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ORIGINAL RESEARCH

Effect of organic waste as fertilizers and weed management practices on the growth and yield of tomato (*Solanum Lycopersicum* L.) in a derived savannah humid environment

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Abstract

Purpose: To understand the effect of organic wastes as fertilizer and weed management on the growth and fruit yield of tomatoes to recommend the best organic waste fertilizer and weed management practices for the production of this crop in a derived savannah agro-ecology zone of Nigeria.

Method: The experiment was conducted in Nsukka, Nigeria where the climate is characterized by mean annual rainfall of about 1600mm, with a bimodal distribution pattern that peaks in July and October. The mean minimum and maximum temperatures are 21˚C and 31˚C, respectively. The relative humidity varies yearly, often in the range of 55-90%. The treatment is comprised of organic animal wastes as manure types which include: 20 t/ha of poultry manure, 20 t/ha of Pig dung, zero manure application(control), and 5 weed management practices: sawdust cover (17,000 tons/ha), rice husk mulch (23,000 tons/ha), black polyethylene mulch, hoe weeding, and weedy check. The treatment was laid out in a 3 x 5 factorial arrangement in a randomized complete block design with three replications.

Results: Among the mulch materials used, rice husk plots consistently recorded the highest tomato fruit yield per hectare (34, 222.0 tons/ha). On the organic wastes, the pig dung treatment performed better than others used, the yield recorded per hectare was (15,533.0 tons/ha) for the tomatoes.

Conclusion: The research found out that the use of pig dung should be adopted as well as the use of rice husk mulch on the soil surface as weed management practices to improve yield of tomatoes.

Keywords: Fruit yields, Organic fertilizers, Plant growths, *Solanum lycopersicum*

Introduction

Tomato (*Solanum lycopersicum* L.) belongs to the *Solanaceae* family; it is one of the most important and popular vegetable fruit crops in the world (Bashir et al. 2019; Gao et al. 2019). The crop is grown primarily because of its fruits which contain vitamins, essential minerals, antioxidants, bio-flavonoids, dietary fibres, and flavour compounds (Pramod et al. 2016). Tomato fruit consumption is known for avoiding many cancers and cardiovascular diseases (Frusciante et al. 2007). Most plant's growth and yield largely depend on the quality and quantity of fertilizers.

Fertilizers are classified into two broad groups which are inorganic and organic fertilizers. A fertilizer is termed organic if it is obtained from plant and animal wastes or minerals. Organic fertilizers are environmentally friendly due to their quality of being renewable and soluble in nature (Christians et al. 2016). Edmeades (2003) reported that organic fertilizers such as sheep, cattle manure, and poultry litter and green fertilizers improved organic matter accumulation and soil N, P, K, Ca, and Mg contents.

As a weak competitor against weeds, tomato plants have initial slow growth and are grown in wide rows which favour heavy weed competition (Olubanjo and Alade 2018) causing a high loss in fruit yield (Mennan et al. 2020). Weed management is an important and expensive practice in tomato cultivation (Ghafory et al. 2018). Most weeds and tomatoes are similar in their demand for carbon dioxide and nitrogen from the atmosphere, water, and minerals from the soil, and light from the sun for growth and development (Oerke 2006). When weeds utilize these components, the growth of tomato plants is restricted and yield is reduced. The quality and market value of tomato fruit yield are often reduced by weeds (Brown et al. 2019). Row spacing affects light interception and also influences the space available for weeds to grow. Row spacing can also affect the plant canopy (tomato) shape and branching, thereby influencing flowering and fruiting as well as crop competitiveness with weeds. Row spacing is often determined by the type of planting and harvesting equipment available, and will result in different crop yields and can influence overall economic return. Mulches protect tomato crops against the negative effects of long droughts that are caused by climate change phenomena and can result in significant crop losses (Wabwoba and Mutoro 2019). Hence, this study was designed to understand the effect of organic waste as fertilizer and weed management on the growth and fruit yield of tomatoes in order to recommend the best organic fertilizer and weed management practices for the production of this crop in a derived savannah agro-ecology zone of Nigeria.

