EVALUATION OF PLANT FUNGICIDES IN THE CONTROL OF FUNGII AFFECTING THE GROWTH AND COB YIELD OF MAIZE IN AWKA.

ABSTRACT

Most fungal diseases of maize are distributed in all fields of maize which are mostly favored by humid and warm environmental conditions. The major and devastating disease of maize caused by fungi are *Aspergillus*, which is a widely distributed, saprotrophic and pathogenic fungus and may occur when hosts are in the field. This study was undertaken to evaluate the effect of plant fungicides in the control of fungi affecting growth and cob yield in maize. *Azadirachta indica* and *Cympobogon citrarus* leaf ectracts served as fungicides with 25%, 50%, 75% and 100% concentration each. Maize seeds were sown immediately after land preparation and spraying of plant fungicides was carried out every 2weeks starting from emergence and ended at the flowering stage. Data collection was on leaf area, plant height, plant girth and cob yield. Effect of plant fungicides on the growth of maize showed that there was significant growth in the leaf area for all treatment at week 8 and 12. Maize sprayed with *Azadirachta indica* recorded significant growth for plant height at week 2, 4, and 12 for all the treatments. Week 6 showed significant difference in the plant height only for SLg25% (11.000 ± 0.000^{a}) and SLg100% (13.100 ± 0.000^{a}). maize sprayed with *Azadirachta indica* recorded significant growth in the plant girth at week 2 for SAi25% (11 ± 0.00^{a}) and SAi100% (12 ± 0.00^{a}). Week 4, 6, 10 and 12 showed significant growth in the plant girth in all the treatments while SAi50% (12 ± 0.00^{a}) and SAi75% (12 ± 0.00^{a}) recorded a significant difference in the plant girth at week 8. maize sprayed with lemon grass showed a significant difference in the plant girth for all the treatments at week 6 and 12 while week 8 showed a significant growth in the plant girth except for SLg75% (16 ± 0.00^{a}). The effect of the plant fungicides on maize cob yield recorded that SAi50% gave a fresh weight of 413g (being the highest) while SLg25% was the lowest at 130g. For the dry weight, SAi50% recorded the highest weight (312g) while the lowest was SLg25% at 80g. The number of cob per plant recorded 1 for all the treatment while the cob diameter and cob length was highest in SLg100% at 8cm and 14 cm respectively. The result showed that both plant extracts used were effective in controlling fungi affecting maize in the field and hence a positive effect on the leaf area of the maize samples. To forestall the growth of fungi in pre-harvest maize, this study recommends the use of plants extracts that have antifungal properties like *Azadirachta indica* and *Cymbopogon citratus*.

Key words: maize, neem, lemon grass, control, fungi

1.0 INTRODUCTION

Corn and maize are synonymous terms in the Western world. This is due to the fact that all cereals were referred to as corn throughout the early British and American trade and the name was retained for maize because it was the most common grain in commerce (Smith, 2001). You can grow maize in a number of environments from 58º North (Canada and the Russian Federation) to 40º South (Chile). Generally, tropical maize is grown between 30º North and 30ºSouth, both temperate and sub-tropical maize are grown between latitudes of 30 and 34, in both the North and the south. It may be grown at elevations ranging from sea level to 3,800

meters, with growing seasons ranging from 42 to 400 days. The tremendous variation of physiological and morphological qualities reveals this ability to develop in a variety of circumstances (Paliwal, 2000c; Farnham *et al*., 2003). Production for maize is increasing more rapidly in Nigeria (Sadiq et al., 2013). This could be as an effect of the grain being used to feed chickens and other animals as the main food for many households (Ogunniyi, 2011). Ogunsumi *et al*. (2005), proposed that that small-scale farmers' cultivation of maize may end hunger in communities, and that the cumulative impact might double food supply in Africa. According to Girei (2018), an average of 4.7 million metric tonnes of maize were generated between 1990 and 2015 in Nigeria and the contribution of maize to total grains produced in Nigeria increased from 8.7% in 1980 to about 22% in 2003. About 56,139,729 hectares of Nigerian land were planted with maize, which constitutes about 61% of total cultivable land in Nigeria. Maize consumption is widespread across the country and among households (Olaniyan, 2015).

