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Assessment of Plant Population and Time of Introduction of Maizeon the Performance of Garden egg - Maize Intercrop

Olabisi Awoniyi[1,a], Felix Takim[1,b,*], Gbadebo Olaoye[1,c], Patience Olorunmaiye[2,d], Ade Isaac Afe[3,e]

[1]*Department of Agronomy, Faculty of Agriculture, University of Ilorin, Nigeria*
[2]*Department of Plant Biology, Faculty of Life Sciences, University of Ilorin, Nigeria*
[3]*Department of Crop Production, Kwara State University, Malete, Nigeria*
[*]*Corresponding author*

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ABSTRACT

The field trials were conducted during the rainy and dry seasons of 2014 and 2015 to investigate the influence of population density and time of introduction of the component maize on the performance of garden egg/maize intercrop in Nigeria. The trial was laid as a randomised complete block design in a split-plot arrangement with 3 replications. The main plots were time of introduction of maize [2weeks before transplanting (WBT), same time with transplanting (STT) and 2 weeks after transplanting (WAT)] while 9 plant population ratios were the sub plots (100M: 100G, 100M: 75G, 100M: 50G, 100M: 25G 100M: 0, 0:100G, 25M: 100G, 50M: 100G, 75M: 100G). Intercropping system was evaluated using competitive indices and data collected on yield and yield components of both crops were subjected to analysis of variance. Maize sown STT garden egg had significantly high grain yield (3.70 t/ha) while the highest garden egg fruit yields of 40.96 t/ha was obtained when maize was introduced 2 WAT garden egg. This study recommends that, 50-75% maize should be introduced 2WAT of 100% garden egg during the dry season where irrigation facilities are available for optimal crops yields and minimal intercrop losses.

[a] mail4bisi@gmail.com https://orcid.org/0000-0002-8539-2554
[b] fotakimson@unilorin.edu.ng https://orcid.org/0000-0001-6992-5106
[c] debolaoye@gmail.com https://orcid.org/0000-0003-1739-2197
[d] ksolorunmaiye@yahoo.com https://orcid.org/0000-0001-5803-7234
[e] ade.afe@kwasu.edu.ng https://orcid.org/0000-0001-8952-5476

Introduction

Garden egg (*Solanum gilo*) is a very important vegetable crop grown on commercial scale in some parts of Nigeria with the small-scale growers accounting for about 86% of the total production. The dominant cropping system in garden egg production is sole cropping which accounts for 65%, while intercropping accounts for the remaining 35% in combination either with maize, yam, guinea-corn, okra, groundnut, pepper or tomato (Anyaegbu et al., 2013).

Studies on intercropping have recently focused on cereal-vegetable mixture such as maize/okra, maize/pepper, maize/tomatoes intercrops (Ijoyah and Jimba, 2012; and Dzer, 2012). Ngbede and Nworie (2011) reported an increase in productivity of garden egg/ maize intercrop at different maize population as compared to sole of each crop.

Maize and garden egg respond to plant population significantly in all cropping systems. According to Pepó and Sárvári (2013), maize is a plant with individual productivity; therefore, plant density determines maize yield significantly. Shrestha and Fidelibus (2005) and Mohammadi (2010) observed that increased hairy vetch planting rate from 0 to 50 kg/ha improved maize yield by 11%. The seedling rate of each crop in intercrop is adjusted below its full rate to optimize plant density. If full rate of each crop were planted, neither would yield well because of intense overcrowding (Seran and Brintha, 2009).

Suitable time to introduce the component crop into the intercrop is a very important factor in intercropping system. Crops may be introduced at the same time or at different times (with considerable overlap in time) depending on farmer's preference (Ofori and Stem, 1987). The relative time of planting of the intercrop, before, at the same time or after the main crop has both biological and practical implications. For example, differential sowing minimizes competition for growth limiting factors as peak demand (tasseling or flowering) for these factors occur at different times. Also, it ensures full utilization of growth factors because crops occupy the land throughout the growing season.