Materials and methods

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Location of the experiment

The experiment was conducted in the Department of Crop Science Research Farm, Faculty of Agriculture, University of Nigeria, Nsukka. The experimental site is located at latitude 06˚ 51˚N and longitude 07 ˚29˚E and an elevation of 445 m above sea level. The climate of the area is characterized by mean annual rainfall of about 1600mm, with a bimodal distribution pattern showing peaks in July and October. The mean minimum and maximum temperatures are 21 ˚C and 31˚C, respectively. The relative humidity varies yearly, often in the range of 55-90 % (Uguru et al. 2011). This area can be best described as a derived savannah agro-ecology zone of tropical environment. The experiment was conducted in the rainy seasons from April to July when both rainfall and relative humidity are always in their peak range of 21- 31 ˚C and 75 to 90 %, respectively.

Experimental design and treatments

The experimental plots were laid out in a randomized complete block design (RCBD) with three replications. The experiment is a 3 x 5 factorial arrangement. The treatment is comprised of three manure types which include: 20 t/ha of poultry manure, 20 t/ha of Pig dung, zero manure application (control), and 5 weed management practices: sawdust cover (17,000 tons/ha), rice husk mulch (23,000 tons/ha), black polyethylene mulch, weedy check, and hoe weeding (at 2 weekly intervals) which were combined in a factorial arrangement and gave fifteen treatment combinations.

Nursery preparation and sowing of the seeds

The seeds were raised on beds with a mixture of topsoil and poultry manure. The seeds were sown by drilling to a depth of about 2-3cm between rows on a bed. The seedlings were watered morning and evening every day for weeks before transplanting into the field.

Land preparation /treatment allocation

The experimental plots were manually cleared and mapped using measuring tape and peg to give an area of 30 m x 5 m (150 m²) as length and width, respectively. The cleared site was divided into 3 blocks (representing three replications). Each replication contained fifteen (15) plots which gave a total of 45 plots in the experiment. Each plot measured 1 m x 1 m. The distance between plots was 0.5 m and a distance of 1m separated one block from the other. Organic manure was applied once at the rate of 20 tons/ha before planting. Mulching materials such as black polyethylene film, sawdust, and rice husk were applied on the surface of the plot receiving the treatments respectively.

Weeding

Weeding was carried out manually using a hoe at regular intervals except the weedy check plot which was abounding with weeds throughout the experiment. For hoe weeded plots, it was weeded at 2 weekly intervals.

Weed parameters collected

Weed data were collected using a 0.5 m² quadrat. This was done to check the level of occurrence and reoccurrence of weeds on each plot. An assessment was made per plot. The quadrat was randomly thrown within a plot and weeds within the quadrat were identified, counted, and clipped from the base. The clipped weed species were identified and classified. The weed parameter was collected three times at 2, 4, and 6 weeks after planting, respec-

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tively. The collected fresh samples of weeds from each plot were weighed and dried in the oven for 48 hours at a temperature of 80 ˚C and the dry weight was taken and recorded. Weed control efficiency (%) was calculated on a dry weight basis. This denotes the magnitude of weed reduction due to weed control treatments. It is worked out using the formula suggested by Mani *et al.* (1976) as expressed in percentages.

WCE (%) = Dry weight of un-weeded control-dry weight of treated plots X100
Dry weight of un-weeded weeds in un-weeded control

The growth and yield parameters taken on the tomato plants were:

-*Plant height (cm)*: The plant height is the distance from the shoot/root system junction to the shoot apex. It was measured with a meter or tape rule.

-*Stem girth (G)*: The stem diameter was measured using Vernier callipers at 5 cm height above ground level and converted to girth by the following formula: Stem girth () = Diameter (D) x π ($^{22}/_{7}$)

-*Number of leaves*: The number of leaves per plant was counted.