Most of fungal diseases of maize are distributed in all fields of maize. Many of them are mostly favored by humid and warm environmental conditions. Some others also prevalent in humid and cool conditions. The major and devastating disease of maize caused by fungi are *Aspergillus*, which is a widely distributed, saprotrophic and pathogenic fungus. The disease may occur when hosts are in the field (pre-harvest), before post-harvest storage or transport (Ramírez-Camejo *et al*., 2012). Others include: *Gibberella* stalk rots, *Fusarium* stalk rots, false head smut, head smut, late wilt, and black bundle disease (Rehman *et al*., 2021b).

The continuing development of fungicide resistance in plant and human pathogens necessitates the discovery and development of new fungicides. Several pre-harvest and postharvest pathogens have developed resistance to commonly used fungicides. Hence, a diverse array of chemicals has been evaluated for their potential for use as alternative to the current fungicides, e.g. plant extracts and some compounds obtained from plants (Wedge and Smith, 2006). The ability of some plants to have been associated to the presence of certain chemically active compounds in various portions of these plants and their extracts are being utilized for therapeutic purposes..These active substances are known as phytochemicals and are capable of producing specific physiological action on target organisms (Thirumurugan, 2010). Plants produce an extensive range of phytochemical components which are secondary metabolites. Secondary metabolites are now thought to mediate chemical defense mechanisms by providing chemical barriers against animal and microbial predators (Williams *et al*., 1989; Juan, 2012). Phytochemicals are known to possess the capability to destroy or impede the growth of fungi. Phytochemicals help in the prevention of the adhesion of pathogens to cell walls (Ojewumi *et al*., 2017).

Neem (*Azadirachta indica*) are commonly employed in agriculture because they are essential to pest management. There has been a noticeable transition away from synthetic pesticides to non-synthetic ones throughout the world; this is partly due to the widespread knowledge of these synthetic pesticides' negative side effects not only on plants and soil but also on other living organisms. Neem pesticides are being manufactured and exported to various countries as a lot of research has been conducted to test the safety and efficacy of neem for use as a pesticide (Anis *et* al., 2010; Vethanayagam and Rajendran, 2010). Neem tree parts can be used for commercial purposes since they have a wide range of pharmacological qualities, including those that are

antimicrobial, fungicidal, antiallergic, anti-feedant, repelling, insecticidal, antiprotozoal, and sterilant and therefore can be used for income (Biswas *et al., 2002*; Das *et al., 2002*). It also benefits to nourish and condition the soil, it is environmentally friendly, it is non-toxic and it can be used in combination with other pesticide and oil for more effectiveness. Instead of killing the pests, it affects the lifespan of the pests (Das *et al.*, 2002).

Cymbopogon citratus, is known throughout the world as lemon grass is widely used as a source of medicines in tropical countries. Extracts from *Cymbopogon citratus* leaves have shown to have antibacterial, antifungal, and antioxidant properties (Hanaa *et al*., 2012; Wifek *et al*., 2016). Consumers are increasingly aware and concerned about the use of synthetic chemicals in the food additives. Thus, food can be preserved with the natural additives have become more and more preservatives for encompassing the shelf life of various food products. Indeed, essential oils not only showed antimicrobial activity in vitro against several pathogens in the foodstuffs but also in the food systems (Salvia-Trujillo *et al*., 2013). Neem seed and lemon grass plant extracts were effective in controlling fungal seed-borne pathogens of farmer-saved seed maize and in the protection of seed maize rot by fungi (Usman and Bawa, 2018).

A research project by Ujah *et* al. (2021), on the phytochemical constituents of neem leaves revealed alkaloids to be present, saponins, tannins, steroid, terpenoid, glycoside, flavonoid, phenol, oxalic acid and their abundance. Result of phytochemical screening of lemon grass (*Cymbopogon citratus*), using standard protocol method by Gupta *et al*. (2019), demonstrated evidence of flavonoids, phenol, tannins, cardiac glycosides, alkaloids and coumarins.

Synthetic fungicides are now more expensive than they were previously due to an extremely high and disproportionate currency conversion rate, making them inaccessible for the majority of resource-poor farmers. Some synthetic fungicides, like methyl bromide, are hazardous to plants and frequently leave undesirable residues when applied on the growing crops (Salako *et al*., 2008). Other deleterious effects include occupational hazards, mammalian toxicity and soil pollution. Keeping the above facts in mind, this study was undertaken to evaluate the effect of plant fungicides in the control of fungi affecting growth and cob yield in maize. Thus, the search for an alternative to synthetic fungicide is justified in this study.

2.0 MATERIALS AND METHODS

The trial field of the Nnamdi Azikwe University in Awka's Department of Botany was the site of the experiment. Farmers in the area of Awka provided the maize seeds. The Main Campus Awka of Nnamdi Azikiwe University supplied the leaves of *Cymbopogon citratus* (lemon grass) and *Azadirachta indica* (neem).

