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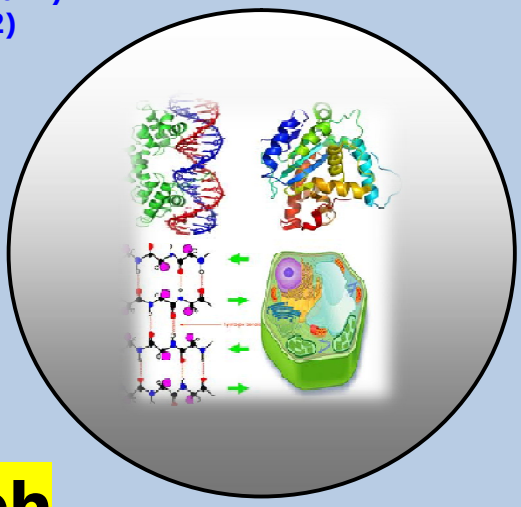

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Effect of Different Weed Control Practices on Growth and Yield of Sesame in South-West Nigeria

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ABSTRACT

One of the major problems which affect the production of sesame is the presence of weed which can negatively influence sesame yield. The objective of this study is to determine the effect of different weed control practices on growth and yield of sesame. The field experiment was carried out at the Teaching and Research farm of Ladoke Akintola University of Technology Ogbomoso, Oyo state Nigeria. The experiment was arranged as split plot fitted into a randomized Complete Block Design with three replications. The treatment include; Hoe weeding, Hand weeding, Pre emergence herbicide + hoe weeding, Pre emergence herbicide + post emergence herbicide, Organic mulching (elephant grass), Inorganic mulching (black plastic) and Zero weeding. Data was generated on plant height, stem girth, number of leaves, number of pods, weed population, weed density (fresh), weed density (dry) and seed yield. The result of this study shows that the weed control methods significantly improved the performance of sesame. However, pre emergence herbicide + hoe weeding has been the most effective weed control method in enhancing all the growth while black plastic mulch enhance the yield parameters of sesame. The fresh and dry weed density and weed population in all the treatment were drastically reduced as compared to weedy check. Similarly, number of pods per plant, stem girth and yield of sesame were also the highest in pre emergence + hoe weeding treatment. Therefore, based on the result of this experiment inorganic mulching weed control method which gave the highest yield compare to other treatments is recommended for optimum production of sesame.

Keywords: Sesame (Sesamum indicum L.), Weed Control Methods, Organic mulching, Inorganic mulching and Yield.

INTRODUCTION

Sesame *(Sesamum indicum L.)* Known as sesamum or benniseed. It belongs to the family of Pedaliaceae, is one of the most ancient oilseeds crop known to mankind. Sesame plays an important role in human nutrition. Most of the sesame seeds are used for oil extraction and the rest are used for edible purposes (El Khier *et al;* 2008). After the extraction of oil, the cake is mostly used for livestock feed or often as manure. The major world producers include India, Sudan, China and Burma (who contribute about60% of the total world production) (El Khier *et al;* 2008). It is also one of main commercial crops in Nigeria, Sudan and Ethiopia. Sesame is an important crop to Nigerian agriculture: it is quite extensively cultivated especially in Northern Nigeria. Despite the economics important of sesame, weed control therefore becomes an important consideration in obtaining optimum sesame performance and yields. In recent years the production of sesame has had a lot of setbacks. One of the major problems which affect the production of sesame is the presence of weed which can negatively influence sesame yield (Kropff and Spirrers 1991). The weed emerges simultaneously and grows vigorously with the crop and so competes for nutrients, space and solar radiation which causes about 50-70 per cent reduction in seed yield (Ghosh *et al.* 1980). Inadequate weed management appears to be one of the major constraints for such low productivity of sesame. Being a slow growing crop during seedling phase, weed affects the growth of sesame and reduced the yield. (Venkatakrishnan and Gnanamurthy 1998).Therefore, the objective of this study is to determine the effect of different weed control practices on growth and yield of sesame.

