ANTIBACTERIAL ACTIVITY OF THE ESSENTIAL OILS FROM FOUR SELECTED VARIETIES OF *CAPSIUM ANNUUM*.

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ABSTRACT:
An in vitro antibacterial action of the essential oils from the fruits of four varieties of *Capsicum annuum* (U-SRCP, U-RSP, U-LP and N-YAP) was evaluated.. The oils exerted significant action against all the test organisms with N-YAP and U-SRCP showing the highest activities.

INTRODUCTION

Capsium annuum L. (Solanaceae) are known species for cooked dishes. Pepper fruits have been reported as being useful in the treatment of several kinds of ailments and have been used as counter irritants and carminatives [1]. *C. annuum* has also been recognised in the British and United States pharmacopoeia as a gastrointestinal stimulant and as a rubefacient as well as an anti-rheumatism decoction [2]

An infusion or decoction of the leaf is an effective regimen against ear pinnae or craw-craw. Herbalists in the treatment of broken limbs and revitalisation of collapsed veins and artilleries (personal communication) use the dried ground fruit. Extracts from plant species have been reported to inhibit the growth of some pathogenic bacteria [2]. Similar evidence has however been provided for *Capsicum* sp.

This study is therefore aimed at investigating the essential oils of four varieties of pepper fruits for their bioactive potentials against G+ve and G-ve pathogenic bacteria.

RESULTS AND DISCUSSION

60% diethyl ether was used as the diluent for the oils in the antimicrobial testing because preliminary screening of solvents showed no activity at this solvent composition.

Generally the undiluted oils showed significant ($p<0.01$) activity against all the test organisms with N-YAP oil showing the highest activity in both diluted and undiluted forms followed by U-SRCP oil (Table 1). Ideally, one would have expected less activity with increased dilution of the oil. In out study, the activity was most pronounced between 1:8 and 1:16 dilutions. This could be due to differences in the viscosity and concentration between the undiluted and diluted oil, which affect their respective diffusion rates within the agar matrix. Thus diluted fractions were able to diffuse faster resulting in wider zones of inhibition [4].

Comparatively, the oils were more active against G+ve than G-ve bacteria. The minimum inhibitory concentration (MIC) of the oils against the test organisms were found to be about 1:64 for G+ve bacteria. It is interesting to note that *Staphylococcus aureus* which is one of the organisms usually resistant to commonly used antimicrobial agents was found to be very susceptible to some of the oils of *C. annuum* variety.

MATERIALS AND METHOD

Plant Material

Fresh matured and ripe *Capsicum annuum* fruit, varieties of "acuminatum" (small red cluster pepper) U-SRCP; "grossum" Red sweet pepper (U-RSP); "Longum", long pepper (U-Lp) were all grown and harvested at Ibesikpo-Asutan Local government area of Akwa Ibom State. The fourth variety also a "grossum" known as the Nsukka yellow aromati pepper (N-YAP) was grown and harvested from Nsukka, Enugu State.

Test Organisms

Stock cultures of *Bacillus subtilis*, *Salmonella* spp., *Escherichia coli*, *Shigellia dysenteriae*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* were obtained from the Department of Microbiology culture collection, University of Uyo, Nigeria. All cultures were checked for purity and maintained on nutrient or brain heart infusion agar (Difco) stabs:slants and stored at 4°C.

Extraction

About 500g each of the ground fresh samples was separately extracted for essential oil with petroleum spirit (60 - 80°C) using the soxhlet apparatus and by steam distillation. Soxhlet extraction and steam distillation yielded 1.2% to 2.8% of oil respectively.

Antimicrobial Activity

The extracting solvents, the diluents and the essential oil extracts were separately tested for their activity against the test organisms by the tube dilution and cup-plate agar diffusion techniques [5,6,7]. The degree sensitivity was expressed as a measure of the diameter of zone of inhibition in mm. A zone of inhibition of 10mm diameter or higher was considered as an indication of the

sensitivity of the test organisms to the solvents; diluents or the oil extract.

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Table 3: Antibacterial activity of essential oil of four *Capsicum annuum* L varieties

Test organisms	Activities of essential oils as determined by cup plates method (Diameter of some inhibition in mm)																				
	Undiluted oils					Dilutions of the essential oils															
	U-SRCP	U-RSP	U-LP	N-YAP	Control diluent	U-SRCP					U-RSP					U-LP					N-YAP				
						1:4	1:8	1:16	1:32	1:64	1:4	1:8	1:16	1:32	1:64	1:4	1:8	1:16	1:32	1:64	1:4	1:8	1:16	1:32	1:64
S aureus	18	18	15	26	-	16	20	18	10	-	22	25	23	15	-	18	20	16	6	-	30	32	28	10	-
Salmonella Sp	21	20	18	24	-	23	28	26	6	±	20	24	20	10	±	20	23	22	8	-	25	30	22	15	-
E.oli	18	20	20	22	-	22	26	24	8	±	21	24	22	15	8	21	26	23	10	±	26	28	27	10	±
Shigellia dysenteriae	22	20	18	21	-	20	25	23	10	±	23	25	24	13	±	23	25	22	15	±	20	25	23	18	15
Pseudomonas aeruginosa	21	18	16	20	-	24	30	26	15	8	20	23	20	8	6	18	21	20	18	10	26	32	29	15	10
Bacillus subtilis	18	16	18	24	-	22	25	26	10	-	18	22	20	12	-	21	23	18	16	±	22	30	24	18	-

Diluent = Dimethyl sulfoxide (60%)

- = No activity i.e. no zone of inhibition

± = Undefined activity against test organism