The two plant components (*A. indica* and *C. citratus*), weighing one kilogram each, were properly cleaned with tap water, chopped into small pieces, and ground to a fine powder using a porcelain pestle and mortar. 500 ml of sterile, distilled water was added to each of the two beakers containing the pulverized plant material, and the beakers were left to stand for 24 hours. Separately sieved and filtered through Whatman No1 filter paper were the solutions. The two filtrates were used as 100% w/v aqueous extracts of *A. indica* (Ai100) and *C. citratus*, respectively (Cc 100). From the 75 ml, 50 ml, and 25 ml stock solutions, successive dilutions

were made by bringing the volume to 100 ml with sterile distilled water. A total of eight solutions were produced, including aqueous extracts of *A. indica* and *C. citratus* at concentrations of 100, 75, 50, and 25% (Ai100, Ai75, Ai50, and Ai25) and 100, 75, 50, and 25 (Cc100, Cc75, and Cc25), respectively.

Three replications of the experiment were set up using a Randomized Complete Block Design (RCBD). There were 13-unit plots in total, each measuring 3.6 m by 1.5 m. A power tiller was used to cross-plow and plough the trial land extensively. Laddering was used to break up clods and level the ground after each plowing. Weeds, stubble, and crop remnants were removed from the field to clean it. The moment the land was prepared, maize seeds were planted. Two weeks following emergence, the two seeds per hole were reduced down to one plant. At the base of each plant, a rate of plant extracts at various concentrations was administered. The plant extracts were sprayed using hand sprayers. Distilled water was sprayed on the control plant. Starting at the emergence stage and ending at the flowering stage, spraying of plant extracts on the maize was done every two weeks.

From each plot, five (5) plants were chosen at random for data collection on leaf area, plant height, plant girth, and cob yield over a 12-week period at intervals of two weeks. Polyethylene ropes were used to identify the chosen plants from the other plants by marking them. Maize cobs were appropriately labeled at harvest time. The following labels were placed on the plants:

SAi25%: Maize plants sprayed with *Azadirachta indica* extract of 25% concentration

SAi50%: Maize plants sprayed with *Azadirachta indica* extract of 50% concentration

SAi75%: Maize plants sprayed with *Azadirachta indica* extract of 75% concentration

SAi100%: Maize plants sprayed with *Azadirachta indica* extract of 100% concentration

SLg25%: Maize plants sprayed with *Cymbopogon citratus* extract of 25% concentration

SLg50%: Maize plants sprayed with *Cymbopogon citratus* extract of 50% concentration

SLg75%: Maize plants sprayed with *Cymbopogon citratus* extract of 75% concentration

SLg100%: Maize plants sprayed with *Cymbopogon citratus* extract of 100% concentration

CONTROL: Maize plants without treatment

3.0 RESULTS

Effect of Plant Extracts (Plant Fungicide) on the Growth Parameters of Maize

3.1 Effect of Plant Extracts on the Leaf Area of Maize

Table 1 showed that maize sprayed with *Azadirachta indica* leaf extracts recorded no significant growth in the leaf area for week 2. At week 4, only SAi75% showed significant growth in the leaf area (10.000 ± 0.00^{a}) while there was significant growth in the leaf area for SAi25%, SAi75% and SAi100% at week 6. Week 8 and 12 showed significant growth in the leaf area for all treatments while week 10 recorded significant growth in most of the treatments.

Maize sprayed with lemon grass recorded insignificant growth in the leaf area at week 2, 4 and 6 while week 8 and 10 showed significant growth in most of the treatments. Week 12 recorded significant growth in the leaf area for all the treatments.