MATERIAL AND METHODS

The field experiment was carried out at the Teaching and Research farm of Ladoke Akintola University of Technology Ogbomoso, Oyo state Nigeria. (Latitude of 8-10°North and longitude 40-50°East). The temperature of the area ranges from 28°C- 33°C with humidity of about 74% all year round except in January when the wind blows from the North. The area is characterized with bimodal pattern of rainfall with peak in June and September of the year. Annual rainfall for this area is 1286mm. The site was cleared of bushes using cutlass. The trash was packed out manually, after trash was ploughed and harrowed two weeks after ploughing. Sesame seeds were obtained from Institute of Agricultural Research and Training (IAR&T), Ibadan. The experiment was arranged as split plot fitted into a randomized Complete Block Design with three replications. Each plot measured 3m by 3m with 1m gap in between plots and 1m gap between replicate to allow for easy access during cultural operation. The treatment include; Hoe weeding, Hand weeding, Pre emergence herbicide + hoe weeding, Pre emergence herbicide + post emergence herbicide, Organic mulching (elephant grass), Inorganic mulching (black plastic) and Zero weeding. Two pinches of seeds were planted per hole at a spacing of 60cm by 10cm and the seedlings later thinned to one plant per stand at two weeks after planting (3WAP). The surrounding of the farm was kept clean to prevent rodent attack. 90 kg/ha of NPK 15-15-15 was applied at planting. This was done to boost the growth and development of the crops. Weeding was done using hand and hoe respectively.

First weeding was carried out at 4WAP for all the crops and subsequent weeding was carried out once in two weeks for weed free plots only while the zero weeding was not weeded at all. Data was collected on growth and yield parameters. The growth parameters determination commenced at 4WAP. The growth parameters measured were plant height using measuring tape placed at the base of the main stem to the tip of the plant and the stem girth was measured by using vernier calliper at a height of 5cm above the ground level. Data collection on the number of capsules per plant was by direct counting. The crop was harvested when lower leaves, capsules and stem turned to lemon yellow colour. During harvest, plant from each plot was harvested by cutting the plants from ground level and these were bundled. Bundled of harvested plants were dried in sunshine. Later stalked bundles were inverted down and tapped with stick to separate the seeds. The seeds were dried, winnowed, cleaned and weighs of seeds obtained from each net plot were recorded. Weeds were harvested from three (3) randomly thrown 0.5m by 0.5m quadrant. Weeds harvested from the quadrant thrown were oven dried at 80°C for 72hours before the determination of weed dry weight by weighing on a sensitive balance. All data collected was analysed using analysis of variance (ANOVA) techniques and the means are separated using Duncan's Multiple Range Test (DMRT) was used to compare means at 5% level of probability.

RESULTS AND DISCUSSION

Comparison of different weed control methods on plant height of sesame is as presented in table 1. Different weed control methods had significant ($P < 0.05$) effect in plant height of sesame throughout the study period. At 4WAP and 6WAP, significantly higher plant heights were recorded in hand weeding weed control methods while the least was in zero weeding weed control method. Highest plant height values recorded at 4WAP was statically comparable to the other treatment except zero weeding. However, at 6WAP, significantly higher plant height values recorded in hand weeding was only comparable to pre emergence + hoe and post emergence herbicide. At 8WAP, 10WAP and 12WAP, significantly higher plant height was recorded in pre emergence herbicide + hoe while the least plant height was observed in zero weeding weed control except at 8WAP, at which inorganic mulching recorded the least value. The tallest plant height in the pre emergence herbicide (metolachlor) was comparable to weed hoeing and hand weeding. This confirms the findings of Imoloame (2004) who found out that Metolachlor treated plots produced the tallest plant height. The different weed control method on stem girth of sesame is as presented in table 2. Throughout the study period different weed control method had significant effect ($P<0.05$) on stem girth of sesame except at 4WAP. At 10WAP, significantly higher stem girth values was recorded in the Pre emergence herbicide + hoe (5.89) and hand weeding which was statically comparable to hoe weeding, organic mulching and inorganic mulching. While the least was recorded in the weedy check plots. At 12WAP, significantly higher stem girth values was recorded in hoe weeding ,hand weeding, pre emergence + hoe, organic mulching and inorganic mulching which was statically comparable to pre emergence herbicide + post emergence herbicide while the least was in the weedy check plots.