Garden egg and maize are extensively cultivated as sole crop or intercropped with other crops such as maize/cowpea, garden egg/pepper, maize/cassava and okra/garden egg in the southern Guinea savannah of Nigeria. The physiological and morphological differences (rooting system, canopy leaf type, plant height etc.) that exist between these two crops suggest that there could be mutual association if they are sown together in an intercropping system rather than sole crop and achieve the benefits of intercropping. While there are considerable information involving maize and other crops in crops mixture, there is limited reported work in maize-garden egg mixture particularly the component population ratios and time of introduction of component maize. This study therefore, seeks to investigate the influence of population density and time of introduction of the component maize on the agronomic performance of garden egg/maize intercrop in a southern Guinea savannah of Nigeria.

Materials and Methods

The field trials were carried out at the Lower Niger River Basin Development Authority, Kampe/Omi irrigation project, Ejiba (Lat 8° 18[1] N; Long 5° 39[1]E; 246 m above the sea level) in the southern Guinea savannah agro – ecological zone of Nigeria, during the wet and dry seasons of 2014 and 2015.

The average rainfall recorded during the study years was 1029.4mm, bimodal rainfall distribution with peaks in June and September, the temperature range between minimum of 28°C and maximum of 34°C. The area is characterized by well drained loamy sandy soil with pH of 6.06, high base saturation (75.70%), low in carbon (0.98%), high in nitrogen (0.29%) and low in available P (3.94 mg/kg).

The trial was laid as a randomised complete block design (RCBD) in a split-plot arrangement replicated thrice. The main plots were time of introduction of maize [2weeks before transplanting (WBT), same time with transplanting (STT) and 2 weeks after transplanting (WAT)] while 9 plant population ratios were the sub plots (100M: 100G, 100M: 75G, 100M: 50G, 100M: 25G, 100M: 0, 0:100G, 25M: 100G, 50M: 100G, 75M: 100G) where M = maize and G=garden egg.

The garden egg seedlings were raised in the nursery before transplanting to the field. Prior to transplanting, the field (1122 m^2) was ploughed and harrowed. The garden egg seedlings were transplanted the same day while the component maize (SAMMAZ 28) seeded according to treatment allotted. Pre emergence application Pendimethalin at the rate of 2.0 kg a.i ha^{-1} and supplemented by hand weeding at 8 and 12 weeks after planting (WAP). NPK 20:10:10 fertilizer was applied in split application to maize at 3WAP at the rate of 200 kg ha^{-1} and 100 kg ha^{-1} at 8WAP. Chlorpyriphos 20% was applied to the garden egg plants to control hoppers and sucking insects. Plant height (cm) of maize was estimated at 4, 6 and at 9 WAP while that of garden egg was at 4 and 6 WAT. The length of the plant from the ground level to the dewlap for maize and the tip of the last leaf of garden egg within a net plot was done using measuring tape. Five randomly selected plants were uprooted at 6 WAP and leaf area was estimated using Systronic Leaf Area Meter (Model 21). Grain yield of maize was estimated from the harvested maize cobs which were threshed, winnowed and weighed while total garden egg fruits harvested in each plot were weighed and each was extrapolated to ton/ha. Evaluation of the intercropping system using different indices was carried out as in Takim (2012). All data were subjected to analysis of variance at $P \leq 0.05$.

Results and Discussion

Plant Height

Time of introduction of maize and population of intercrops significantly influenced maize plant height (Table 1). Maize seeds sown 2 weeks after garden egg was transplanted had significantly high plant height as compared to other time of maize introduction. The maize plant height at 9WAP ranged between 181.17-197.99 cm and 189.44-192.44 cm during rainy and dry seasons, respectively. Plots with 100% maize population had similar maize plant height (190.56-199.89cm) and significantly higher plant height compared to other populations except 75% maize plots. Sowing maize 2 weeks after garden egg was transplanted had the highest plant height in both seasons and plots with high population of component crops had the high maize plant height (Table 2).

