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RESPONSE OF MANGO GINGER (*CURCUMA AMADA*) TO PLANT POPULATION AND DIFFERENT WEED CONTROL METHODS IN THE FOREST-SAVANNA TRANSITION ZONE OF SOUTH-WESTERN NIGERIA

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Abstract: Field trials were conducted in the early cropping seasons of 2016 and 2017 at the Teaching and Research Farm of Federal University of Agriculture, Abeokuta (07° 20' N, 3° 23' E 159 m above sea level) in the forest-savanna transition zone of south-western Nigeria to evaluate the response of mango ginger to plant population and different weed control methods. Treatments were laid out in a randomized complete block design with a split-plot arrangement and replicated three times. The main plot consisted of two plant populations: 444,444 plants/ha and 250,000 plants/ha, while the sub-plots consisted of ten weed control methods. The collected data on growth and yield of mango ginger plant, and weed biomass were subjected to analysis of variance (ANOVA) and the means of the treatments were separated using the least significant difference (LSD at $p \leq 0.05$). Planting mango ginger at 444,444 plants/ha resulted in a 43.1% increase in rhizome yield compared to 250,000 plants/ha. Different weed control methods gave significantly higher crop vigor score, yield and yield components than the weedy check. Relative to the highest value in both years, uncontrolled weed infestation resulted in a 91.4% reduction in rhizome yield. There was a 60.7% increase in mango ginger rhizome yield when post-emergence weed control followed pre-emergence weed control. Our study has revealed that mango ginger, as a perennial crop with initially slow growth, requires a weed-free period beyond the first 12 weeks after planting (WAP) for acceptable weed control and optimum rhizome yield. Hence, a pre-emergence application of oxyfluorfen at a dosage of 0.24 kg a.iha^{-1} and a post-emergence hoe weeding are recommended.

Key words: mango ginger, rhizomes, population, post-emergence, weed infestation.

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Introduction

Mango ginger (*Curcuma amada* Roxb.) is a rhizomatous perennial plant belonging to the Zingiberaceae family with leafy tuft and of Asian origin (Chatterjee et al., 2012). The fresh rhizome of mango ginger looks like ginger (*Zingiber officinale*) but smells like mango (*Mangifera indica*) and is therefore known as mango ginger (Sasikumar, 2005). The plant is mainly cultivated in tropical areas, especially in India, for its rhizomes, which are used as a mild ginger spice and also have medicinal uses (Huxley, 1992; Chevallier, 1996). Mangiferin is a phytochemical found in mango ginger, and has been shown to have anti-inflammatory, anti-diabetic, anti-cancer, immunomodulatory, anti-HIV, and anti-oxidant properties (Wauthoz et al., 2007; Padmapriya et al., 2012). In addition, the plant is said to have antiobesity (Nissankara-Rao et al., 2021), antitumor (Ramachandran et al., 2017), and antibacterial (Divyashri et al., 2021) effects. The chemical composition and numerous biological activities of the essential oil produced by hydrodistillation have also been evaluated. The hydrodistilled essential oil from *Curcuma amada* has been reported to be a good source of pinene, ocimene, curcumene, and linalool (Padalia et al., 2013; Srivastava et al., 2001; Tamta et al., 2016). The essential oil has been shown to have antifungal properties against a range of fungi, including *Aspergillus species* (Singh et al., 2002).

Despite its widespread importance, the productivity of mango ginger remains low due to factors such as poor agronomic practices and uncontrolled weed infestation (Hailemichael and Tesfaye, 2008; MoARD, 2007; Osunleti et al., 2021b). Plant population has been identified as an important factor contributing significantly to the growth and yield of mango ginger (Osunleti et al., 2023). Bahadur et al. (2000) previously reported appreciable differences in growth and yield of turmeric when the spacing between plants was varied. Hailemichael and Tilahun (2004) recommended 222,000 plants per hectare at 15 cm x 30 cm spacing in a preliminary study conducted on the effect of plant population density of ginger on rhizome yield at Tapi, western Ethiopia. Osunleti et al. (2023) observed higher rhizome yield in mango ginger when the population increased beyond 222,000 plants.

