
EFFECT OF DIFFERENT MULCH MATERIALS ON WEED BIOMASS, GROWTH AND YIELD OF CUCUMBER (*CUCUMIS SATIVUS* L.) IN NEKEDE OWERRI, IMO STATE.

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Abstract: A trial experiment was conducted in 2023 cropping season at the Teaching and Research Farm of Agricultural Technology, Federal Polytechnic Nekede to evaluate the effect of different mulch materials on weed biomass in cucumber production in Nekede Owerri Imo State. The study was laid out in a Randomized complete block design (RCBD). There were four treatments (neem leaves, sawdust, plastic mulching film and no mulch as the control) replicated five times which gave a total of 20 beds/plots. The size of each bed was 2m x 2m. All the necessary agronomic practices were carried out in the field. Data were collected on the following parameters; vine length, leaf area, number of leaves, number of fruits, weight of harvested fruits, and weed biomass. The result obtained, showed that use of black plastic mulch for cucumber production in Nekede Owerri gave the best growth and yield for cucumber. The least weed biomass was also found in the plots covered with black plastic mulch when compared to the other mulch materials and the control plots.

Keyword: Mulch, Weed control, Cucumber, Growth and Yield.

INTRODUCTION

Cucumber (*Cucumis sativus* L.), is one of the most popular members of the Cucurbitaceae family which has excellent flavor, varied usefulness, texture and medicinal value (Shrivastava and Roy, 2013; Keerthika *et al.*, 2016). Cucumbers are in high demand because of their nutritional and economic values. They are consumed fresh, as desserts (after meals), juice or in combination with other food materials. The fruits contain about 95 percent water, 4% carbohydrate, and 1% protein. Phytonutrients and vitamin K are abundant in cucumbers. Vitamin B1, vitamin C, phosphorus, potassium, manganese, and copper are also present.

Its consumption has various health benefits, including weight loss, balanced hydration, digestive regularity, detoxification, improved brain function, cancer prevention, renal health, constipation relief, natural cure for intestinal worms, and control of diabetes (Panhwar *et al.*, 2018).

Due to its importance, it ranks among major horticultural crops cultivated in Nigeria. Like most vegetables, its production is profitable due to high amount of cash income per unit area compared to some other crops. According to (Adeoye and Balogun, 2016), cucumber production has the

capacity to enhance agricultural production, economic empowerment and food security of any country.

However, like many other vegetable crops, cucumber cultivation has several constraints in cucumber production, of which weeds often pose a serious problem by competing for space, light, water and nutrients, weakening crop stand and reduce harvest efficiency (Abassi *et al.*, 2013). The losses due to weeds depend upon type of weed flora, their density, agro-climatic conditions, fertility, moisture status, soil type and type of growth of the crop, etc. Though manual weeding has been reported to be one of the effective methods of weed control, it is however, cumbersome and uneconomical due to hike in wages and labour scarcity in the recent times (Warade *et al.*, 2007).

Mulches are effective alternatives to manual weeding, herbicides, when used correctly, and there are several materials commonly used. Usually, weed control, soil moisture conservation, and temperature modification are the major goals of mulching (Karki *et al.*, 2020b). It also improves the microclimate, which has a significant impact on plant growth parameters such as plant height, the number of leaves, and branches per plant. Mulching has also been reported to suppress and/or prevent Mulch, Weed control, Cucumber, Growth and Yield. the growth of weed species, allowing for improved uptake of nutrients from the soil while also reducing plant competition (Parmar *et al.*, 2013). Some authors reported that mulching enhances floral production by 3-4 times and increases the number of blooms and fruits per plant (Karki *et al.*, 2020b). They also reported that plants produced in various mulching conditions create larger yields than those planted in the absence of mulch. This experiment, therefore, seeks to determine the effect of different mulch materials on weed emergence, growth and yield of cucumber (*Cucumis sativus* L.) in Nekede, Owerri, Imo state, Nigeria.

MATERIALS AND METHODS

Experimental site:

The study was carried out at Federal Polytechnic Nekede farm, Owerri Imo State, Southeastern Nigeria. The area lies between Latitude 5° 21' N and 5° 25' N and Longitude 7° 03' E and 7° 15' E. The experiment was laid out in a randomized complete block design (RCBD) with four (4) treatments (neem leaves, sawdust, plastic mulching film and no mulching as the control) replicated five (5) times. The neem leaves were allowed to air dry for two weeks before using. Data was collected on the following parameters:

Vine Length

At 3, 6, 9, weeks after sowing (WAS), the plant height was measured using a meter rule from the soil base to the tip.

Number of leaves

The number of leaves of tagged plants was counted, the average taken and recorded at 3, 6, 9 weeks after sowing (WAS).

Number of fruits

The number of fruits per treatment was counted manually.

Weight of harvested fruits

The weight of harvested fruits were taken per plot.

Weed biomass:

The total number of weeds present in each treatment was gently uprooted, cleansed of soil particles, and weighed at 4, 8 and 12 weeks after sowing (WAS). The weeds present within each of the 50cm x 50cm quadrat, placed diagonally in each plot, were identified and counted.

