more crops simultaneously on the same field during a growing season (Ofori and Stern, 1987) and is a traditional practice in the tropics. Okigho and Greenland (1976) described intercropping as the most widespread cropping system in Africa. Also they estimated that 99% of cowpea, 95% of groundnut, 90% of sorghum, 89% of millet, and 75% of maize grown in Nigeria are intercropped. Intercropping is a common cropping system practiced by almost all small scale farmers in Nigeria. Many researchers have reported the advantages of intercropping over mono-cropping (Ogunwole, 2000; Quainoo *et al.,*2000; Makinde *et al.,*2011 and Bassi, 2019). Ghanbari and Lee, (2002) reported that the dry matter production in wheat and beans intercrops had more benefits than their pure cropping. Also Martin and Snaydon, (1982) in their study reported that grain and dry matter yield in bean and barley intercrops was more than their pure cropping. Odhiambo and Ariga, (2001) with maize and beans intercrops in different ratio found that production increased due to reduced competition between species compared with the competition within species.

Wiley, (1990) considers intercropping as an economic method for higher production with lower levels of external inputs. This increasing use efficiency is important, especially for small-scale farmers and also in areas where growing season is short (Altieri, 1995). Production is more in intercropping and this can be attributed to the higher growth rate, reduction of weeds, reducing the pests and diseases and more effective use of resources due to differences in resource consumption (Eskandari, 2012b; Eskandari et al., 2009a; Willey, 1990). In addition, if there are "complementary effects" between the components of intercropping, production increases due to reducing the competition between them (Zhang and Li, 2003).

Watermelon is mostly cultivated as under sown crop intercropped together with cereals or root crops (Matanyaire, 1998; Ikeorgu, 1991) in the same ways as cucurbits (Ndoro *et al.*, 2007) in contrast with legume where intercropping studies are relatively common (Silwana and Lucas, 2002; Tsubo *et al*. 2003; Vesterager *et al.,*2008*)*. There are few row arrangements studies regarding watermelon as a mixture in Africa (Ikeogu, 1991). In the southern guinea Savannah of Nigeria, several authors have reported on the performance of other closely related variant of guna melon which is referred to as "egusi melon" (*Citrulluslanatus[thumb]) grown* with other stable food crops like maize, yam and vegetables such as maize. Anuebunwa (1992); Aiyelaagbe and Jalaosa (1993) reported similar results from intercrop combinations involving egusi/melon/maize/yam/cassava and maize/egusi melon in alleys of pawpaw (*Carica papaya*). When guna is sown at a later date, it also protects the soil from adverse wind erosion and ensure soil moisture conservation when most of the other vegetation covers have dried up (NEAZDP, 1992). Gwandzang (1992) reported that guna melon could be used for sand-dune stabilization. This is because of the ability of guna melon to provide an efficient soil cover and the crop thrives on residual moisture later in the season. It also allows economy of labour and environmental resources such as light, water, space, and time among crop components. Another important advantage that could result from pearl millet-guna melon intercrop is weed suppression. Similar results were earlier reported by IITA (1997), Akobundu (1987) and Unamma *et al* (1990).

Arrangements of crops in mixture in the traditional farming systems of the local farmers is random and without any sufficient attempt to partner the crops for effective interception of essential resources. Much of the poor crop yields obtained in traditional crop production systems of these farmers might be attributable in part to improper crop arrangements with its attendant waste of essential environmental resources. Similarly, there is no establishing suitable manual weeding regimes for watermelon grown in mixture with other crops. Manual (hoe weeding, hand pulling and slashing) weeding regimes in crops like watermelons whose produce are directly born (produced) on the soil surface and consumed when it is still raw is important, as use of herbicide to control weed in such crop is not advisable because of health hazard. The development of appropriate row arrangements and suitable manual weeding regimes for watermelon in mixture with any crop such as maize is therefore paramount. So, therefore the objectives of the study are to determine the most suitable row arrangements on the growth and yield of maize-watermelon intercrop and determine the most suitable weeding regimes on the growth and yield of maize-watermelon intercrop