Pests are important organisms that have a significant effect on the agriculture system, health systems, and economic status of the country (Farnsworth et al., 2017). Weeds have been described as the most common crop pests in the humid and subtropical countries (Nedunchezhiyan et al., 2013), competing with crops for water, soil nutrients, light and even harboring insect pests (Unamma et al., 1984; Osunleti et al., 2021a). Eshetu and Addisu (2015) observed a 100 percent yield loss when weed control was completely ignored. Uncontrolled weed infestation throughout the crop life cycle has earlier been reported to cause 85.1% to 92.2% rhizome yield loss in mango ginger (Osunleti et al., 2021a, b). In most cases, weed management accounts for the major share of the total cost and time of production (KAU, 2006; Osunleti et al., 2022b). The mango ginger plant has been reported to belong to the same family as ginger (Zingiberaceae), and is closely related to turmeric (Chandarana et al., 2005). Several studies have been carried out on different weed control measures in turmeric (Sathiyavani and Prabhakaran, 2015; Suresh et al., 2014) and ginger (Baruah and Deka, 2020), but there is a dearth of information on weed control measures in mango ginger. Moreover, the initial slow growth of mango ginger makes it highly vulnerable to weed infestation with high yield losses (Osunleti et al., 2023). Therefore, different weed control strategies must be tested to ensure an initial weed-free period for mango ginger and minimize yield losses.

Material and Methods

Site description

Field experiments were conducted at the Federal University of Agriculture, Abeokuta, Nigeria, between June and December during the 2016 and 2017 cropping seasons to determine the response of mango ginger to plant population and different weed control methods. The details of the physico-chemical properties of the soil before the commencement of the trials are included in Table 1. The result of the soil analysis showed that the soil had a sandy loam texture in both years with a pH of 6.5 and 6.6 in 2016 and 2017, respectively (Table 1). The site received a total rainfall of 1146.3 and 839.7 mm during the 2016 and 2017 growing seasons, respectively (Table 2).

Table 1. Physico-chemical properties of soil at the experimental sites in 2016 and 2017.

Soil composition	2016	2017
pH	6.5	6.6
Particle size analysis		
Sand (g/kg)	799.5	736.6
Silt (g/kg)	160.5	220.5
Clay (g/kg)	40.0	42.9
Textural class	Sandy loam	Sandy loam
Chemical composition		
Organic carbon (%)	1.56	1.92
Available P (mg/kg)	2.46	4.05
Total N (%)	0.11	0.13
Exchangeable cations (centimol/kg)		
Ca	6.64	6.59
Na	0.22	0.16
Mg	1.25	0.18
K	0.31	0.45

Table 2. Monthly distribution of total rainfall and mean temperature of the experimental site in 2016 and 2017.

Month	2016		2017	
	Total rainfall (mm)	Mean temperature (°C)	Total rainfall (mm)	Mean temperature (°C)
January	32.0	28.1	15.9	28.9
February	0.0	30.3	0.0	30.2
March	150.3	29.5	34.3	30.0
April	68.2	29.2	112.8	29.1
May	226.2	29.0	146.0	27.8
June	150.5	26.7	111.0	26.7
July	65.2	26.3	156.0	25.7
August	63.6	25.7	90.0	25.5
September	229.0	26.9	52.0	25.2
October	155.4	28.0	90.2	27.6
November	5.9	22.5	45.6	28.6
December	0.0	28.1	15.9	28.9
Mean		27.5		27.9
Total	1146.3		839.7	

Source: Federal University of Agriculture, Abeokuta Meteorological Station.

