EFFICACY OF PHYTOCHEMICALS FROM FOUR SPECIES OF ALOE IN THE CONTROL OF SOME PLANT PATHOGENS

BY

ADEYEMO, OLUWASEUN RUQAYAH

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ABSTRACT

Aloe plants, like other lilies are rich in phytochemicals which are known to have pronounced biological and physiological consequences for microbes. This study is aimed at determining the phytochemical constituents and the antimicrobial properties of the leaf and root extracts of four species of aloe on some pathogens of agricultural importance in order to determine the appropriate parental genotypes for breeding of new variety of aloe with more potent phytoconstituents. The four species of aloe used are *Aloe keayi, Aloe macrocarpa* var. *major, Aloe schwenfurthii* and *Aloe vera.* Their antibacterial properties were investigated using *Bacillus cereus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa Pseudomonas syringae pv phaseolicola, Xanthomonas axonopodis pv. manihotis, Xanthomonas axonopodis pv. vignicola, Staphylococcus aureus* while *Sclerotium rolfsii, Trichoderma rubrum, Colletotrichum lindemuthiamum* were used to investigate their fungicidal properties.

Proximate analysis reveals that all the four aloe species under investigation are rich in nutrients but *A. schwenfurthii* can be stored for a longer period because it contains low amount of water. Phytochemical screening shows that the leaf and the root extracts of the four aloe species contain alkaloids, tanins, saponins, terpenoids, flavonoids, cardiac glycosides, phytates and oxalates. However, steroids are present only in the root and leaf of *Aloe macrocarpa* var. *major* and *Aloe schwenfurthii*. Though the study establishes that the four aloe species contain biorationals with antibacterial and antifungicidal properties, the phytochemicals are highly concentrated only in the root and leaf of *A. marcrocarpa* var. *major* and the root of *A. schwenfurthii* var. *major*. This

presents *A. macrocarpa* var. *major* and *A. schwenfurthii* as the most suitable parental genotypes for the breeding of an aloe with more potent biocides.

CHAPTER ONE

INTRODUCTION

The therapeutic use of plants certainly goes back to the Sumerian and the Akkadian civilizations in about the third millennium BC. Hippocrates (ca. 460–377 BC). One of the ancient authors who described medicinal natural products of plant and animal origins, listed approximately 400 different plant species for medicinal purposes. Natural products have been an integral part of the ancient traditional medicine systems (Sarker & Nahar, 2007). The science of application of these indigenous or local medicinal remedies including plants for treatment of diseases is currently called ethno pharmacology but the practice dates back since antiquity. Ethno pharmacology has been the mainstay of traditional medicines in the entire world and currently, it is being integrated into mainstream medicine (Heinrich *et al*., 2004). Plants used in this way will have their parts including leaves, roots, rhizome, stems, barks, flowers, fruits, grains or seeds employed in the control or treatment of a disease condition and therefore contains chemical components that are medically active. These non-nutrient plant chemical compounds or bioactive components are known as phytochemicals (‘phyto-‘ from Greek meaning ‘plant’) or phytoconstituents and are responsible for protecting the plant against microbial infections or infestations by pests (Liu, 2004; Nweze *et al*., 2004; Doughari *et al*., 2009). The study of natural products on the other hand is called phytochemistry. Phytochemicals have been isolated from fruits such as grapes and apples, vegetables such as broccoli and onion, spices such as turmeric, beverages such as green tea and red wine, as well as many other sources (Doughari and Obidah, 2008; Doughari *et al*., 2009). They are factors used in the characterization of members of a plant group that are closely related. The components with phenolic structures like carvacrol, eugenol, and thymol, are known to be highly