Antimicrobial Activity of the Crude Ethylacetate and Methanol Extacts from the Root Bark of Jatropha Curcas (LINN).

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***Abstract*-** This study was conducted to measure the antimicrobial activity of *Jatropha curcas* (Linn.) root bark extract against *Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa* and *Candida albicans*. The antimicrobial activity was carried out using agar diffusion method. The minimum inhibitory concentration (MIC) and minimum bactericidal/fungicidal concentration (MBC/MFC) was done using broth diffusion method. Broth extracts were found active against all the tested organisms with zone of inhibition ranging from 15 mm – 20 mm and 15 mm – 18 mm for ethylacetate and methanol extracts respectively and 50 – 100 mg/ml MBC/MFC. The ethylacetate extract was found to be bactericidal to all the organisms tested.
This result indicates the wide spectrum activity of this plant (extract) against micro organisms and can be used to treat topical ailments (infectious diseases).

***Index Terms*-** Antimicrobial, *Jatropha curcas,* MBC/MFC, MIC, Root bark.

I. INTRODUCTION

It is an established fact that almost all plants contain medicinal compounds which provide a source of inspiration for novel drug compounds [1]. Plants have been used for traditional medicine for centuries as arbortifacients, contraceptives, menstrual regulation and fertility control, treatment of ailment of both microbial and non-microbial origins.

Traditional medicine has continued to provide health coverage for over 80% of the world's population, especially in developing world [2]. The basic uses of plants in medicine as source of therapeutic agents and raw material are bases for the extraction of semi-synthetic chemical compounds such as cosmetics, perfumes and food additives will continue in the future [3].

Jatropha curcas is an ornamental plant used in traditional medicine against various ailments [4]. It is used to cure various ailments in Africa, Asia and Latin America [5]. It belongs to the family Euphorbiaceae and commonly called Barbados nut, Physic nut, Curcas nut, Purging nut and Pig nut [6].

II. MATERIALS AND METHOD

Sample collection

Fresh root bark of *Jatropha curcas* was collected from Mimyak in Kanke L.G.A of Plateau State in January 2010 and identified in Federal College of Forestry, Jos, Nigeria. The plant sample was washed with distilled water to remove sand. It was chopped into small sizes, and crushed into fine powder.

Extraction

The sample was extracted by soxhlet for 10 hours in ethylacetate and methanol. The extracts were concentrated using rotary evaporator to give gummy extracts.

Test Organisms

Clinical isolates of bacteria: *Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa* and the fungus *Candida albicans* were obtained from the Department of Microbiology, University of Jos and National Veterinary Research Institute (NVRI), Vom. The organisms were grown on nutrient agar (bacteria) and sabouraud dextrose agar (fungus).

Antimicrobial Assay

The antimicrobial activity of the crude ethylacetate and methanol extracts was determined using agar well diffusion method, the minimum inhibitory concentration (MIC) and minimum bactericidal/fungicidal concentration (MBC/MFC) by broth dilution method [7-8].

III. RESULTS AND DISCUSSION

The antimicrobial activities of the crude extracts from the root bark of *Jatropha curcas* as shown in Table 1 revealed significant activities against the four test organisms used- *Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pyogenes* and *Candida albicans*. The crude extracts of ethyl acetate and methanol, showed concentration dependent inhibitory effect on the test organisms. This shows that higher concentration of the extract could be used in treating infections caused by these organisms, since research has shown that anti-microbial drug resistance is fast developing among bacterial/fungal organisms [9]. The ability of the crude extracts to inhibit the growth of several bacterial and fungal species is an indication of the wide spectrum antimicrobial potential of *Jatropha curcas,* which makes the plant an important source for bioprospecting antibiotic and antifungal drugs.

Earlier studies reported the presence of tannins, alkaloids, flavonoids, saponins and steroids in both ethylacetate and methanol extracts [10] and also, the presence of some secondary metabolites in the root extracts of *Jatropha curcas* inhibited

some micro organisms isolated from sexually transmitted infections [11].

Flavonoids have been reported to have antimicriobial and antiviral activities [12]. Thus the activity of this plant may be due to the presence of the flavonoids and other secondary metabolites present in it.

Tannins are components of many traditional herbal medicine and many of them are cytotoxic to cell cultures thus exhibit antibiotic activity by complexation of extracellular enzymes that the pathogens produce with the metabolism of the pathogens itself [13]. Thus the presence of tannins can also contribute to this plant's antimicrobial activity. A novel diterpenoid lactam was also isolated from the roots of *Jatropha curcas* [14]. Saponins were reported to possess anti-microbial and anti-inflammatory activities and have effects on serum cholesterol [15-16]. This supports the use of the plant in the treatment of inflammation.

Staphylococcus aureus is a pyogenic bacterium known to play significant role in various skin diseases including superficial and deep follicular lesion [17]. The prevalence of *Staphylococcus aureus* resistant strains to conventional antibiotic has increased to high levels in some hospitals [18]. This extract could serve as a remedy to such resistance. Both extracts were active against all the tested organisms. The ethylacetate and methanol extracts are bactericidal since the MIC equals the MBC of the tested organisms. It can be observed that both extracts are bactericidal against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Candida albicans* as shown in Tables 2-3.

Table 1: Antimicrobial Sensitivity Test for the Crude Extracts of Ethylacetate and Methanol against test organisms

Test Organisms	Concentration (mg/ml)	Zone of Inhibition (mm) Ethylacetate	Zone of Inhibition (mm) Methanol
Pseudomonas aeruginosa	100	15	18
	50	12	-
	25	11	-
	12.5	10	-
	6.25	-	-
Staphylococcus aureus	Gentamicin	-	18
	100	15	15
	50	11	10
	25	-	-
	12.5	-	-
	6.25		-
Streptococcus pyogenes	Gentamicin	23	15
	100	20	15
	50	-	14
	25	-	-
	12.5	-	-
	6.25	-	-
Candida albicans	Gentamicin	20	-
	100	16	19
	50	-	-
	25	-	-
	12.5	-	-
	6.25	-	-
	Gentamicin	-	-

- : no sensitivity

Table 2: Results of Minimum Inhibitory Concentration (MIC) of the Crude Extracts

Test Organisms	Minimum Bactericidal concentration (mg/ml) Ethylacetate	Minimum Bactericidal concentration (mg/ml) Methanol
Pseudomonas aeruginosa	100	50
Staphylococcus aureus	100	50
Streptococcus pyogenes	50	50
Candida albicans	100	100

Table 3: Results of Minimum Bactericidal Concentration (MBC) of the Crude Extracts

Test Organisms	Minimum Bactericidal concentration (mg/ml) Ethylacetate	Minimum Bactericidal concentration (mg/ml) Methanol
Pseudomonas aeruginosa	100	100
Staphylococcus aureus	100	50
Streptococcus pyogenes	50	50
Candida albicans	100	100

IV. CONCLUSION

This study has investigated the antimicrobial activity of the root bark of *Jatropha curcas* (*Linn*) against common bacteria and fungus. This explains the use of *Jatropha curcas* for therapeutic purposes and should be harnessed for medicinal uses which may be of immense importance in the management of some economic diseases.

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