Experimental design

Mango ginger rhizomes were sown in June of the 2016 and 2017 cropping seasons using a split-split plot design with three replicates. Two plant spacings (0.15 m x 0.15 m and 0.20 m x 0.20 m) were used in both years, giving a plant population of 444,444 and 250,000 plants/ha, respectively, assigned to the main plots. Ten weed control methods were assigned to the sub-plots: pre-emergence application of oxyfluorfen (24% EC) at 0.36 kg a.i ha^{-1} + hoe weeding as a post-emergence treatment (TT1), pre-emergence application of oxyfluorfen at 0.36 kg a.i ha^{-1} + (oxadiazon 25% EC at 0.5 kg a.i ha^{-1} and diuron 50% EC at 0.4 kg a.i ha^{-1}) as a post-emergence treatment (TT2), pre-emergence application of oxyfluorfen at 0.36 kg a.i ha^{-1} alone (TT3), pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} + hoe weeding as a post-emergence treatment (TT4), pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} + (oxadiazon 25% EC at 0.5 kg a.i ha^{-1} and diuron 50% EC at 0.4 kg a.i ha^{-1}) as a post-emergence treatment (TT5), pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} alone (TT6), hoe weeding at 4, 8 and 12 WAP (TT7), hoe weeding at 4, 8, 12 and 16 WAP (TT8), hoe weeding at 4, 8, 12, 16 and 20 WAP (TT9) and a weedy check, where no weeding was applied (T10). The post-emergence application was carried out at 8 weeks after planting.

Cultural practices

The experimental site was plowed and harrowed at two-week intervals each cropping season to destroy the existing vegetation and produce level, smooth and weed-free fields. After the removal of weed debris, the land was divided into various replicates, plots and subplots. The mango ginger rhizomes were then planted into various plots (0.15 m x 0.15 m and 0.20 m x 0.20 m) according to the treatment plan. The pre-emergence herbicide oxyfluorfen (24% EC) was applied, while some plots were left without the pre-emergence herbicide application according to the treatment structure. Manual weeding with the West African hand hoe was carried out according to the treatment requirements.

Data collection

1. The crop vigor score was determined on a scale of 1 to 10, where 1 means complete crop death and 10 means a vigorously growing crop. The components of crop vigor score included: height of the crop, greenness of the leaves, and length and width of the leaves.
2. The rhizomes were harvested from the net plot, counted and weighed, and recorded as the number of rhizomes and yield, respectively (at 6 months after planting).
3. Weed biomass: Weed samples were collected in squares of 0.5 m × 0.5 m (2 in each plot) before any weeding. The samples taken from each plot were separated into broadleaves, grasses and sedges. The samples were oven-dried at 70°C until a constant dry weight was obtained and weighed.

Statistical analysis

Data were subjected to analysis of variance (ANOVA) using Genstat 12th edition to determine the level of significance of the treatments. The treatment means were separated using the least significant difference (LSD at $p \leq 0.05$).

Results and Discussion

Growth parameters

During the entire observation period, the weed control methods had a significant effect on the crop vigor score (Table 3). At 6 WAP in both years, the pre-emergence application of oxyfluorfen at 0.24 kg a.iha^{-1} + hoe weeding as a post-emergence treatment resulted in the highest crop vigor score, while the lowest crop vigor in 2017 was recorded in the weedy check. At 9 and 12 WAP in both years, the lowest crop vigor score was recorded in the weedy check plots. At 9 WAP in both years and 12 WAP in 2017, the pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} + hoe weeding as a post-emergence treatment resulted in significantly higher crop vigor than all other treatments except for the pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} + oxadiazon and diuron as a post-emergence treatment. The lowest crop vigor score in the weedy check plots in this study was due to the intense weed competition with the crops. The weeds competed freely with the crops for light, space, soil nutrients and moisture, thereby limiting the resources available for the crops for proper growth. Mango ginger has been reported to be a slow-growing crop initially, and highly susceptible to weed infestation (Osunleti et al., 2023; Osunleti et al., 2021a). An initial weed-free period is a necessity for a good start and healthy growth of mango ginger. Our results showed that the application of pre-emergence herbicides or early hoe weeding ensured a weed-free period and increased the crop vigor. This agrees with the findings (Osunleti et al., 2023; Osunleti et al., 2021b), which described higher crop vigor in mango ginger as a result of early weed removal in mango ginger using a hoe and the application of pre-emergence herbicides.