-*Number of branches:* This was arrived by counting the number of branches per plant

-*The yield data parameters taken were:* Number of fruits, Weight of fruits, and yield estimated in tonnes per hectare.

The data collected were subjected to a two-way analysis of variance (ANOVA) using the software GenStat Discovery Edition 12. The significant treatment effects and mean separation were done by Fisher's least significance difference (F-LSD) procedure at a 5% level of probability ($p<0.05$).

Results and discussion

As shown in Table 1, the dominant weed species of the experimental sites were more broadleaved leaves and sedges. *Ageratum conizoides* and *Mimosa pudica* were the most dominant species in broad leaves weeds while among the sedges, *Cyperus iria* and *Cyperus rotundus* dominated the most. At 2 weeks after transplanting (WAT), most of the morphological parameters were not significantly affected by the weed management practices except for plant height where hoe weeded plot recorded a significantly ($p<0.05$) higher value (31.06 cm) when compared to other weed management practices while sawdust cover plot recorded the least significant value (16.80 cm) (Table 2). Morphological parameters were significantly affected by manure type at 2 WAT. Pig dung plots consistently recorded significantly ($p<0.05$) higher values for plant height (29.95 cm), number of branches (6.04), number of leaves (38.7), and stem girth (0.30 cm) while significantly lesser values ($p<0.05$) were recorded in control plots where plant height is (23.41 cm), number of branches is (3.60), number of leaves is (17.7) and stem girth is (0.14 cm) (Table 3). Furthermore, at 4 WAT, all the morphological parameters measured were significant ($p<0.05$) (Table 3). Pig dung plots recorded significantly higher values for plant height (45.50 cm), number of branches (9.42), number of leaves (75.50), and stem girth (0.59 cm) when compared to other manure types. At 4 WAT, weed management practices did not show any significant effect on the morphological parameters. Also at 6 WAT, the morphological parameters were significantly affected by manure types (Table 4). Pig dung plots recorded significantly ($p<0.05$) higher values in plant height (61.3 cm), number of branches (15.04) and stem girth (0.51cm) when compared to other manure types. This was statistically similar to that of poultry manure that recorded a significantly higher value of (55.4 cm) for plant height, number of branches (14.51), and stem

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girth (0.40 cm). At 8 WAT, all the morphological parameters recorded were significant ($p<0.05$) in the plots with manure (Table 5). Pig dung still consistently recorded significantly ($p<0.05$) higher values in plant height (68.90 cm), number of branches (15.09), number of leaves (150.90), and stem girth (0.58 cm). Most of the morphological parameters were not significantly affected by the weed management practices except for stem girth where sawdust cover recorded significantly ($p<0.05$) a higher value (0.71cm) when compared to other weed management practices. However, it was statistically similar to that of rice husk mulch (0.47 cm) and hoe-weeded plots (0.44 cm).

Table 1. The predominant weed species in the experimental plots.

Common name	Scientific name	Family	Occurrence
Broad leaves			
Sensitive weed	*Mimosa pudica*	Leguminosae	***
Wild green	*Amaranthus spinosis*	Amaranthaceae	**
Goat weed	*Ageratum conizoides*	Asteraceae	***
Tropical girdlepod	*Mitracarpus villosus*	Rubiaceae	**
Grasses			
Bermuda/Bahama grass	*Cynodon dactylon*	Graminaceae	***
Goose grass	*Eleucine indica*	Graminaceae	**
Spurge	*Euphorbia heterophylla Linn*	Euphorbiaceae	*
Sedges			
Papyrus /umbrella	*Cyperus iria*	Cyperaceae	***
Rice weed	*Fuirena cilaris*	Cyperaceae	*
Purple nutsedges	*Cyperus rotundus*	Cyperaceae	***

Note: *= Low weed occurrence, **=moderate weed occurrence, ***=high weed occurrence

Table 2. Effect of manure type and weed management practices on morphological parameters of *S. Lycopersicum* at 2 weeks after transplanting.