Table 1. Effects of time of introduction of component maize and population ratio on plant height (cm) of maize

Treatment	Rainy Season			Dry Season		
	4 WAS	6 WAS	9 WAS	4 WAS	6 WAS	9 WAS
Time of Introduction of component maize (TI)						
2 WBT	32.31^{b}	117.65^{c}	181.17^{b}	36.24^{b}	131.95^{c}	189.44
STT	34.47^{a}	132.33^{b}	195.32^{a}	37.47^{a}	133.98^{b}	190.21
2 WAT	34.39^{a}	146.43^{a}	197.99^{a}	37.71^{a}	149.38^{a}	192.44
SED	0.614	3.019	1.734	0.105	0.549	1.075
Population Density (PD) Ratio (Maize: Garden egg)						
100:100	32.80^{c}	137.59^{a}	197.26^{a}	36.71^{d}	155.37^{a}	199.89^{a}
100:75	34.08^{ab}	132.09^{b}	194.87^{ab}	36.90^{cd}	135.11^{c}	197.61^{ab}
100:50	34.25^{a}	130.94^{b}	192.57^{abc}	36.82^{cd}	132.89^{ef}	190.56^{c}
100:25	34.24^{a}	132.59^{ab}	187.26^{c}	37.12^{bc}	132.52^{f}	185.61^{d}
75:100	33.36^{abc}	133.40^{ab}	193.09^{abc}	36.67^{d}	134.87^{cd}	195.33^{b}
50:100	33.98^{ab}	132.91^{ab}	187.31^{c}	36.90^{cd}	133.85^{de}	190.11^{c}
25:100	33.19^{bc}	123.78^{c}	189.94^{bc}	37.34^{b}	133.41^{ef}	182.00^{e}
100:0	33.90^{ab}	133.80^{ab}	189.63^{bc}	38.65^{a}	149.46^{b}	184.44^{de}
SED	0.5195	2.5394	3.0841	0.1989	0.6303	1.3580
TI × PD	NS	*	NS	*	*	NS

Means followed by the same letters are not significantly different from each other at 5% probability level, WBT = weeks before transplanting. STT =same time as transplanting. WAT = weeks after transplanting

Table 2. Interaction effects of time of introduction of component maize and population ratio on plant height of Maize

Weeks after sowing (WAS)	Time of Introduction	Population Density Ratio (Maize: Garden egg)							
		100:100	100:75	100:50	100:25	75:100	50:100	25:100	100:0
6WAS (Rainy)	2 WBT	112.44^{a}	88.78^{bc}	80.45^{c}	84.11^{bc}	83.76^{bc}	91.78^{bc}	89.22^{bc}	93.22^{b}
	STT	108.45^{b}	118.78^{ab}	129.11^{a}	125.55^{a}	112.67^{b}	119.56^{ab}	108.11^{b}	127.78^{a}
	2 WAT	150.00^{a}	147.00^{ab}	146.43^{ab}	145.55^{ab}	147.67^{ab}	135.44^{b}	147.00^{ab}	135.45^{b}
SED		6.220							
6WAS (Dry)	2 WBT	151.886^{a}	110.56^{e}	112.11^{de}	146.11^{b}	120.89^{c}	120.00^{c}	121.11^{c}	114.89^{d}
	STT	152.22^{a}	104.89^{e}	106.11^{e}	146.89^{b}	119.00^{c}	119.45^{c}	120.33^{c}	112.44^{d}
	2 WAT	154.00^{a}	154.33^{a}	147.78^{bc}	148.45^{bc}	156.67^{a}	147.33^{c}	148.33^{bc}	150.78^{b}
SED		1.544							

The means followed by the same letter do not differ statistically between each other. 2 WBT = 2 Weeks before transplanting; STT = same time as transplanting; and 2 WAT = 2 Weeks after transplanting

Table 3. Effects of year of planting, time of introduction of component maize and population ratio on plant height (cm) of garden egg