MATERIALS AND METHODS

Experimental Site

Field experiments were conducted during the wet season of 2019 at the Teaching and Research Farm, Department of Crop Production, Faculty of Agriculture, University of Maiduguri (Longitude 13°12' 36.02'' E and Latitude 11°48' 2.32'' N and on an altitude of 354 m above sea level).Maiduguri is located in the Sudan Savannah region of Borno State, Nigeria under semi-arid environment characterised by sparse vegetation with an average annual rainfall of 650mm, spanning 4-5 months (May – September).The average temperature is 28.5^0 C with relatively low humidity during the dry season and high humidity during the wet season. The soils are generally sandy-loam.

Experimental Materials

Description of varieties used:

Maize: Sam-maize28 variety was used for the study, which matures in 65 days. The variety is highly remarkable or consumed, a day neutral, high yielding, insect and disease resistant. It has very thick flesh pods, short to medium in height and deeply lobed leaves arranged spirally on the stem.

Watermelon: Local variety of watermelon known as Gurthli was used for the research. Gurthli as a trialling plant is anticipated to control weeds in the intercrop.

Source of seeds: The seeds of maize were obtained from the Institute of Agricultural Research Samaru, Zaria Nigeria while the seeds of watermelon were obtained from Borno State Agricultural Development Programme, Maiduguri.

Treatments and Experiment Design

The experiment consists of three (3) row arrangements (1:1, 1:2, 2:1) and four (4) weeding regimes (weedy check, hoe weeding once at 3 WAS, hoe weeding twice at 3 and 6 WAS, and weed-free). The sole crops of maize and watermelon were also included for the purpose of calculating land equivalent ratio (LER). The weeding regimes allocated to the main plots while the raw arrangements were allocated to the sub plots. The treatments were factorially combined and laid out in a Split Plot Design and replicated three times. There were total of 36 plots and each measuring 3.0 m x 4.5m (gross size of 13.5m^2) while the net plots consist of the three (3) most central rows in each gross plot excluding boarder rows (6.75m^2). Within replicate block, rows were separated using 1m apart and 2mbetween each replicate block. The estimated land area used for the experiment was 0.11ha. Details of the field layout and experimental design.

Data Collected on Maize

Establishment count

This was done at two weeks after sowing (2 WAS) by counting fully established seedling stands from gross plot and average stands counts for each treatment was computed.

Plant height (cm)

Plant height was measured from 4 – 8 weeks after sowing (WAS). Three plants were randomly selected and tagged from each net plot area and their height measured from ground level to the apex of the plant with a graduated meter rule, and average computed.

Number of leaves/plant

Average number of fully expanded leaves per plant was determine from 4 - 8WAS. This was done by selecting 3 plants at random from each plant and counting the fully expanded leaves and average was recorded per plant.

Days to 50% flowering

This was determining by visual observation and noting when 50% of the plants population per plot flowers.

Leaf area

This was calculated using method described by Asif (1977) as below:
$\delta = 115x - 1050$
Where δ = leaf area
X = length of the leaf mid-rid.
Thus, mean length of the leaf mid-rid obtained from the average length of the 3 sampled plants was used to compute the single leaf area and then multiplied by the total number of the leaf number of the plant to get the total leaf area of a particular plant.

Leaf area index

This was computed as the ratio of leaf area of the stand to ground area covered by its canopy.

Number of fruits harvested/plant

This was done by taking the average of the total number of fruits harvested from each sampled plant at each harvested.

Fruits weight/plant (g)

Fruit weight of fresh fruit recorded using weighing balance. This was done by dividing the total weight of the fruits by their number.

Fruit length (cm)

Mean fruit length was recorded using a measuring tape. This was done by measuring the full length of the fruits from the sample plants and averaged.

Fruit diameter

Mean fruit diameter was recorded using a Vanier calliper at the middle point of the fruits.