Manure type	plant height (cm)	Number of branches	Number of leaves	stem girth (cm)
Poultry	20.69	4.71	28.00	0.26
Pig dung	29.95	6.04	38.70	0.30
Control	23.41	3.60	17.70	0.14
F-LSD$_{(0.05)}$	3.68	0.78	7.14	0.05
Weed management practices				

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Sawdust cover	16.80	4.44	22.40	0.26
BPM	22.83	4.07	23.80	0.21
Rice husk	27.08	5.07	29.90	0.21
Hoe weeding	31.06	5.30	34.90	0.23
Weedy check	25.65	5.04	29.60	0.19
F-LSD$_{(0.05)}$	4.746	ns	ns	ns

ns = not significant, BPM= Black polyethylene mulch

Table 3. Effect of manure type and weed management practices on morphological parameters of *S. Lycopersicum* at 4 weeks after transplanting.

Manure type	**Plant height (cm)**	**Number of branches**	**Number of leaves**	**Stem girth (cm)**
Poultry	37.40	8.24	60.40	0.38
Pig dung	45.50	9.42	75.50	0.59
Control	28.50	8.82	38.40	0.22
F-LSD$_{(0.05)}$	7.50	1.66	15.44	0.21
Weed management practices				
Sawdust cover	33.50	7.70	68.10	0.50
Black polyethylene mulch	34.30	6.81	56.40	0.43
Rice Husk Mulch	38.60	7.70	58.10	0.37
Hoe weeding	39.10	7.81	49.30	0.29
Weedy check	40.10	7.30	58.60	0.39
F-LSD$_{(0.05)}$	ns	ns	ns	ns

ns= not significant

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Table 4. Effect of manure type and weed management practices on morphological parameters of *S. lycopersicum* at 6 weeks after transplanting.

Manure type	**Plant height(cm)**	**Number of branches**	**Number of leaves**	**Stem girth (cm)**
Poultry	55.40	14.51	127.30	0.40
Pig dung	61.30	15.04	139.00	0.51
Control	34.40	6.60	71.80	0.26
F-LSD$_{(0.05)}$	9.40	3.79	ns	0.08
Weed management practices				

Sawdust cover	54.10	13.04	128.30	0.57
Black polyethylene mulch	47.30	13.52	118.60	0.31
Rice Husk Mulch	51.20	13.81	114.60	0.45
Hoe weeding	45.50	9.15	90.40	0.31
Weedy check	53.90	10.74	111.50	0.29
F-LSD $_{(0.05)}$	ns	ns	ns	0.10

ns= not significant

Table 5. Effect of manure type and weed management practices on morphological parameters of *S. lycopersicum* at 8 weeks after transplanting.

Manure type	Plant height (cm)	Number of branches	Number of leaves	Stem girth (cm)
Poultry	62.3	15.18	146.50	0.50
Pig dung	68.9	15.09	150.90	0.58
Control	40.4	6.76	75.50	0.31
F-LSD $_{(0.05)}$	10.6	3.55	45.67	0.08
Weed management practices				
Sawdust cover	61.20	13.19	128.10	0.71
BPM	53.50	13.44	127.20	0.36
Rice Husk Mulch	57.80	14.22	133.20	0.47
Hoe weeding	52.8	9.48	104.2	0.44
Weedy check	60.7	11.37	128.7	0.34
F-LSD $_{(0.05)}$	ns	ns	ns	0.11

