دراسات كيميائية حيوية على بعض المركبات الفعالة المستخلصة من قلف الجذر لشجرة التوت وتأثيرها على الأمراض الفطرية والبكترية

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للحصول على

درجة دكتور فلسفة في العلوم الزراعية

(كيمياء حيوية زراعية)

قسم الكيمياء الحيوية الزراعية

كلية الزراعة – جامعة عين شمس

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صفحة الموافقة علي الرسالة

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BIOCHEMICAL STUDIES ON SOME ACTIVE COMPNENTS EXTRACTED FROM MULBERRY ROOT BARK AND THEIR EFFECTS ON FUNGAL AND BACTERIAL DISEASES

BY

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ABSTRACT

Rania Abdou Abdou Hessien. Biochemical studies on some active components extracted from mulberry root bark and their effects on fungal and bacterial diseases. Unpublished, Doctor of Philosophy in Agricultural Science, Ain Shams University, Faculty of Agriculture, Department of Agricultural Biochemistry, ٢٠٠٧.

The investigation aims to study the hepatoprotective, anti-tumor, antioxidant, antibacterial and antifungal activities of total saponin mulberry root bark and its toxicity effect. In addition to that, separation and identification of new triterpenoid saponins using spectroscopic methods (UV, IR, FAB-MS and ^{1}H NMR) and their biological activities were investigated.

The results of the present investigation could be summarized in the following :-

١) The yield of total saponin (TS) was ٠,٥٪ of dry plant. While, sapognin was recorded ٢٤,٥٪ of TS as betulin. Sugar moiety of TS was consisted mainly from fructose, galactose, glucose and rhamnose.

٢) The pre- and post-treatment with TS protected liver from sever toxic effect and histopathological changes due to CCl_4-hepatotoxicity.

٣) Antitumor activity of TS was recorded ٩٠٪ using Erlish cells.

٤) Antioxidant activity of TS at a concentration ٢٠٠ppm was ٧٥,٧٪ comparing with control after ٨days of oxidation.

٥) TS at different concentrations (٢٥٠, ٥٠٠, ١٠٠٠ and ٢٠٠٠μg/ml) had moderate activity against *Bacillus subtilis, Pseudomonas sp.* and *Proteus vulgaris*. Also, it had weak activity against *Eschericha coli* and *Streptomyces sp.* and no effect against *Erwinia amylovora* was observed.

٦) TS at different concentrations (٢٥٠, ٥٠٠, ١٠٠٠ and ٢٠٠٠μg/ml) reduced the linear growth of *Rhizoctonia solani, Sclerotium rolfsii, Fusarium oxysporum, Botrytis cinerea* and *Alternaria alternata*. The

highest effect was observed in case of *S. rolfsii* and *B. cinerea*. This effect proved by biochemical, electrophoresis and SEM studies. Also, greenhouse experiment proved that TS as a natural plant substance could be used for root-rot disease control induced by *S. rolfsii* and promoted some growth parameters in tomato seedlings.

٧) No toxicity effect of TS at a dose of ٢٠٠ or ٤٠٠mg/Kg b.w., was observed when it gave to health rats oral daily for ٣٠days.

٨) Five triterpenoid saponins from mulberry root bark, (A) ٣-O-glucopyranosyl-betulin-٢٨-O-fructopyranosyl, (B) ٣-O-glucopyranoside ursolic acid, (C) ٣-O-fructopyranosyl-O-rhamnopryransyl-٧ methyl ursolic acid-٢٨-O-glucopyranosyl-Oxylopyranosyl, (D) ٢٨-O-glucopyranoside-٦ hydroxy betulinic acid and (E) ٣-O-rhamnopyraosyl-oleanolic acid-٢٨-O-glucopyranosyl were separated and identified. These components were evaluated for anti-tumor, antioxidant, antibacterial and antifungal activities. The most effective components were A, B, and C.

Key words: hepatoprotective, antitumor, antioxidant, antibacterial, antifungal, total saponin mulberry root bark, toxicity effect, triterpenoid saponins, histopathological changes, electrophoresis, SEM, greenhouse, betulin, ursolic acid, ٧-methyl ursolic acid, ٦ hydroxy betulinic acid and oleanolic acid .

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