Treatment	Rainy Season		Dry Season	
	4 WAT	6 WAT	4 WAT	6 WAT
Time of Introduction of component maize (TI)				
2 WBT	8.79	55.61	9.36	67.71^{a}
STT	8.67	57.09	9.30	65.15^{b}
2 WAT	8.53	55.53	9.28	65.44^{b}
SED	0.227	1.332	0.109	0.193
Population Density (PD) Ratio				
100:100	9.19^{a}	62.41^{a}	9.71^{a}	77.18^{a}
100:75	9.01^{ab}	60.70^{ab}	9.43^{b}	73.73^{b}
100:50	8.96^{ab}	56.19^{cde}	9.19^{d}	63.89^{e}
100:25	8.61^{abc}	53.61^{de}	9.17^{d}	63.92^{e}
75:100	8.62^{abc}	58.28^{bc}	9.21^{cd}	70.22^{c}
50:100	8.27^{c}	57.11^{bcd}	9.21^{cd}	65.17^{d}
25:100	8.55^{bc}	53.20^{de}	9.22^{cd}	56.67^{g}
0: 100	8.08^{c}	52.44e	9.37^{bc}	58.00^{f}
SED	0.316	2.017	0.080	0.627
TI × PD	NS	NS	*	*

Means followed by the same letters are not significantly different from each other at 5% probability level, WBT = weeks before transplanting. STT =same time as transplanting. WAT = weeks after transplanting

Table 4. Interaction effects of time of introduction of component maize and population density on plant height of Garden egg during Dry season

Weeks after Transplanting (WAT)	Time of Introduction	Population Density Ratio (Maize: Garden egg)							
		100:100	100:75	100:50	100:25	75:100	50:100	25:100	0:100
4WAT	2 WBT	10.47^{a}	10.00^{a}	9.60^{a}	9.67^{a}	9.33^{de}	9.37^{de}	9.27^{bc}	9.77^{a}
	STT	9.67^{a}	9.33^{bc}	8.93^{d}	8.97^{cd}	9.13^{cd}	9.20^{bc}	9.53^{ab}	9.67^{a}
	2 WAT	9.33^{bc}	9.00^{c}	9.1^{bc}	9.33^{bc}	9.20^{bc}	9.40^{ab}	9.40^{ab}	9.77^{a}
SED		0.196							
6WAT	2 WBT	79.00^{a}	76.67^{a}	64.33^{c}	64.83^{c}	73.33^{b}	65.67^{c}	57.67^{d}	56.67^{d}
	STT	74.33^{a}	65.00^{b}	62.33^{bc}	59.67^{c}	65.00^{b}	62.00^{bc}	55.67^{d}	54.67^{d}
	2 WAT	79.67^{a}	76.00^{b}	57.00^{c}	56.00^{cd}	58.00^{c}	56.33^{cd}	53.33^{d}	53.33^{d}
SED		1.537							

The means followed by the same letter do not differ statistically between each other. 2 WBT = 2 Weeks before transplanting; STT = same time as transplanting; and 2 WAT = 2 Weeks after transplanting

Conversely, garden egg height was not influenced by time of introduction maize to the intercrop except at 9WAT where plots that maize was introduced 2 weeks before transplanting garden egg had high plant height (67.71 cm) while other plots had similar garden egg height (Table 3). Population ratio of the Intercrop significantly affected garden egg height. The plant height of garden egg relatively increases with increased in the population density of maize in the intercrop system. At 6 WAT, the height of garden egg was relatively high in plots with high population of the component crops. The sole garden egg had plant height that ranges between 53.33 - 56.47 cm as compared to 79.00 - 79.67 cm obtained from plots with 100% of both crops (Table 4). This is in agreement with the findings of Zhang et al. (2006) who reported that plant height of maize was highest in the densely populated plots in an intercrop while Sangakkara et al. (2004) observed that, increased in the number of plants in a given area, increases interspecific competition among the plants for nutrients uptake and sunlight interception hence the high plant height of the component crops.