Table 3. Effects of plant population and weed control methods on crop vigor score.

Treatments	Crop vigor score					
	6 WAP		9 WAP		12 WAP	
	2016	2017	2016	2017	2016	2017
Plant population (P)						
444,444	2.8	2.9	4.9	5.2	6.0	6.0
250,000	2.9	3.0	4.9	5.1	6.0	6.0
Lsd	0.932ns	0.502ns	0.072ns	0.399ns	0.124ns	0.124ns
Weed control methods (W)						
TT1	2.9	3.0	5.1	5.3	6.0	6.1
TT2	2.8	3.0	5.0	5.3	6.3	6.3
TT3	2.7	2.7	4.8	5.2	5.8	5.8
TT4	3.3	3.4	5.5	5.8	6.7	6.8
TT5	2.8	3.0	5.3	5.7	6.5	6.8
TT6	2.8	2.8	5.2	5.3	5.9	6.0
TT7	3.0	3.0	4.7	5.2	6.3	6.3
TT8	2.8	3.0	5.0	5.3	6.3	6.3
TT9	2.7	3.0	4.8	5.2	6.3	6.3
TT10	2.5	2.5	3.2	3.1	3.3	3.3
Lsd	0.268	0.294	0.377	0.302	0.328	0.297
Interaction						
P * W	ns	ns	ns	ns	ns	ns

Yield and yield components

Plant population had no significant effect on the yield and yield components of mango ginger (Table 4). However, planting mango ginger at 444,444 plants/ha resulted in a 43.1% increase in rhizome yield in both years compared to 250,000 plants/ha. The higher yield with 444,444 plants/ha could be attributed to the higher stands of the crop on the plots. Similar findings were observed by Bahadur et al. (2000), who reported a higher rhizome yield of turmeric at closer spacing and attributed this to a higher plant population per unit area.

The weed control methods had significant effects on the yield and yield components of mango ginger (Table 4). In both years, the lowest rhizome yield and count were recorded in the weedy check plot. The pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} and 0.36 kg a.i ha^{-1} + hoe weeding as a post-emergence treatment, and plots hoe weeded five times at 4, 8, 12, 16 and 20 WAP produced similar rhizome yields, which were significantly higher than the pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} and 0.36 kg a.i ha^{-1} alone, and hoe weeding at 4, 8 and 12 WAP. Relative to the weedy check in both years, rhizome yield increased by 479% to 1067% by the various weed control methods, with the pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} + hoe weeding as a post-emergence treatment having the highest value of 1067% (Figure 1). Hoe weeding at 4, 8, 12, 16 and 20 WAP and the pre-emergence application of oxyfluorfen at 0.36 kg a.i ha^{-1} + hoe weeding as a post-emergence treatment also increased rhizome yield by 1063% and 1018% compared to the weedy check (Figure 1). The higher yield of mango ginger with the pre-emergence application of oxyfluorfen at 0.24 kg a.i ha^{-1} and 0.36 kg a.i ha^{-1} plus hoe weeding as a post-emergence treatment could be attributed to both initial and subsequent weed-free periods provided by the treatment. The pre-emergence application of oxyfluorfen provided the initial weed-free period, while the subsequent weed-free period was achieved by the hoe weeding. The long weed-free period in the plots with the application of pre-emergence herbicides and hoe weeding gave the crop the opportunity to maximize its potential as it had the opportunity to adequately utilize the soil nutrients. Sivakumar et al. (2019) took similar views and reported more ginger rhizomes when the pre-emergence herbicide was followed up with hand weeding. Barla et al. (2015) also concluded that the application of metribuzin as a pre-emergence herbicide followed by a post-emergence treatment was the most productive among the different weed control methods experimented. In our study, a 60.7% higher yield of mango ginger rhizomes was observed when post-emergence weed control followed pre-emergence weed control, compared to pre-emergence herbicide application alone. This is a further indication that mango ginger requires more than the initial weed-free period for optimum yield in the crop. There was a 91.4% reduction in yield of mango ginger due to uncontrolled weed infestation throughout the growing season. This confirms that mango ginger is a poor competitor. This result is similar to that of Krishnamurthy and Ayyaswamy (2000), who reported a 75% reduction in the yield of turmeric, while Osunleti et al. (2021a) reported an 85.1% reduction in yield due to seasonal competition with weeds.