ns= not significant, BPM= black polyethylene mulch

A significant difference (p<0.05) was observed in weed dry weight where the hoe-weeded plot recorded a higher value (0.61 g) and also exhibited significantly different weed control efficiency where black polyethylene recorded (76 %) at 2 WAT (Table 6). At the 4 WAT, weedy check plots recorded significantly(p<0.05) higher values for number of broad leaves (3.75/0.5m^2) and weed fresh weight (64.0 g), while rice husk and sawdust covered plots recorded significantly (p<0.05) higher weed dry weight (1.84 g) and weed control efficiency (92%). The least significant (p<0.05) value was recorded in saw dust plots for the number of broad leaves (1.36/0.5m^2), weed fresh weight (4.50 g), and weed dry weight(0.50g) (Table 6). At 6 WAT, the weedy check plots recorded significantly(p<0.05) higher number of broad leaves (2.28/0.5 m^2), weed fresh weight (71.2 g), weed dry weight (9.41 g), while sawdust cover plots recorded significant (p<0.05) higher weed control efficiency (81 %). The least significant (p<0.05) value on the number of broad leaves was recorded in rice husk plots (1.28/0.5 m^2), while weed fresh weight (11.1 g) and weed dry weight (1.45 g) was recorded in black polyethylene mulch plots. The effect of manure types on weed data at 2 WAT showed no significant difference (p<0.05) of manure types on weed data collected on the various weed populations which include broad leaves, grasses, and sedges but showed a significant difference (p<0.05) on weed control efficiency where poultry manure plots recorded (52.00 %). The least significant (p<0.05) value on the number of broad leaves was recorded in control plots (31%). Similarly, at the

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6WAT, control plots recorded a significantly ($p<0.05$) higher number of broad leaves ($1.76/0.5\ m^2$), while the least significant ($p<0.05$) value was recorded in pig dung plots ($0.71/0.5\ m^2$) (Table 7).

Table 6. Effect of weed management on weed data.

Weed management practices	Broadleaves/0.5m²	Grasses/0.5m²	Sedges/0.5m²	WFW	WDW	WCE (%)
		2 WAT				
Sawdust cover	2.04	0.77	1.41	10.80	1.10	45.20
BPM	2.38	0.71	0.77	0.90	0.12	76.00
Rice husk	1.65	0.99	1.25	3.70	0.31	55.8
Hoe weeding	2.28	0.80	1.30	3.9	0.61	45.10
Weedy check	2.61	1.16	1.42	7.9	1.15	0.00
Mean	5.53	0.44	1.20	5.9	0.66	44.4
F-LSD$_{(0.05)}$	ns	ns	Ns	ns	0.76	20.08
		4 WAT				
Sawdust cover	1.36	0.71	1.01	4.50	0.50	92.70
BPM	1.94	0.71	0.86	5.30	0.54	82.00
Rice husk	1.56	1.02	0.99	10.20	1.84	73.90
Hoe weeding	1.71	0.82	1.15	5.80	0.78	85.20
Weedy check	3.75	0.98	1.62	64.00	0.54	0.00
Mean	5.07	0.31	1.36	17.9	2.40	66.8
F-LSD$_{(0.05)}$	2.77	ns	Ns	23.66	2.24	16.51
		6 WAT				
Sawdust cover	1.52	0.71	0.82	37.50	2.18	81.20
BPM	1.85	0.77	0.77	11.10	1.45	76.00
Rice husk	1.28	0.71	0.86	28.10	1.71	73.7
Hoe weeding	1.49	0.82	0.94	18.80	3.35	58.10
Weedy check	2.28	0.92	0.81	71.20	9.41	0.00
Mean	2.80	0.16	0.27	33.4	3.62	57.80
F-LSD$_{(0.05)}$						
	1.94	ns	Ns	33.53	3.28	21.29

ns= not significant, BPM= black polyethylene mulch, WFW= weed fresh weight, WDW= weed dry weight, WCE= weed control efficiency

Table 7. Effect of manure type on weed data.

