ABSTRACT

Phytochemical Studies on

Solanum arboreum, Solanum asperum,

Solanum stramonifolium and *Solanum triste*

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The isolation, characterization and biological screening of steroidal alkaloids and other secondary metabolites from four *Solanum* species of Trinidad are the subject of this dissertation.

The phytochemistry of *Solanum* is reviewed in **Chapter one**. In this chapter the biosynthesis and biological activities of steroidal alkaloids and the application of modern structure elucidation techniques (mass, 1D and 2D NMR spectroscopy) to these compounds are discussed. Secondary metabolites of *Solanum* recently reported in the literature is also reviewed in this chapter.

In **Chapters two to four** the isolation of the 3-hydroxysteroidal alkamine, tomatidine, nine 3-aminosteroidal alkaloids and five glycoalkaloids by silica gel chromatography as well as the structure elucidation of these compounds using mass spectroscopy and high field NMR experiments, viz. ^{1}H, ^{13}C, ^{1}H-^{1}H COSY,

HMQC, HMBC, TOCSY, NOESY and ROESY are discussed. From *S. triste* the known compounds 5α-solasodan-3β-amine and 5α-solasodan-3α-amine were isolated along with three new epimeric steroidal alkamines of the rare 3-aminospirosol-5-ene type. Sodium borohydride reduction of one of the new 3-aminospirosol-5-ene alkamines afforded a new 22,26-epiminocholest-5-en-3β-amine. *S. arboreum* yielded one new saturated and one new unsaturated 3-aminospirosolane, two new tomatidine glycosides and the known alkaloids solacallinidine, soladunalinidine and tomatidine. The known γ-solamarine and its new 5,6-dihydro derivative were identified from a mixture of their acetates. *S. stramonifolium* gave the well known solasodine glycoalkaloid, solamargine, which was isolated and characterized as its peracetylated 22,26- epiminocholest-5,22-diene-16β-ol derivative.

The isolation and identification of the kaempferol glycoside, robinin, the known lignan, syringaresinol, and its monoglucoside from *S. asperum* are dealt with in **Chapter five**.

Finally in **Chapter six** the bioactivity of the crude plant extracts and some of the pure compounds using the brine shrimp bioassay is discussed. In addition the results obtained from an antifeedant bioassay using *Spodoptera frugiperda* and the ryanodine displacement

binding affinity bioassay on selected isolates are also discussed in this chapter.

Keywords: *Solanum*; steroidal alkaloids; 22,26-epiminocholestanes; spirosolanes; solasodine; tomatidine; flavonoids; kaempferol; lignans; syringaresinol; bioactivity; brine shrimp assay; antifeedant bioassay; ryanodine displacement binding affinity bioassay and calcium channel regulating activity.