Total fruit yield/ha

This was obtained by weighing all the fruits yield harvested from each net plot in kgand extrapolated to yield per hectare using the formula:

Fruit yield kg ha^{-1} = $\underline{\text{fruit yield/net plot Hectare x 10,000m}^2}$

Net plot area (m^2)

Data Collected on Watermelon

Number of leaves/plant

This was obtained by counting the number of watermelon leaves from three (3) randomly selected and tagged plants from the net plot and average was computed. This was done at 3, 6 and 9 WAS.

Length of primary vine (cm)

This was determined by measuring the length of primary branches from three (3) selected and tagged plant from net plot at 3, 6 and 9 WAS.

Number of secondary vines/plant

This was determined by counting the number of secondary vine from three (3) selected and tagged plants from net plot at 3, 6 and 9 WAS.

Days to first flowering

This was obtained by carefully nothing the date (i.e. the number of days from planting) when first flowering begins in each plot.

Days to 50% flowering

This was obtained by carefully nothing the number of days from planting till when 50% of the plants in each plot have flowered. This was achieved by regular field observation.

Number of fruits/plant

This was obtained by counting the number of fruits at each harvest from the tagged plants for each treatment plot and the average later determined and recorded.

Fruits diameter (cm)

This was determined by measuring the diameter of the fruits from the three (3) tagged plants in the net plot using a Vanier calliper at harvest. The average was then computed and recorded.

Fruits length (cm)

This was determined by measuring the length of the fruits from the three (3) tagged plants in the net plot using meter ruler at harvest. The average was then computed and recorded.

Fruits weight/plant

This was determined by measuring the weight of the fruit from the three (3) tagged plants in the net plot using weighing machine at harvest. The average was then computed.

Total fruit yield/ha

This was obtained by weighing all the fruits yield harvested from each net plot in kg and extrapolated to yield per hectare using the formula:

$$\text{Fruit yield kg ha}^{-1} = \frac{\text{fruit yield/net plot Hectare x }10{,}000\text{m}^2}{\text{Net plot area (m}^2\text{)}}$$

Weed Identification

Prior to each weeding, weeds within 1m^2 quadrat were identified, counted and recorded. Weed samples were pressed as herbarium specimen and identified (Akobundu and Agyakwa, 1987). Actual number of weeds per square meter of each weed species was also recorded.

Weed Dry Matter

Weeds within 1m^2 quadrat were taken at each weeding, cut at ground level and oven dried at 70^{0}C to a constant weight. The dry weight was obtained using electronic balance. The cumulative dry weight of the weeds was extrapolated to give dry weight per hectare in metric tons.

Data Analysis

Data collectedwas subjected to analysis of variance (ANOVA) and a difference between means was identified using Duncan Multiple Range Test (DMRT) at 5% level as reported by Gomez and Gomez (1984).

RESULTS

Days to 50% flowering of maize

There was significant interaction between row arrangements and weeding regimes on days to 50% flowering of maize in both years and combined mean, the 1:2 row arrangements with weed free produced 50% of plants with flowers earlier while 2:1 with weedy check produced 50% of plants with flowers later than all the treatments (Table 1). In the combined mean, the 1:2 row arrangement with two weeding is optimum to produce 50% plants with flowers while 1:1 and 2:1 with weedy check produced 50% plants with flowers later than all the treatments (Table 1).

Table 1: Interaction between row arrangements and weeding regimes on days to 50% flowering of maize in Maiduguri

	Weeding regimes			
	Weedy Check	**1W**	**2W**	**WF**
Row arrangements				
1:1	60.16^{a}	57.88^{bc}	57.00^{c}	56.83^{cd}
1:2	59.00^{ab}	57.00^{c}	56.83^{cd}	56.16^{d}
2:1	60.33^{a}	58.00^{b}	57.16^{c}	56.88^{cd}
SE ±		0.19		

Means having the same letter are not statistically different at p =0.05 (DMRT)

Comb weight/plant (g) of maize

There was significant interaction between row arrangements and weeding regimes on maize fruit weight/plants in both years and combined mean (Tables 2). The 1:2 row arrangements with two weeding was optimum for fruits weight/plant of maize in both years and combine mean while the least fruits weight/plant was observed in 2:1 with weedy check.