The different weed control method on number of leaves of sesame as presented in Table 3. Different weed control method had significant effect ($P<0.05$) in number of leaves throughout the study period. Significantly higher number of leaves was observed in the pre emergence herbicide weed control method throughout the study period, while the least was recorded in the weedy check plots. Comparison of different weed control method on number of pods of sesame is as presented in table 4. The number of pods per plant were significantly ($P < 0.05$) affected by weed control methods. The means analyses showed that higher number of pods per plant were recorded in Hoe weeding, Hand weeding, Pre emergence herbicide + hoe weeding, Organic mulching and inorganic mulching which was statically compared to Pre emergence herbicide + post emergence herbicide while the control plots in which there was no weeding done had the least. The decrease in the number of pods per plant in weedy check plots might be due to the increased competition for moisture, light and nutrients. Higher pods per plant in weed control plots than weedy check might be due to better growth and development of the plants and availability of more resources which resulted in more pod production in the plant. The results are in agreement with those of A.M El Naim *et al*, (2010) who reported that weed control through mulch has increased the number of pods per plant. The different weed control methods on seed yield kg/ha are as presented in table5. Yield was significantly ($P < 0.05$) affected by different weed control methods. Significantly higher seed yield recorded in inorganic mulching (236.16) was followed by pre emergence herbicide and hoe weeding (194.50) while minimum (57.16) was recorded from weedy check plots. Less competition for nutrient and other available resources in inorganic mulching plots resulted in higher yield of sesame in those plots. Significantly higher yield in inorganic mulching compared to organic mulching is in line with the findings of Siborlabane (2000) in tomato who pointed out that the yield of the fruit for tomato market varies according to the type of mulch used on the plantation. Also Olabode *et al* (2006) reported that plastic and grass *(Panicum maximum)* mulches significantly enhanced the performance of rain-fed okra in the Southern Guinea Savannah of Nigeria. The different weed control methods on weed density of sesame plot are as presented in Table 6. Weeds fresh and dry density was significantly reduced by weed control. Highest fresh weed density (221.0) and dry weed density (57.7) was recorded in weedy check plots whereas lowest weed fresh density (61.0) and dry weed density (12.9) were recorded in pre emergence herbicide + post emergence herbicide weed control which was statically comparable to other treatment except the weedy check. Timely eradication of weeds could be the possible reason for lower fresh weed density in these plots which inhibited weeds seed germination resulting in less fresh and dry weed density. Weeds were effectively controlled in the pre emergence herbicide + post emergence herbicide plot and the black plastic mulched plots. The weeds in the pre emergence herbicide + post emergence herbicide plots were destroyed through application of herbicide twice. In black plastic mulch treatment plots weeds seeds might have failed to germinate due to lack of light and rise in temperature under black plastic. This is similar to the findings of Tarara (2000), who reported that black plastic mulch effectively stopped weed growth by intercepting nearly all income radiation. Comparison of different weed control methods on weed population of sesame plot is as presented in table 7.

The weed control treatments significantly ($p < 0.05$) effected weed population. Significantly different weed population was observed in the weed check plots (47.30). There was no statically different in the other treatment. However, the lowest weed population was recorded in the pre emergence herbicide + post emergence herbicide weed control method. The higher weed population in weedy check plot may be attributed to the open soil surface and niches available to weeds for free and aggressive growth. Timely weed control in all other plot might be the possible reason for the lower weeds population in these plots. These results are also in accordance with those of Fathi *et al.* (2010) and Hassan *et al*. (1995) who also found highest number of weeds in weedy check plot. The result of this study shows that the weed control methods significantly improved the performance of sesame. However, pre emergence herbicide + hoe weeding has been the most effective weed control method in enhancing all the growth while black plastic mulch enhance the yield parameters of sesame. The fresh and dry weed density and weed population in all the treatment were drastically reduced as compared to weedy check. Similarly, number of pods per plant, stem girth and yield of sesame were also the highest in pre emergence + hoe weeding treatment. Therefore, based on the result of this experiment inorganic mulching weed control method which gave the highest yield compare to other treatments is recommended for optimum production of sesame.

Table 1. Comparison of different weed control methods on plant height of sesame.