Leaf Area

Leaf area was significantly affected by time of introduction of maize except at 6WAS during the dry season cultivation (Table 5). Sowing maize 2WBT of garden egg had significantly lower leaf area compared to other plots. Conversely, population ratio of component crops significantly affected maize leaf area. Sole and low densely populated plots had significantly higher leaf area then intercropped and highly populated plots. As expected, when plants compete for light, they tend to grow taller by producing more but smaller leaves. This is evident in production of poor leaf sizes in the intercrop compared with the sole maize. Table 5 also showed that, higher maize population in the intercropping system lead to a decrease in leaf area of garden egg. This similar to the findings of Ijoyah and Dzer (2012) who reported a depressed leaf area of okra associated in a maize/okra intercrop. Ibrahim (2008) reported significantly reduced leaf area and leaf area index of an intercropped maize compared to sole plots.

Yields

Time of introducing component maize and population of intercrop significantly influenced grain and fruit yields of maize and garden egg except time of maize introduction on grain yield during the dry season production (Table 6). Maize sown the same day with garden egg had significantly higher grain yield (3.70 t/ha) during the rain-fed trial while fruit yields of garden egg were significantly higher when maize was introduced 2 weeks later. Muoneke and Asiegbu (1997) reported that, the best intercropped maize yield was obtained when planting was done on the same time as okra in a maize-okra mixture. Garden egg fruit yields relatively higher during the dry season (40.96 t/ha) then rain-fed (25.50 t/ha) cultivation.

Table 5. Effects of time of introduction of component maize and population ratio on leaf area (cm^2)

Treatment	Maize		Garden Egg	
	Rainy Season	Dry Season	Rainy Season	Dry Season
	6 WAS	6 WAS	6 WAT	6 WAT
Time of Introduction of component maize (TI)				
2 WBT	357.70	372.16^{a}	185.16^{b}	136.85^{b}
STT	349.53	365.82^{ab}	188.07^{b}	156.02^{a}
2 WAT	362.24	358.75^{b}	199.66^{a}	159.00^{a}
SED	10.069	3.298	4.129	1.890
Population Density (PD) Ratio				
100:100	355.23^{bc}	354.61^{bcd}	192.98^{bc}	139.77^{c}
100:75	356.86^{bc}	346.00^{d}	174.04^{d}	132.80^{def}
100:50	335.71^{d}	351.28^{cd}	177.56^{d}	128.53^{f}
100:25	348.54^{bcd}	365.39^{b}	183.72^{cd}	130.56^{ef}
75:100	339.65^{cd}	352.33^{bcd}	189.81^{bc}	137.11^{cde}
50:100	362.39^{ab}	359.83^{bc}	189.66^{bc}	139.20^{cd}
25:100	377.54^{a}	357.84^{bcd}	198.01^{b}	167.82^{b}
100:0	375.98^{a}	437.36^{a}	221.91^{a}	229.19^{a}
SED	9.040	6.676	5.835	3.474
TI × PD	*	*	**	**

Means followed by the same letters are not significantly different from each other at 5% probability level, WBT = weeks before transplanting. STT =same time as transplanting. WAS = weeks after sowing; WAT = weeks after transplanting

Table 6. Effects of population ratio and time of introduction of component maize on fruit yield of garden egg and grain yield of maize

Treatment	Rainy Season		Dry Season	
	Grain yield of maize (t/ha)	Fruit yield (t/ha)	Grain yield of maize (t/ha)	Fruit yield (t/ha)
Time of Introduction of component maize (TI)				
2 WBT	3.42^{ab}	23.03^{b}	3.14	37.79^{c}
STT	3.70^{a}	22.38^{b}	3.05	39.06^{b}
2 WAT	3.25^{b}	25.50^{a}	2.86	40.96^{a}
SED	0.134	0.730	0.110	0.346
Population Density (PD) Ratio (Maize: Garden egg)				
100:100	3.33^{c}	21.05^{c}	2.93^{d}	30.75^{e}
100:75	3.33^{c}	18.16^{d}	3.12^{c}	35.43^{d}
100:50	3.80^{b}	21.48^{c}	3.24^{c}	27.29^{f}
100:25	3.80^{b}	14.61^{e}	3.53^{b}	16.43^{g}
75:100	3.66^{bc}	21.31^{c}	2.89^{d}	37.74^{c}
50:100	3.49^{bc}	22.82^{c}	2.45^{e}	38.45^{c}
25:100	2.75^{d}	25.64^{b}	1.59^{f}	56.52^{b}
0: 100	4.38^{a}	44.00^{a}	4.38^{a}	71.54^{a}
SED	0.205	0.969	0.094	0.525
TI × PD	NS	*	NS	NS