Table 2: Interaction between row arrangements and weeding regimes on comb weight of maize in Maiduguri

	Weeding regimes			
	Weedy Check	1W	2W	WF
Row arrangements				
1:1	118.39^{fg}	229.36^{e}	411.20^{c}	526.92^{ab}
1:2	116.27^{fg}	183.85^{ef}	543.01^{ab}	588.05^{a}
2:1	97.31^{g}	374.99^{d}	477.85^{bc}	585.09^{a}
SE ±	29.72			

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Comb yield (kg/ha) of maize

The interaction between row arrangements and weeding regimes on maize fruit yield mean was significant. The 2:1 row arrangements with weed free treatment produced significantly higher maize fruit yield in both years and combined mean in the crops mixture (Tables 3).

Table 3: Interaction between row arrangements and weeding regimes on comb yield (t/ha) of maize in Maiduguri

	Weeding regimes			
	Weedy Check	1W	2W	WF
Row arrangements				
1:1	0.01^{h}	1.28^{g}	5.39^{c}	6.38^{b}
1:2	0.65^{h}	1.63^{fg}	5.25^{c}	6.24^{bc}
2:1	0.25^{h}	1.57^{fg}	6.38^{b}	7.89^{a}
SE ±		0.32		

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Number of secondary vines/plant of watermelon

Treatment interaction was significant at 9WAS in both years and combined mean. At 9 WAS in both years and combined mean, two weeding and weed free regimes in relation to other weeding regimes, produced the highest number of secondary vines (Table 4)

Table 4: Interaction between row arrangements and weeding regimes on number of secondary vine of watermelon in Maiduguri

	Weeding regimes			
	Weedy Check	**1W**	**2W**	**WF**
Row arrangements				
1:1	2.26^{fg}	3.75^{de}	4.21^{bc}	4.60^{a}
1:2	2.40^{fg}	3.83^{de}	4.35^{ab}	4.61^{a}
2:1	2.20^{g}	3.55^{ef}	4.00^{cd}	4.48^{b}
SE ±	0.10			

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Number of fruits/plant of watermelon

There was significant interaction between row arrangements and weeding regimes on number of fruits/plant of watermelon in both years and combined means. The 1:2 row arrangements with two weeding was optimum for number of fruits/plant of watermelon while 1:1 and 2:1 row arrangements with weedy check produced the least number of fruits/plant (Tables 5).

Table 5: Interaction between row arrangements and weeding regimes on number of fruits/plant of watermelon in Maiduguri

	Weeding regimes			
	Weedy Check	**1W**	**2W**	**WF**
Row arrangements				
1:1	8.01^{h}	8.65^{gh}	12.53^{d}	14.21^{c}
1:2	9.18^{fg}	10.05^{f}	17.33^{ab}	18.56^{a}
2:1	8.65^{gh}	9.33^{fg}	12.11^{d}	13.35^{cd}
SE ±	0.53			

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Fruit length (cm) of watermelon

The 1:2 row arrangements with two weeding and weed free produced the best fruits length. However, 1:2 row arrangements with two weeding were optimum for fruit length of watermelon while 2:1 row arrangements with weedy check produced the least (Table 6).

Table 6: Interaction effect of row arrangements and weeding regimes on fruits length of watermelon in Maiduguri

	Weeding regimes			
	Weedy Check	1W	2W	WF
Row arrangements (A)				
1:1	10.96^{de}	13.97^{d}	15.30^{b}	16.00^{ab}
1:2	11.08^{de}	14.40^{c}	16.22^{a}	16.38^{a}
2:1	10.62^{e}	14.38^{c}	14.98^{bc}	15.53^{b}
SE ±		0.40		

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Fruits weight/plants (kg) of watermelon

There was significant interaction between row arrangements and weeding regimes on fruits weight/plant of watermelon in both years and combined mean. Generally, the 1:2 row arrangements with two weeding and weed free produce the best fruit weight. Essentially, 1:2 with two weeding was optimum for fruit weight of watermelon. The least was observed in 2:1 row arrangements with weedy check (Tables 7).

