SEASONAL VARIATION OF THE CHEMICAL COMPOSITION OF ESSENTIAL OILS FROM *BURSERA LUNANII, B. SIMARUBA, B. AROMATICA* AND *B. HOLLICKII* AND THEIR BIOLOGICAL ACTIVITIES

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ABSTRACT

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The thesis is presented in three sections (sections 1, 2 and 3). Section 1, Chapter 1 documents literature reports of *Bursera* isolates and the chemical composition of their essential oils and summarizes some of the more important medicinal properties of the genus. In chapter 2, a brief review of the retention indices system used in Gas Chromatography is discussed. Van den Dool and Kratz along with the Kovats retention indices principles are examined. The review presents Kovats retention index system as the dominating general - purpose system.

Section 2 (chapter 3 to 6), presents the qualitative and quantitative results obtained from analysis of the volatile secondary metabolites found in the leaf, bark and fruits of *Bursera simaruba*, *B. lunanii* and *B. aromatica* along with the leaf and bark of *B. hollickii*, using capillary GC and GCMS. A single experimental for all three chapters (3 – 6) is presented at the end of chapter 6.

Most of the oils were predominantly characterized by monoterpene hydrocarbons and, to a lesser extent, sesquiterpenes. The major monoterpenes for all the oils were α and β-pinene, while the major sesquiterpenes were β-caryophyllene and caryophyllene oxide. The volatile secondary metabolites present in the plants over the seasons were fairly similar.

Section 3 (chapter 7 to 9), gives an account of selected biological assays of the oils obtained from the four *Bursera* species studied. Chapter 7 details the investigation of the essential oil extracts for antibacterial activity against six common pathogens. *Bursera simaruba* and *B. lunanii* showed notable antibacterial activity against all six pathogens. Chapter 8 presents the insecticidal activity of the oils against adult, sweet potato weevil (*Cylas formicarius elegantulus*). *B. hollickii* showed significant insecticidal activity against sweet potato weevil after 48 hours. Finally, chapter 9 presents the investigation of the antioxidant activity of the essential oils studied. None of the *Bursera* species investigated possessed antioxidant activity. A single experimental is presented at the end of chapter 9 for this section.

The thesis present results that is useful for academic advancement of the knowledge on Jamaican plants belonging to the genus. These findings also give credence to the ongoing search for locally available plants whose extracts possess significant biological activities. It is our opinion that *B. simaruba, B. lunanii* and *B. hollickii* could be cultivated to be used as a source of naturally derived antibacterial and insecticidal agents for the pharmaceutical and agricultural industries.

Keywords: Grace – Ann Ofelia Junor; *Bursera*, Van den Dool; Kratz; Kovat; retention indices; Gas Chromatography; α-pinene; β-pinene; β-caryophyllene; antibacterial; pathogens; insecticidal; *Cylas formicarius elegantulus* and antioxidant.