Means followed by the same letters are not significantly different from each other at 5% probability level, WBT = weeks before transplanting. STT =same time as transplanting. WAT = weeks after transplanting

Table 7. Yield, land equivalent ratio (LER) and relative crowding coefficient (K) for sole stands and intercrop of maize with garden egg

Planting Ratio	Rain-fed Cropping							
	Yield (t/ha)		LER Values			K Values		
M: G	M	G	M	G	Total	M	G	Total
100:100	3.33	21.05	0.76	0.47	1.24	3.17	0.92	2.91
100:75	3.33	18.16	0.76	0.41	1.17	3.16	0.70	2.22
100:50	3.80	21.48	0.87	0.49	1.36	6.55	0.95	6.22
100:25	3.80	14.61	0.87	0.33	1.20	6.55	0.50	3.28
75:100	3.66	21.31	0.48	0.84	1.32	5.08	0.94	4.78
50:100	3.49	22.82	0.52	0.79	1.31	3.92	1.08	4.23
25:100	2.75	25.64	0.58	0.63	1.21	1.69	1.40	2.37
100:0	4.38	-	1.00	-	1.00	1.00	0.00	1.00
0:100	-	44.00	-	1.00	1.00	0.00	1.00	1.00
SED	0.21	0.97	0.04	0.14	0.06	1.07	0.24	2.36
Planting Ratio	Dry Season Cropping							
	Yield (t/ha)		LER Values			K Values		
M: G	M	G	M	G	Total	M	G	Total
100:100	2.93	30.75	0.67	0.43	1.10	2.02	0.75	1.52
100:75	3.12	35.43	0.71	0.49	1.20	2.48	0.98	2.43
100:50	3.24	27.29	0.74	0.38	1.12	2.84	0.62	1.76
100:25	3.53	16.43	0.81	0.23	1.04	4.15	0.30	1.25
75:100	2.89	37.74	0.53	0.66	1.19	1.94	1.12	2.17
50:100	2.45	38.45	0.56	0.54	1.10	1.27	1.16	1.47
25:100	1.59	56.52	0.79	0.36	1.15	0.57	3.76	2.14
100:0	4.38	-	1.00	-	1.00	0.00	0.00	0.00
0:100	-	71.54	-	1.00	1.00	0.00	0.00	0.00
SED	0.09	0.53	0.05	0.08	0.02	1.28	0.33	1.64

M=Maize, G=Garden egg, LER=land equivalent ratio, K=relative crowding coefficient

Maize grain yield increased with increased in population density and peaked at 3.80t/ha and then decrease with an increase of garden egg population above 50%. This is in line with the report of Bavec and Bavec (2002) which showed that increase in plant population, could lead to increase in yield under optimal climatic and management conditions due to greater number of smaller cobs per unit area. Also, Adeniyan (2014) reported that grain yield increased with increasing plant population densities of maize. This is also in agreement with the findings of Ijoyah and Dzer (2012) who reported that in a maize-okra mixture, increasing the maize plant density up to 50,000 plants/ha reduced intercropped okra yield, but significantly increased intercropped maize yield.

Evaluation of Maize-Garden egg Intercropping System

In general, partial land equivalent ratio (LER) for component crop increases with an increase in the proportion of the in the intercrop. The total LER of the intercrop was above 1.00 and all the intercrop LERs were significantly higher than the sole components (Table 7). The land equivalent ratio indices were the greatest in maize component of the intercropping systems. The total LER values were higher than one showing the advantage of intercropping over sole cropping in regard to the use of environmental resources for plant growth (Takim, 2012). Crowding coefficient (K) is the measure of relative dominance of one species over the other in an intercropping system. The positive K values is an indication that there was an absolute yield advantage over the sole cropping counterpart (Ghosh, 2012) and presumably due to adequate utilization of resources. The intercropped maize had higher K values than the garden egg component and this indicates maize dominance and yield advantage over garden egg in the intercrop system (Table 7). The competitive ability of the component crops in an intercropping system is determined by its aggressively (A) value.