Table 1. Effect of Plant Extracts on the Leaf Area of Maize

S/N	Samples	WK 2 (cm^2)	WK 4 (cm^2)	WK6 (cm^2)	WK8 (cm^2)	WK10 (cm^2)	WK12 (cm^2)
1	SAi25%	8.000±0.707 **b**	13.500±0.00 **b**	14.050±0.0707 **a**	14.800±0.00 **a**	15.000±0.000 a	16.000±0.000 **a**
2	SAi50%	6.000±1.414 **b**	9.500±0.00 **b**	11.500±0.707 **b**	19.000±0.00 **a**	21.500±2.121 b	21.100±0.141 **a**
3	SAi75%	7.500±0.707 **b**	10.000±0.00 **a**	12.100±0.141 **a**	19.000±0.00 **a**	23.500±0.707 a	24.000±0.000 **a**
4	SAi100%	12.000±1.414 **b**	15.500±0.00 **b**	17.050±0.070 **a**	17.300±0.00 **a**	17.500±0.707 a	18.050±0.0707 **a**
5	SLg25%	6.500±0.707 **b**	9.000±0.00 **b**	9.000±0.707 **b**	9.000±0.00 b	10.150±0.212 b	13.150±0.212 **a**
6	SLg50%	7.500±0.707 **b**	10.500±0.00 **b**	14.050±0.070 **b**	19.000±0.00 **a**	19.500±0.707 a	19.800±0.000 **a**
7	SLg75%	12.500±2.121 **b**	12.500±0.00 **b**	12.950±0.354 **b**	14.000±0.00 **a**	14.500±0.707 a	14.900±0.000 **a**
8	SLg100%	11.500±2.121 **b**	12.800±0.00 **b**	15.300±0.424 **b**	16.500±0.00 **a**	16.000±0.000 a	16.850±0.0707 **a**
9	CONTROL	7.500±0.707 **b**	15.000±0.00 **b**	17.050±0.070 **a**	18.000±0.00 **a**	25.500±0.707 a	28.050±0.0707 **a**

Results are in Mean± Standard deviation. Values with superscript 'a' are significant at 0.05% while value with superscript 'b' are not significant at 0.05%

* SAi25%-Maize plants sprayed with *Azadirachta indica* extract of 25% concentration, SAi50%-Maize plants sprayed with *Azadirachta indica* extract of 50% concentration, SAi75%-Maize plants sprayed with *Azadirachta indica* extract of 75% concentration, SAi100%-Maize plants sprayed with *Azadirachta indica* extract of 100% concentration, SLg25%-Maize plants sprayed with *Cymbopogon citratus* extract of 25% concentration, SLg50%-Maize plants sprayed with *Cymbopogon citratus* extract of 50% concentration, SLg75%-Maize plants sprayed with *Cymbopogon citratus* extract of 75% concentration, SLg100%-Maize plants sprayed with *Cymbopogon citratus* extract of 100% concentration,

3.2 Effect of Plant Extracts on the Plant Height of Maize

Maize sprayed with *Azadirachta indica* recorded significant growth for plant height at week 2, 4, and 12 for all the treatments while there was a significant growth in the plant height for most of the treatments except for SAi75% at week 6 and 10 (Table 2). Week 8 showed significant growth in the plant height for only SAi25% (25.000±0.000[a]) and SAi50% (28.000±0.000 [a])

At week 2, maize sprayed with lemon grass showed significant difference in the plant height for only SLg25% (8.100±0.141[a]). Week 4 and 12 recorded significant growth for plant height in all the treatments while week 6 showed significant difference in the plant height only for SLg25% (11.000±0.000[a]) and SLg100% (13.100±0.000[a]). Week 8 recorded significant growth for plant height for most of the treatments except for SLg75% while week 10 showed significant growth in the plant height for SLg25%, SLg75% and SLg100% at 16.000±0.000[a], 18.000±0.000[a] and 18.000±0.000[a] respectively.

Table 2. Effect of Plant Extracts on the Plant Height of Maize

S/N	Samples	WK 2 (cm^2)	WK 4 (cm^2)	WK6 (cm^2)	WK8 (cm^2)	WK10 (cm^2)	WK12(cm^2)
1	SAi25%	18.000±0.000 [a]	21.000±0.000 [a]	23.000±0.000 [a]	25.000±0.000 [a]	28.000±0.000 [a]	35.000±0.00 [a]
2	SAi50%	17.000±0.000 [a]	19.000±0.000 [a]	20.000±0.000 [a]	28.000±0.000 [a]	33.000±0.000 [a]	35.000±0.00 [a]
3	SAi75%	22.000±0.000 [a]	23.000±0.000 [a]	23.000±0.000 [b]	23.000±0.000 [b]	23.000±0.000 [b]	26.000±0.00 [a]
4	SAi100%	21.100±0.000 [a]	23.000±0.000 [a]	25.000±0.000 [a]	25.100±0.141 [b]	28.000±0.000 [a]	30.000±0.00 [a]
5	SLg25%	8.100±0.141 [a]	10.000±0.000 [a]	11.000±0.000 [a]	12.300±0.424 [a]	16.000±0.000 [a]	19.800±0.00 [a]
6	SLg50%	7.100±0.141 [b]	9.000±0.000 [a]	15.050±0.0707 [a]	19.150±0.212 [a]	19.200±0.000 [b]	24.000±0.00 [a]
7	SLg75%	10.050±0.141 [b]	13.000±0.000 [a]	15.250±0.0707 [b]	16.150±0.212 [b]	18.000±0.000 [a]	20.000±0.00 [a]
8	SLg100%	10.500±0.070 [b]	12.000±0.000 [a]	13.100±0.000 [a]	16.150±0.212 [a]	18.000±0.000 [a]	21.000±0.00 [a]
9	CONTROL	15.050±0.070 [b]	17.600±0.000 [a]	17.550±0.495 [b]	18.050±0.070 [b]	18.100±0.000 [b]	18.000±0.00 [b]

