

World Congress on  
**VIROLOGY, MICROBIOLOGY AND MICROBIOLOGISTS**  
November 19-20, 2018 Orlando, USA



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### Assessment of antimicrobial and antioxidant properties of ethanolic extracts of the leaves of *Dysphania ambrosoides* (L.), *Tithonia diversifolia* (Hemsly) A Gray and *Laggera alata* (D. Don)

**Statement of the Problem:** Plant constituents have broad spectrum in provision of their biological properties and structure and thus have become sources active natural products capable of curing many ailments. Regrettably, the therapeutic potentials of medicinal plants are yet to be fully harnessed in many countries. This research was designed to assess the antimicrobial and antioxidant properties of ethanolic extracts of the leaves of *Dysphania ambrosoides*, *Tithonia diversifolia* and *Laggera alata* on some pathogenic organisms.

**Methodology & Theoretical Orientation:** The phytochemical screening of the ethanolic extracts was conducted using standard methods. The antimicrobial activity of the extracts against six pathogens namely; *Escherichia coli*, *Salmonella Typhi*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Staphylococcus aureus* and *Candida albicans* was determined *in vitro* using the agar well diffusion method at concentrations ranging from 25 mg/ml to 200 mg/ml. Gentamycin and fluconazole were used as control. The Minimum Inhibitory Concentration (MIC) of the extracts was also determined using standard methods. The extracts were screened for the presence of phytochemicals and their inhibition of 2,2-Diphenyl-1-Picryl-Hydrazyl (DPPH) radical was used to evaluate their free radical scavenging activity. Standard Rutin, Standard Gallic and Vitamin C were used as reference antioxidants.

**Findings:** The phytochemical screening of the ethanolic extract of *Dysphania ambrosoides* revealed the presence of alkaloids, tannins, saponins, flavonoids, carbohydrates, steroids, cardiac glycosides, terpenes, while *Tithonia diversifolia* and *Laggera alata* revealed all of the above except saponins and terpenes. The sensitivity test revealed the zones of inhibition of *Dysphania ambrosoides* leaf extracts ranged between (6.00-16.00 mm) with the highest zone of inhibition being exhibited on *Bacillus subtilis* and the least on *Pseudomonas aeruginosa*, while the leaf extracts of *Tithonia diversifolia* ranged between (6.00-15 mm) with the highest zone shown on *Bacillus subtilis* and the least on *Pseudomonas aeruginosa*. Also, the zones of inhibition exhibited by antimicrobial activity of leaf extracts of *Laggera alata* varied from (6.00-16.00 mm) with the highest zone being shown on *Salmonella Typhi* and the lowest on *Pseudomonas aeruginosa*. There was no significant difference ( $p > 0.05$ ) between the extracts plant species with regard to their antimicrobial effects on the various test microorganisms. Also, the mean diameter zones inhibition exhibited by the crude extracts of the plants decreased as the concentrations of the extracts decreased. Overall, the antibiotic drugs used as control exhibited better antimicrobial potential as compared to the plant extracts with zones of inhibition ranging from 13-29 mm for gentamycin and from 14-25 mm for fluconazole. The MIC of the ethanolic extracts of the plant species against the test microorganisms varies between 25-100 mg/ml. The antioxidant activity of the plant extracts were low compared to the control. However, the scavenging effect of *L. alata* was found to be greater than those of *T. diversifolia* and *D. ambrosoides*. Thus, the inhibition concentration at 50% ( $IC_{50}$ ) was shown in increasing order  $0.397 \pm 0.00 \mu\text{g/ml} < 10.20 \pm 0.50 \mu\text{g/ml} < 57.60 \pm 3.87 \mu\text{g/ml} < 32.03 \pm 3.45 \mu\text{g/ml} < 51.00 \pm 6.7 \mu\text{g/ml} < 363.30 \pm 8.47$  for vitamin C, Standard Gallic, Standard Rutin, *L. alata*, *T. diversifolia* and *D. ambrosoides* respectively.

**Conclusion & Significance:** The findings of the present study suggest that the ethanolic extracts of the test plants possess significant antimicrobial and antioxidant activities as well as pharmaceutical potentials which make them potential candidates as natural chemoprophylactic agents. Studies are required to further elucidate antimicrobial and antioxidant potentials using *in vivo* biochemical and molecular biology techniques.

#### Biography

Janet Uchechukwu Itelima has her expertise in Applied Microbiology and passion in research related to applied microbiology, biotechnology and plant science, lecturing and community services. She has obtained her PhD and currently an Associate Professor of Applied Microbiology. She is an Academic Staff of the Department of Plant Science and Biotechnology, Faculty of Natural Sciences University of Jos, Nigeria. She has published over 45 papers both nationally and internationally. She has also written two books. She is an Editor of Direct Research Journal of Agriculture and Food Science and a Reviewer of articles published in several journals both nationally and internationally. She has attended workshops and conferences both home and abroad, where she presented papers, chaired sessions and served in advisory committee.

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