Table 4. Effects of plant population and weed control methods on yield and yield components of mango ginger.

Treatments	Rhizome yield (kg/ha)		Number of rhizomes (x0000/ha)	
	2016	2017	2016	2017
Plant population (P)				
444,444	25769	30915	806	1007
250,000	18656	20944	663	731
Lsd	8854.3ns	15500.5ns	513.1ns	496.4ns
Weed control methods (W)				
TT1	30855	34119	988	1099
TT2	22554	25407	735	818
TT3	14961	23304	626	643
TT4	31956	35862	941	1162
TT5	27897	31268	923	1024
TT6	15063	21331	646	799
TT7	16045	17611	640	837
TT8	28169	31599	675	1015
TT9	31888	35722	1072	1189
TT10	2738	3074	97	107
Lsd	7632.2	9459.2	327.3	293.8
Interaction				
P * W	ns	ns	ns	ns

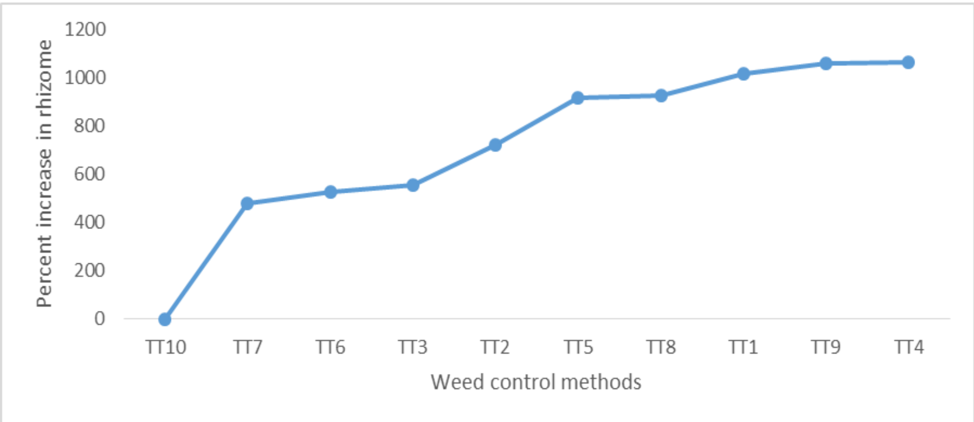

Figure 1. Effects of weed control methods on the increase in rhizome yield.

In both years, hoe weeding at 4, 8, 12, 16 and 20 WAP resulted in a significantly higher number of rhizomes than hoe weeding at 4, 8 and 12 WAP and the pre-emergence application of oxyfluorfen at 0.24 kg a.iha^{-1} and 0.36 kg a.iha^{-1} alone (Table 4). The higher number of rhizomes in the plots hoe weeded at 4, 8, 12, 16, and 20 WAP was the result of continuous hoe weeding in the plots, leading to long-lasting weed control. This allows the opportunity for optimal utilization of the environmental resources required for good crop growth. The earlier study of Salawudeen (2017) also showed that the weed-free period beyond 12 WAP in mango ginger as a result of hoe weeding increased the yield of the crop.