Treatment	4WAP	6WAP	8WAP	10WAP	12WAP
T1	16.47ab	42.97bc	89.87ab	121.80ab	144.47abc
T2	18.22a	59.07a	93.93ab	134.68ab	153.73ab
T3	16.05ab	54.53ab	99.27a	142.93a	163.07a
T4	13.01ab	41.27bc	77.67ab	141.27ab	138.80bc
T5	15.35ab	46.40abc	80.95ab	129.67ab	148.00bc
T6	15.65ab	41.80bc	73.00b	118.07ab	141.47bc
T7	12.14b	37.7c	79.48ab	107.73b	130.93c
LSD(0.05)	5.38	15.59	24.67	29.69	20.78

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05)

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 2. Comparison of different weed control methods on stem girth of sesame.

Treatment	4WAP	6WAP	8WAP	10WAP	12WAP
T1	1.65a	3.08ab	4.86ab	4.62a	5.16ab
T2	1.77a	3.89a	4.84ab	4.82a	5.49a
T3	1.81a	3.80ab	5.23a	4.89a	5.89a
T4	1.49a	3.08ab	4.47ab	4.37ab	4.48bc
T5	1.60a	3.39ab	4.51ab	4.59a	5.17ab
T6	1.71a	3.33ab	4.37b	4.93a	5.22ab
T7	1.71a	2.87b	4.38b	3.71b	3.94c
LSD(0.05)	Ns	1.02	0.81	0.79	0.78

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05).

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 3. Comparison of different weed control methods on number of leaves of sesame.

Treatment	4WAP	6WAP	8WAP	10WAP
T1	9.07c	21.53c	91.87ab	144.67abc
T2	9.9bc	29.67abc	104.00ab	149.87abc
T3	14.87a	36.13a	125.53a	180.60a
T4	9.60c	23.20bc	83.07b	137.53abc
T5	10.20bc	25.20abc	77.20b	130.53bc
T6	12.80ab	34.20ab	89.53b	168.87ab
T7	8.13c	20.73c	72.93b	118.87c
LSD(0.05)	2.91	11.93	34.65	43.78

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05)

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 4. Comparison of different weed control methods on number of pods of sesame.

Treatment	12WAP
T1	66.00a
T2	84.80a
T3	91.67a
T4	64.80ab
T5	68.20a
T6	98.80a
T7	30.93b
LSD(0.05)	34.92

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05)

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 5. Comparison of different weed control methods on seed yield of sesame.

Treatment	Seed yield (kg/ha)
T1	108.16b
T2	139.16b
T3	194.50ab
T4	146.33b
T5	184.83ab
T6	236.16a
T7	57.16c
LSD(0.05)	81.07

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05).

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 6. Comparison of different weed control method on weed density (m^{-2}) of sesame.

Treatment	Weed density (Fresh)	Weed density (Dry)
T1	122.00ab	23.40c
T2	121.00ab	28.70bc
T3	104.00ab	17.40bc
T4	61.00b	12.90c
T5	126.00ab	26.50bc
T6	0	0
T7	221.00a	57.70a
LSD(0.05)	120.0	16.57

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05)

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 7. Comparison of different weed control methods on weed population of sesame plot.

Treatment	Weed population
T1	28.70b
T2	20.00b
T3	16.70b
T4	10.30b
T5	19.70b
T6	0
T7	47.30a
LSD (0.05)	19.70b

Means followed by the same letter along the column are not significantly different by DMRT (P= 0.05)

T1: Hoe weeding, T2: Hand weeding, T3: Pre emergence herbicide + hoe, T4: Pre emergence herbicide + Post emergence herbicide, T5: Organic mulching (Elephant grass), T6: Inorganic mulching (Black Plastic), T7: Zero weeding.

Table 8. Check list of weeds observed on the experimental plots.

Common name	Botanical name	Family name
Goat weed	*Ageratum conyzoides*	Asteraceae
Milk weed	*Euphobia heterophyla*	Euphorbiaceae
Stylo weed	Stylosanthes humilis	Leguminoceae
Water leaf	Talinum triangulare	Portulaceae
Wild Mexican sunflower	*Tithonia diversifolia*	Asteraceae
Tridax	*Tridax procumbens*	Asteraceae
Siam weed	*Chromolaena odorata*	Asteraceae
Spear grass	*Imperata cylindrical*	Poaceae

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