Table 7: Interaction effect of row arrangements and weeding regimes on fruit weight/plants (kg) of watermelon in Maiduguri

	Weeding regimes			
	Weedy Check	1W	2W	WF
Row arrangements				
1:1	1.5^{e}	2.5^{d}	3.1^{c}	4.5^{ab}
1:2	1.6^{e}	2.5^{d}	4.6^{ab}	5.0^{a}
2:1	1.0^{e}	2.1^{d}	3.3^{c}	3.9^{b}
SE ±		0.88		

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Fruit yield (t/ha) of watermelon

Results for the 1:2 row arrangements with two weeding and weed free produced the best fruits yield of watermelon. Essentially, 1:2 row arrangements with two weeding was optimum for yield of watermelon and the least fruits yield was observed in 2:1 row arrangements with weedy check (Tables 8).

Table 8: Interaction effect of row arrangements and weeding regimes on fruit yield (t/ha) of watermelon in Maiduguri

	Weeding regimes			
	Weedy Check	**1W**	**2W**	**WF**
Row arrangements				
1:1	7.36^{de}	8.07^{d}	10.38^{b}	10.66^{ab}
1:2	7.69^{d}	8.59^{d}	11.06^{a}	11.29^{a}
2:1	6.60^{e}	7.20^{de}	9.47^{b}	10.46^{ab}
SE ±	0.32			

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

Effects of Row Arrangements and Weeding Regimes on Weed Prevalence, Weed Attributes of Maize/Watermelon Intercrop

Weed identification

The experimental site was infected mainly with grasses and broad leaved weeds. A total of thirteen major weeds species were identified in the area during the two years of study. Complete list of the common weed species identified and their level of infestation in rainy season.

Among the grasses, *Eragrotis tenella* (A. Rich) Hoschst. Ex Steud and*Cleome gynandra* were the most dominant in both seasons. *Cyperus rotundus* were present in the seasons (Table 9).

Table 9: Common weed species identified at the experimental site and their level of infestation in Maiduguri

Weed Species	Level of Infestation
Scientific Names	
Amaranthus retroflexus L	+++
Amaranthus spinosis	++
Leptadenia hastate	+++
Calotropis procera	++
Cleome gynandra	++++
Commelina benghalensis	++
Commelina erecta	+++
Ipomoea eriocarpa	++
Cyperus rotundus	++
Euphorbia hirta	++
*Crotalaria mucronata*L.	++
Acacia nilotica	++
Eragrotis tenella (A. Rich) Hoschst. Ex Steud	+++

- = 0% occurance

+	=	1 – 25% occurance
++	=	26 – 50% occurance
+++	=	51 – 75% occurance
++++	=	76 – 100% occurance

Weed dry matter (t/ha)

There was significant interaction between row arrangements and weeding regimes on weed dry matter in both the years and combined mean. Generally, the 2:1 row arrangements with weedy check produces highest weed dry matter in both years and combined mean (Tables 10).

Table 10: Interaction between row arrangements and weeding regimes on weed dry matter in Maiduguri

	Weeding regimes			
	Weedy Check	1W	2W	FW
Row arrangements (A)				
1:1	2.79^{b}	2.14^{c}	0.85^{ef}	0.00^{g}
1:2	2.24^{bc}	1.46^{c}	0.55^{f}	0.00^{g}
2:1	3.05^{a}	2.21^{bc}	0.90^{ef}	0.00^{g}
SE ±		0.18		

Means having the same letters(s) are not statistically different at p =0.05 (DMRT)

DISCUSSION

Interaction Between Row Arrangements and Weeding Regimes on Growth, Yield Components and Yield of Maize