Weed parameters

Weed control methods had a significant effect on weed biomass at 8 and 24 WAP (Tables 5 and 6). During the entire observation period at 8 and 24 WAP, the highest weed biomass was recorded in the weedy check plots. In 2017 at 8 WAP, the pre-emergence application of oxyfluorfen at both rates resulted in significantly lower biomass of broadleaves and grasses than in the hoe weeding plots. The pre-emergence application of the herbicide resulted in the complete control of sedges. The lower weed cover and biomass in the herbicide-treated plots could be attributed to the application of pre-emergence herbicides at planting, as the herbicide bombed the weed seeds and prevented their germination.

Table 5. Effects of plant population and weed control methods on weed biomass at 8 WAP.

Treatments	Weed biomass (kg/ha)					
	Broadleaves		Grasses		Sedges	
	2016	2017	2016	2017	2016	2017
Plant population (P)						
444,444	408	495	463	324	88	72
250,000	365	470	423	336	100	60
Lsd	291.9ns	359.7ns	397.0ns	195.9ns	74.3ns	48.8ns
Weed control methods (W)						
TT1	124	10	74	51	0	0
TT2	108	62	93	51	0	0
TT3	108	57	93	53	0	0
TT4	82	114	134	87	0	0
TT5	159	114	123	108	0	0
TT6	136	118	95	102	0	0
TT7	369	945	424	635	147	114
TT8	362	777	276	616	193	87
TT9	329	876	286	491	146	137
TT10	2090	1758	2834	1106	463	324
Lsd	211.4	236.7	232.1	169.4	58.8	63.7
Interaction						
P * W	ns	ns	ns	ns	ns	ns

This result corroborates the findings of Osunleti et al. (2022a), who reported a lower weed infestation when pre-emergence herbicides were applied compared to hoe weeding at 8 weeks after planting. In addition, Ramalingam et al. (2013) reported lower weed count and biomass with pre-emergence applications of oxyfluorfen. The integration of pre-emergence herbicides and hoe weeding as a post-emergence treatment resulted in the lowest weed cover at 12 WAP. Several researchers, including Osunleti et al. (2022b) and Ramalingam et al. (2013), had previously reported lower weed cover with pre-emergence herbicide application and supplementary hoe weeding.

Table 6. Effects of plant population and weed control methods on weed biomass at 24 WAP.

Treatments	Weed biomass (kg/ha)					
	Broadleaves		Grasses		Sedges	
	2016	2017	2016	2017	2016	2017
Plant population (P)						
444,444	719	733	609	811	274	343
250,000	752	646	542	845	291	378
Lsd	106.0ns	242.7ns	164.7ns	115.9ns	57.7ns	92.0ns
Weed control methods (W)						
TT1	96	110	92	107	43	55
TT2	120	137	115	134	52	66
TT3	686	751	606	790	364	431
TT4	107	122	103	119	43	40
TT5	108	124	104	121	43	55
TT6	707	813	673	814	326	445
TT7	658	714	600	737	328	420
TT8	235	348	292	264	146	187
TT9	103	143	120	115	50	74
TT10	4534	3632	3052	5078	1435	1836
Lsd	295.4	382.7	322.9	329.7	222.9	282.6
Interaction						
P * W	ns	ns	ns	ns	ns	ns

At 24 WAP in both years, the pre-emergence application of oxyfluorfen at both rates plus various post-emergence treatments resulted in significantly lower weights of broadleaves, grasses and sedges than the pre-emergence application of oxyfluorfen at both rates alone and hoe weeding at 4, 8 and 12 WAP (Table 6). Similarly, hoe weeding after 12 WAP resulted in significantly lower weed biomass than weeding at 4, 8 and 12 WAP and the pre-emergence application of oxyfluorfen alone at both rates. There was a 85% decrease in weed biomass at 24 WAP with the application of a pre-emergence herbicide plus a post-emergence treatment compared to the application of a pre–emergence herbicide alone. This indicates the importance of the post-emergence treatment, especially for a long-

standing crop such as mango ginger. Similarly, there was a 57% decrease in weed biomass at 24 WAP with hoe weeding at 4, 8, 12 and 16 WAP compared to weeding at 4, 8 and 12 WAP, while there was a further 25% decrease with weeding up to 20 weeks. The lengthened weed-free period in the plots with pre-emergence herbicide applications and post-emergence treatments, as well as plots weeded beyond 12 WAP are an important factor for the higher rhizome yields recorded in the plots. Sah et al. (2017) also reported effective and long-term weed control by applying oxyfluorfen in combination with hand weeding in ginger.