Results are in Mean± Standard deviation. Values with superscript 'a' are significant at 0.05% while value with superscript 'b' are not significant at 0.05%

3.3 Effect of Plant Extracts on the Plant Girth of Maize

Table 3 showed that maize sprayed with *Azadirachta indica* recorded significant growth in the plant girth at week 2 for SAi25% (11±0.00[a]) and SAi100% (12±0.00 [a]). Week 4, 6, 10 and 12 showed significant growth in the plant girth in all the treatments while SAi50% (12±0.00 [a]) and SAi75% (12±0.00 [a]) recorded a significant difference in the plant girth at week 8.

At week 2, maize sprayed with lemon grass showed no significant difference in the plant girth while at week 4, there was a significant difference in the plant girth except for SLg50% (9±0.00[b]). Week 6 and 12 recorded a significant difference in the plant girth for all the treatments while week 8 showed a significant growth in the plant girth except for SLg75% (16±0.00 [a]). Week 10 recorded significant growth in the plant girth only in SLg25% (14±0.00[a]) and SLg100% (15±0.00[a]).

Table 3. Effect of Organic and Synthetic Fungicides in the Control of Aflatoxin Production on the Plant Girth of Maize

S/N	Samples	WK 2	WK 4	WK6	WK8	WK10	WK12
1	SAi25%	11±0.00 [a]	13±0.00 [a]	14±0.00 [a]	18±0.00 [b]	22±0.00 [a]	24±0.00 [a]
2	SAi 50%	9±0.00 [b]	12±0.00 [a]	12±0.00 [a]	13±0.00 [a]	17±0.00 [a]	19±0.00 [a]
3	SAi 75%	8±0.00 [b]	11±0.00 [a]	12±0.00 [a]	12±0.00 [a]	14±0.00 [a]	16±0.00 [a]
4	SAi 100%	12±0.00 [a]	14±0.00 [a]	16±0.00 [a]	19±0.00 [b]	20±0.00 [a]	22±0.00 [a]
5	SLg 25%	9±0.00 [b]	12±0.00 [a]	12±0.00 [a]	14±0.00 [a]	14±0.00 [a]	16±0.00 [a]
6	SLg50%	6±0.00 [b]	9±0.00 [b]	10±0.00 [a]	11±0.00 [a]	15±0.00 [b]	17±0.00 [a]
7	SLg75%	8±0.00 [b]	10±0.00 [a]	11±0.00 [a]	16±0.00 [b]	19±0.00 [b]	22±0.00 [a]
8	SLg100	9±0.00 [b]	13±0.00 [a]	14±0.00 [a]	15±0.00 a	15±0.00 [a]	17±0.00 [a]
9	CONTROL	10±0.00 [a]	11±0.00 [a]	12.3±0.00 [a]	13±0.00 [b]	13±0.00 [b]	13.5±0.00 [b]

Results are in Mean± Standard deviation. Values with superscript 'a' are significant at 0.05% while value with superscript 'b' are not significant at 0.05%

3.4 Effect of Plant Extracts on the Cob Yield of Maize

In Table 4 maize sprayed with the plant extracts on the field, recorded that SAi50% gave a fresh weight of 413g (being the highest) while SLg25% was the lowest at 130g. For the dry weight, SAi50% recorded the highest weight (312g) while the lowest was SLg25% at 80g. The number of cob per plant recorded 1 for all the treatment while the cob diameter and cob length was highest in SLg100% at 8cm and 14 cm respectively.