Data Analysis

All the data collected were subjected to analysis of variance (ANOVA) and Means separated by using Least Significant Difference (LSD) at 5% probability level.

RESULTS AND DISCUSSIONS

Effect of mulch types on cucumber vine length and number of leaves

Table 1: Effect of mulch types on cucumber vine length (cm) at 3, 6 and 9 weeks after Sowing (WAS) in 2022 cropping season at Nekede.

Mulch type	Cucumber vine length			Number of leaves		
	weeks after Sowing			weeks after Sowing		
	3	6	9	3	6	9
No mulch (Control)	33.50	69.30	80.40	6.94	14.06	19.56

Neem leaves	36.10	72.90	90.50	6.06	13.94	18.75
Plastic mulch	37.10	75.60	91.80	6.56	14.31	19.31
Saw dust	35.70	71.60	87.80	6.50	14.44	19.38
LSD (0.05)	NS	NS	NS	NS	NS	NS

NS = Not significant

Mulching did not have a significant effect on the plant growth parameters viz vine length and number of leaves when compared to the no mulched (control) plots (Table 1). The result obtained, at 9 weeks after sowing, showed that cucumber plants mulched with black plastic mulch film recorded the highest vine length (91.80 cm) when compared to the other treatments, while the lowest vine length (80.40 cm) was found in control plots. Whereas, the number of leaves (19.56) was highest in the no mulch (control) plots and the lowest number of leaves were found in plots covered with dry neem leaves although there was no significant difference among these treatments. The increase in growth parameters could be attributed to sufficient soil moisture near the root zone, reduced competition of weeds and minimized evaporation loss due to mulching. The extended retention of moisture and availability of moisture also leading to higher uptake of nutrients for proper growth and development of plants, resulted higher growth of plant as compared to control. The results of this study are in close agreement to Struzina and Kromer (1989) and Ibeawuchi *et al.*, 2007 in cucumber.

Effect of mulch types on cucumber number of fruits and weight of fruits

The effect of different mulch types on cucumber number of fruits and weight of fruits is shown in Table 2. The results obtained showed that the mulch materials had no significant effect on the cucumber yield parameters collected, except on the cucumber total number of fruits. Plots covered with black plastic mulch had the highest number of fruits (19.00 and 42.00) on both the net and total yield respectively. Similar trend was observed on the weight of fruits with the plots covered with black plastic mulch having the greatest weight (6321 g/m² and 14633.00 g/m²) for both the net and the total weight of fruits per plot respectively. The result also showed that the lowest yield were obtained in the no mulch (control) plots for both the cucumber number of fruits and weight of fruits. The yield increase in the plots mulched with black plastic mulch may be

Table 2: Effect of mulch types on cucumber number of fruits and weight of fruits (g) at harvest in 2022 cropping season at Nekede.

Mulch type	Cucumber number of fruits		Weight of fruits (g/m ²)	
	Net	Total	Net	Total
No mulch (Control)	10.00	23.00	4236.00	9922.00
Neem leaves	13.00	28.00	4974.00	11265.00
Plastic mulch	19.00	42.00	6321.00	14633.00
Saw dust	12.00	23.00	4760.00	10668.00
LSD (0.05)	NS	15.80	NS	NS

NS = Not significant

attributed to moisture conservation, higher soil temperature, weed control and increased mineral nutrient uptake through improved root temperature which ultimately results in better

Table 3: Effect of mulch types on weed fresh and dry biomass at 3, 6 and 9 weeks after Sowing (WAS) in 2022 cropping season at Nekede.

Mulch type	Weed fresh weight			Weed dry matter		
	weeks after Sowing			weeks after Sowing		
	4	8	12	4	8	12
No mulch (Control)	22.80	19.54	24.15	15.90	10.08	11.62
Neem leaves	6.90	8.76	13.26	3.90	3.78	6.21
Plastic mulch	2.00	1.93	3.13	0.80	0.88	1.08
Saw dust	4.80	5.41	7.60	2.70	2.19	2.93
LSD (0.05)	8.23	4.52	5.36	6.57	2.13	2.47

quality fruits and higher yield (Mario *et.al.*, 1994) Similar results was also reported by Punetha, 2020).

Effect of mulch types on weed fresh biomass

The effect of mulch application on weed biomass is shown in Table 3. The highest fresh weight and dry weight of weed is recorded in the un-mulched plots while the lowest fresh weight and dry weight of weed is the plots mulched with black plastic mulch. The results of this study is similar to Yakar 2008 and Jodauigene *et al.* (2006) who reported that mulch materials they used in their studies effectively prevented weed germination and emergence.

CONCLUSION

The results reported in this study showed that while application of neem leaves, plastic mulch and saw dust mulch materials were effective in suppressing weed incidence in cucumber production, especially the polythene mulch material, its lack of influence in the growth and yield of cucumber was a result of the low fertility status of the acidic soils of the study area. However, mulch application operations are generally aimed at creating a favourable soil environment to enhance plant growth, improve crop yield and control erosion and weeds. Hence, this study suggest a further study assessing the use of liming material to control soil acidity alongside mulch materials to enable the determination of mulching effect on growth and yield of cucumber in the study area.

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