Conclusion

The results of this study showed that planting mango ginger at 444,444 plants/ha produced 43.1% more than at 250,000 plants/ha. Therefore, planting mango ginger at 444,444 plants/ha is recommended. The study also showed that different weed control methods had different effects on growth, yield of mango ginger and weed infestation. There was at least a 57% decrease in weed biomass with the pre-emergence herbicide application and a post-emergence treatment or hoe weeding beyond 12 WAP compared to the application of pre-emergence herbicides and weeding alone for up to 12 WAP only. Our study observed a 60.7% increase in mango ginger rhizome yield when post-emergence weed control followed pre-emergence weed control compared to the pre-emergence herbicide application alone. Mango ginger is a perennial crop with initially slow growth and requires a weed-free period beyond 12 weeks after planting (WAP) to achieve acceptable weed control and optimum rhizome yield. Therefore, the pre-emergence application of oxyfluorfen at 0.24 kg a.iha^{-1} and post-emergence hoe weeding is recommended as this resulted in the best weed control and the highest mango ginger yield.

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ODGOVOR MANGO ĐUMBIRA (*CURCUMA AMADA*) NA GUSTINU POPULACIJE I RAZLIČITE METODE SUZBIJANJA KOROVA U ZONI ŠUMO-SAVANE U JUGOZAPADNOJ NIGERIJI

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R e z i m e

Poljski ogledi su sprovedeni u ranoj sezoni gajenja 2016. i 2017. godine na Nastavno-istraživačkom gazdinstvu Federalnog poljoprivrednog univerziteta, Abeokuta (07° 20’ N, 3° 23’ E, 159 m nadmorske visine) u zoni šumo-savane u jugozapadnoj Nigeriji, kako bi se procenio odgovor mango đumbira na gustinu populacije i različite metode suzbijanja korova. Tretmani su postavljeni po randomizovanom kompletnom blok dizajnu sa rasporedom podeljenih parcela, u tri ponavljanja. Glavni tretman činile su dve gustine populacije biljaka: 444.444 biljke/ha i 250.000 biljaka/ha, dok su pod-tretmani bili deset metoda suzbijanja korova. Prikupljeni podaci o rastu i prinosu biljke mango đumbira, kao i biomasi korova podvrgnuti su analizi varijanse (ANOVA), a srednje vrednosti tretmana su razdvojene primenom najmanje značajne razlike (LSD na nivou $p \leq 0,05$). Populacija mango đumbira u gustini od 444.444 biljke/ha rezultirala je povećanjem prinosa rizoma za 43,1% u poređenju sa gustinom od 250.000 biljaka/ha. Različite metode suzbijanja korova su dale značajno veći učinak u porastu useva, prinosu i komponentama prinosa u odnosu na zakorovljenu kontrolu. U odnosu na najvišu vrednost u obe godine, zakorovljenost na kontrolnoj varijanti rezultirala je smanjenjem prinosa rizoma za 91,4%. Došlo je do povećanja prinosa rizoma mango đumbira za 60,7% kada je suzbijanje korova nakon nicanja pratilo suzbijanje korova pre nicanja. Naše istraživanje je pokazalo da mango đumbir, kao višegodišnji usev sa početnim sporim rastom, zahteva period bez korova tokom prvih 12 nedelja nakon sadnje za prihvatljivo suzbijanje korova i optimalan prinos rizoma. Stoga se preporučuje primena oksifluorfena pre nicanja u dozi od 0,24 kg a.s./ha i okopavanje nakon nicanja.

Ključne reči: mango đumbir, rizomi, populacija, nakon nicanja, zakorovljenost.

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