Table 4. Effect of Plant Extracts on the Cob Yield of Maize

S/N	Sample No:	Fresh Weight(g)	Dry Weight(g)	No of cob/plant	Cob Diameter(cm)	Cob Length(cm)
1	SAi25%	322	220	1	4	12
2	SAi50%	413	312	1	4	11
3	SAi75%	312	267	1	6	10
4	SAi100%	201	187	1	4	9
5	SLg25%	130	80	1	4	9
6	SLg50%	214	83	1	6	8
7	SLg75%	326	241	1	6	10
8	SLg100%	300	281	1	8	14
25	**Control**	**330**	**210**	**1**	**5**	10

DISCUSSION

In this study, plant fungicides used in the control of fungi affecting the growth and cob yield of maize were plant extracts of *Azadirachta indica* and *Cympobogon citratus*.

The plant fungicides showed significant growth in the leaf area only for week 8 and 12 in all treatments while the growth in the leaf area varied for other weeks with *Azadirachta indica* showing more significant in the growth of the leaf area than *Cymbopogon citratus*. The result showed that both plant extracts used were effective in controlling fungi affecting maize in the field and hence a positive effect on the leaf area of the maize samples. This can be seen in the works of (Ojewumi *et al*., 2017) that plants produce an extensive range of phytochemical components which are secondary metabolites Phytochemicals are known to possess the capability to destroy or impede the growth of fungi. Phytochemicals help in the prevention of the adhesion of pathogens to cell walls. According to Das *et al*. (2002), *Azadirachta indica* (neem) helps to nourish and condition the soil, it is environmentally friendly, it is non-toxic and it can be used in combination with other pesticide and oil for more effectiveness. Anti-feedant properties found in neem compounds helps to protect the plants and pests generally do not develop a resistance to neem-based pesticides. A study carried out by Ujah *et* al. (2021), on the phytochemical constituents of neem leaves showed the presence of alkaloids, saponins, tannins, steroid, terpenoid, glycoside, flavonoid, phenol, oxalic acid and their abundance. These phytochemicals and antifungal substances may have been responsible for the minimal level of fungi affecting maize samples recorded in this study.

In evaluating the effect of plant fungicide sprayed on the maize field, the result on the plant height, showed that there was a significant difference in the plant height (at 0.05%) for all treatments at week 4 and 12 while it varied at other weeks. According to the results, it was also observed that there was a more significant growth in the plant girth with maize sprayed with *Azadirachta indica* extracts for week 4, 6, 10 and 12 in all treatments while it varied for maize sprayed with *Cympobogon citratus*. The result in this study showed that the *Azadirachta indica*

plant extract at 50% concentration recorded the highest weight for both fresh and dry. The number of cobs per plant recorded 1 for the treatments The cob diameter and length varied within the treatments with *Cymbopogon citratus* showing the highest cob diameter and length.

According to Hanaa *et al.* (2012), extracts from *Cymbopogon citratus* leaves have demonstrated the antioxidant, antifungal and the antimicrobial action. Usman and Bawa (2018), investigated the efficacy of plant extracts in controlling the pathogens fungal seed-borne pathogens of farmer-saved seed maize (*Zea mays* L.). The result showed that neem seed and lemon grass plant extracts had the potential in the protection of seed maize rot by fungi. The result from this study align with previous researchers. Result of phytochemical screening of lemon grass (*Cymbopogon citratus*) according to Gupta *et al.* (2019), showed the presence of flavonoids, phenol, tannins, cardiac glycosides, alkaloids and coumarins. *Cymbopogon citratus* may have acted by the production of antifungal substances (phytochemicals) which inhibited the growth of aflatoxin-producing fungi in the maize samples. Secondary metabolites are now thought to mediate chemical defense mechanisms by providing chemical barriers against animal and microbial predators (Williams *et al*., 1989; Juan, 2012). These findings may have led to an effective growth in the maize plants undertaken in this research.

CONCLUSION AND RECOMMENDATIONS

Azadirachta indica and *Cympobogon citratus* plant extracts were found to be efficient in this study in suppressing fungus that affected maize growth. Both plant extracts were successful at increasing maize output, as seen by the impact of the plant fungicide on growth metrics and cob yield. As a result, this study suggests using Azadirachta indica and *Cymbopogon citratus* as a plant fungicide to manage fungi that affect maize productivity and growth. The use of medicinal plants as plant fungicides should be further investigated.

This study also advises farmers to utilize plant extracts with antifungal qualities like Azadirachta indica and *Cymbopogon citratus* to prevent the growth of fungi in pre-harvest maize. Fungicide application and the various concentrations utilized should be taken into account while altering the study's methodologies. Additionally, there should be ongoing awareness of the advantages of employing plants as fungicides because they are good for the environment.

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