Table 8 showed that, the component crop with high proportion was the dominant crop. Although, the densely populated plots had a positive sign for maize, indicating that maize was dominant while garden egg was dominated.

Intercropped maize had higher CRs in all mix-proportions except of 100% maize: 25% garden egg where the CRs for M: G ratio had 0.16: 6.07and 0.22: 4.45 during the rain-fed and dry season cropping, respectively (Table 8). This indicated that maize had high competitive ability than garden egg in all planting ratios except at 100% maize: 25% garden egg where garden egg was more competitive than maize. Banik et al. (2006) reported that actual yield loss (AYL) index can give more precise information than the other indices on the inter- and intra-specific competition of the component crops and the behaviour of each crop involved in the intercropping systems. Table 8 shows that, AYL for maize had positive values when the maize proportion was less than 100% and less than 75% during rain-fed and dry season cropping, respectively. Thus, AYL (maize) ranged from 0.40 - 0.69 indicating a yield loss of 31-60% in all the intercropping system as compared to maize sole crop yield. Both AYL values for garden egg and total AYL values were negative indicating disadvantage of the intercropping system to garden egg except 25% maize and 100% garden egg where the intercrop had positive response.

Table 8. Aggressively (A), competitive ratio (CR) and actual yield loss (AYL), for sole stands and intercrop of maize with garden egg

Rain-fed Cropping							
Planting Ratio	A		CR values		AYL values		
M: G	M	G	M	G	M	G	Total
100:100	0.28	-0.28	1.62	0.62	-0.24	-0.52	-0.76
100:75	0.71	-0.71	1.04	0.96	-0.43	-0.45	-0.88
100:50	1.50	-1.50	0.44	2.25	-0.57	-0.02	-0.59
100:25	3.39	-3.39	0.16	6.07	-0.78	0.32	-0.46
75:100	-0.02	0.02	3.11	0.32	0.11	-0.64	-0.53
50:100	-0.64	0.64	6.08	0.17	0.59	-0.74	-0.15
25:100	-2.17	2.17	7.38	0.06	1.51	-0.85	0.66
SED	1.52	1.07	2.75	1.20	0.08	0.05	0.03
Dry Season Cropping							
Planting Ratio	A		CR values		AYL values		
M: G	M	G	M	G	M	G	Total
100:100	0.24	-0.24	1.56	0.64	-0.33	-0.57	-0.90
100:75	0.58	-0.58	0.82	1.23	-0.47	-0.34	-0.81
100:50	1.29	-1.29	0.49	2.05	-0.63	-0.24	-0.87
100:25	3.17	-3.17	0.22	4.54	-0.80	-0.08	-0.88
75:100	-0.21	0.21	2.21	0.45	-0.12	-0.60	-0.72
50:100	-0.80	0.80	4.15	0.24	0.12	-0.73	-0.61
25:100	-3.07	3.07	7.29	0.14	0.45	-0.80	-0.35
SED	0.71	0.28	2.48	1.25	0. 14	0.12	0.06

M=Maize, G=Garden egg, A=aggressively, CR=competitive ratio, AYL=actual yield loss

Conclusion

This study concludes that; maize grain yield was higher when sown the same day with garden (3.70 t/ha) while the highest garden egg fruit yields of 40.96 t/ha was obtained when maize was introduced 2 weeks after transplanting garden egg. Garden egg fruit and maize grain yields were relatively higher during the dry and rainy seasons, respectively. This study recommends that, 50-75% maize should be introduced 2WAT of 100% garden egg during the dry season where irrigation facilities are available for optimal crops yields and minimal intercrop losses.

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