Manure Types	Broadleaves/0.5m²	Grasses/0.5m²	Sedges/0.5m²	WFW	WDW	WCE (%)
		2 WAT				
Poultry	2.26	0.83	1.27	5.60	0.70	52.00
Pig dung	2.38	1.02	1.03	7.80	0.88	50.10
Control	1.93	0.80	1.25	2.80	0.40	31.20
F-LSD$_{(0.05)}$	ns	Ns	Ns	ns	ns	15.56

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		4 WAT				
Poultry	2.19	0.89	1.26	23.90	2.83	72.5
Pig dung	1.99	0.87	1.01	16.60	2.66	71.60
Control	2.02	0.78	1.10	13.30	1.70	56.20
F-LSD(0.05)	ns	Ns	Ns	ns	ns	12.79
		6 WAT				
Poultry	1.58	0.80	0.87	26.60	4.01	67.80
Pig dung	1.71	0.78	0.90	33.60	2.66	54.70
Control	1.76	0.78	0.74	39.90	4.20	50.80
F-LSD(0.05)	1.504	Ns	Ns	ns	ns	ns

ns= not significant, WFW= weed fresh weight, WDW= weed dry weight, WCE= weed control efficiency

Table 8. Effect of weed management and manure type on yield of tomato.

Weed management	**Total number of fruit/ plant/plot**	**Total number of fruit/plot**	**Weight of fruit/ plant(kg)**	**weight of fruit /plot(kg)**	**Yield per hectare**
Sawdust cover	13.44	44.90	0.25	2.18	21778.00
BPM	11.56	39.70	0.18	1.70	17000.00
Hoe weeding	5.00	33.00	0.11	1.32	13222.00
Rice husk	17.78	82.30	0.26	3.42	34222.00
Weedy check	5.00	25.00	0.10	0.91	9111.00
F-LSD(0.05)	5.32	17.21	0.11	0.61	6114.1
Manure type					
Pig dung	10.33	54.50	0.21	2.33	23267.00
Poultry	11.33	42.90	0.18	1.84	18400.00
Control	10.00	37.50	0.14	1.55	15533.00
F-LSD(0.05)	ns	13.38	ns	0.47	4735.9

ns= not significant, BPM= black polyethylene mulch

Table 8 shows the main effect of weed management practices and manure types on the yield of tomatoes. Rice husk plots consistently recorded higher significant values ($p<0.05$) in the weight of fruits per plant (0.26kg), weight of fruit per plot (3.42kg), total number of fruit per plant (17.78), total number of fruit per plot (82.30), and yield per hectare (34222.00 tons/ha), while weedy check plot recorded consistently the least significant values ($p<0.05$) on the weight of fruits per plant (0.10kg), weight of fruit per plot(0.91kg), total number of fruit per plot (25.0), total number of fruit per plant (5.00), and yield per hectare (9111.00 tons/ha) in all the yield parameters. There was a significant effect of manure types on the yield of tomatoes, where pig dung plot recorded significantly ($p<0.05$) higher values on the total weight of fruit per plot (2.33kg), total number of fruit per plot (54.50), and gave the highest yield per hectare (23267.00 tons/ha), while control plot recorded the least significant values ($p<0.05$) on the weight per plot (1.55), total number of fruit per plot (37.5), and yield per hectare (15533.00 tons/ha).

In this study, among the organic fertilizers, pig dung plots consistently showed significantly ($p<0.05$) higher values for plant height, number of branches, number of leaves, and stem girth. Pig dung plots were also remarkable