In the present study, yield components like time to produce 50% flowers was earlier in 1:2 row arrangements with weed free in both the years and combined mean. The 2:1 row arrangements with weedy check took longest time to produce 50% flowering. This is due to low population of maize in the treatment combination which resulted in no competition for environmental resources. The 1:2 row arrangements with two weeding were optimum for fruits weight. The 2:1 row arrangements generally produced lower fruits weight/plant particularly with weedy check. The smaller fruits weight/plant obtained at 2:1 row arrangements combined with weedy check could be due to high population of maize which might have resulted on competition for environmental resources such as nutrient, sunlight and water. In all the years and combined mean, the 2:1 row arrangements with weed free gave the highest maize yield/ha. This is due to high population of the maize in the mixture which resulted in higher yield per unit area. The 1:2 row arrangements with weedy check produced the least maize fruit yield/ha. The low yield recorded in 1:2 row arrangements combined with weedy check could be attributed to low plant population of the maize per plot coupled with intense competition for resources due to the heavy presence of weeds. This finding corroborates with the finding of Matanyaire (1998) who reported that low plant per unit area leads to low yield of crops.

Interaction Between Row Arrangements and Weeding Regimes on Growth, Yield Components and Yield of watermelon

The present study revealed that 1:2 row arrangement combined with two weeding was found to be optimum for number of leaves, length of main vine/plant and number of secondary vine in both years and combined mean. Similarly, 1:2 row arrangements combined with two weeding was found to be optimum for the yield and yield components such as number of fruits/plant, fruits length, fruits weight/plant and fruits yield/ha. The 2:1 row arrangements with weedy check produced least number of fruits/plant, fruits length, fruits weight/plant and fruit yield/ha. The low yield of watermelon could be because of the higher population of maize in this row arrangements posing particularly high shading effect combined with the high weed population. The low yield could also be due to the low plants population of watermelon in this 2:1 row arrangements combined with high weed density (weedy check). These findings collaborate with Adam *et al.* (2020) who reported that the low yield of watermelon could be attributed to low nutrient coupled with dense shading effect of high maize population.

SUMMARY

There was significant interaction between raw arrangements and weeding regimes of maize on days to 50% flowering, fruits weight/plant and fruits yield/ha. Time to produce 50% flowers was earlier in 1:2 row arrangements with weed free in both the years and combined mean. The 2:1 row arrangements with weedy check took longest time to produce 50% flowering. The 1:2 row arrangements with 2 weeding in both the years and combined mean were optimum for fruits weight/plant. The highest fruits yield/ha of maize was obtained in 2:1 row arrangements with weed free in both years and combined mean. Generally, the least fruits yield/ha values were obtained in 1:2 row arrangements with weedy check.

The growth parameters of watermelon like number of leaves/plant, number of secondary vine/plant and yield components and yield of watermelon like number of fruits/plant, fruits weight/plant, and fruit yield/ha were significantly greater in 1:2 row arrangements than any other row arrangements. The least values for these parameters were obtained from 2:1 row arrangements. Number of leaves/plant, length of main vines/plant, number of secondary vines/plant, number of fruits/plant, fruits diameter, fruits length, fruits weight/plant are higher at weed free but they are not statistically different from each other. However, two weeding was found to be optimum. Time to 50% flowering was significantly earlier with two weeding and weeds free than the other treatment but they are not statistically different from each other. Therefore, the two weeding was optimum for time to 50% flowering and the longest time to produce 50% flowering were in weedy check. There was significant interaction between row arrangements and weeding regimes on yield components and yield of watermelon in the mixture. In both the years and combined mean, 1:2 row arrangements with two weeding was optimum for number of fruits/plant, fruits length, fruits weight/plant and yield/ha. The least values for these parameters were obtained in 2:1 row arrangements with weedy check.

CONCLUSION

Generally, from the result of the present study, the growing of maize and watermelon in mixture at the planting pattern of 1:2 row arrangements with two weeding appeared more advantageous. However, if a farmer is more interested in maize yield, he should go for 2:1 row arrangements with weed free. If he is more interested in watermelon yield for maximum profit, he can maintain 1:2 row arrangements with two weeding.

RECOMMENDATIONS

From the results of the present study, maximum yield of maize was obtained at 2:1 row arrangements with weed free, but maintaining weed free in crop production is very expensive. Therefore, more efficient weed management to be combined with the 2:1 row arrangements need to be determined.

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