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with yield (23267.00 per hectare) compared to other manure types. However, several authors (Abd-Allah et al. 2001; Aly 2002; Bayoumi 2005; Ehaliotis et al. 2005; Zhou et al. 2022) indicated that the application of organic fertilizer increased crop yields compared to using chemical fertilizers. Worthington (2001) concluded that organic crops contained more vitamin C, iron, magnesium, and phosphorus and significantly less nitrates than conventional crops. Similarly, Vinha et al. (2014) reported that organic tomatoes were healthier than those produced by conventional practices. There are profound positive effects of organic fertilizers on plants such as tomatoes (Gao et al. 2023; Mayele and Abu 2023). These effects may also be attributed to the top stimulating activities of bacteria which promote the released and availability of N, P, and the other nutrients in the soil and enhance nutrients absorption by tomato roots (Pokluda et al. 2021). Kandil and Gad (2009) pointed out that organic manure enhances nutrient absorption, root, and translocation to upper parts of broccoli plants. These results are similar to those of Gianquinto and Borin (1990) and Wu et al. (2022), who found that the contribution of manure is very favourable to the high yield of industrial tomatoes. This beneficial effect of animal manures allows for keeping soil fertility while improving soil structure and the availability of mineral elements. In fact, the increase in soil organic matter to optimum levels is a key aspect of any organic production system (Gurmu 2020). Shuaib (2001) reported that the period between 15 to 30 days after transplanting was the critical period of crop-weed competition in tomatoes. Weed is the major constraint that limits crop production and has the most deleterious effect ultimately causing the yield reduction of tomato by 53 to 67% (Sanok et al. 1979). Mulching significantly influenced the intensity of weeds in the tomato field. Among the different mulching materials evaluated, rice husk mulch plots were the best weed suppressor with a higher effect on the tomato crop. In an experiment to study the effect of types of soil cover yield and growth characteristics of tomatoes in Ghana, Nkansah et al. (2003) reported that rice straw, rice husks, grass straw, and sawdust mulch reduced fresh weed weight significantly. Research has shown that covering the soil with organic matter in both dry and rainy seasons significantly suppresses the growth of weeds. In a related study, Eneji et al. (2003) found that organic mulching cuts down weed intensity and promotes crop-plant health as well as the ultimate yield. The increase in crop output can be attributed to the effect of reduced tomato to weed competition for nutrients and other factors of plant growth, as a result of weed smothering (Gangawar et al. 2000; de Oliveira et al. 2023). Tomato plants in the mulched plots were generally tall and had thicker stem girth, especially in sawdust cover plots. The highest fresh and dry weight of weed occurred on weedy check plots while the black polyethylene mulch recorded the least. Conversely, clear mulches have been observed to have a negligible effect on weed growth (Waterer 2000) although they promote soil warming, whereas coloured polythene such as black or brown effectively prevent emerging weeds (Norman et al. 2011; Gordon et al. 2010; Ngouajio and Ernest 2004; Ossom 2001; Brault et al. 2002; Bond and Grundy 2001) and earlier crop maturity (Ibarra et al. 2001).

Weed control efficiency (%) was highest in the black polyethylene mulch of the experiment at all durations while it was least in the case of weedy check. Gandhi and Bains (2006) reported that black plastic mulch resulted in 100 percent control of all weeds in tomatoes, whereas silver-lustred thin film resulted in 92 percent control of graminaceous weeds. Black and silver-lustred film mulch resulted in increased tomato yield percent when compared to transparent film. Several Olericulture studies have shown that the first six weeks after transplanting is the most critical window of weed competition. A number of studies have been published in tropical and sub-tropical countries to evaluate crop residues used as mulch. These include research by Shashidhar et al. (2008), and Akhtar et

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al. (2019) who have shown that soil cover positively influences soil health and replenishes plant nutrients by increasing organic matter.

Conclusion

Finally, this study revealed that the use of organic fertilizer and weed management practices affected the growth and yield of tomatoes. Pig dung improved growth and produced more yield compared to other manure types. Also, covering the soil with rice husk enhanced growth, suppressed weeds, and produced more yield of tomatoes compared to other weed management practices and control. The interaction of manure type and weed management practices on weight of fruit per plant, weight of fruit per plot, total number of fruit per plant per plot, total number of fruit per plot, and highest yield was not significant but the highest yield number were obtained in the pig dung and rice husk mulch due to less weed interference. It is recommended that the use of pig dung should be adopted by farmers in the area as well as the use of rice husk mulch on the soil surface as weed management practices to improve the growth performance and yield of tomatoes.

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