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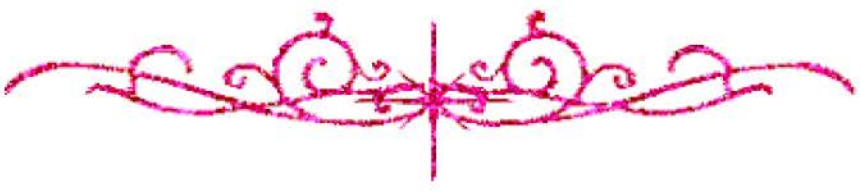

بالرسالة صفحات لم ترد بالأصل

PHOTOSENSITIZATION PROCESSES TO CONTROL WHITEFLY (*Bemesia tabaci*)

A THESIS

Submitted for partial fulfillment of master degree in Laser Science (Photochemistry), from department of environmental, photochemistry and agriculture applications

PRESENTED BY

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To my family

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Firstly thanks to my god

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Abstract

There are more than 1000 whitefly species exist in the world. The sweet potato whitefly (*Bemisia tabaci*) is one of the most pestiferous of the group. It attacks more than 500 species of plants from 63 plant families. The damages caused by whitefly are weakening, and early wilting of the plant, reduction of the plant growth rate and yield. It may also causes leaf chlorosis, leaf withering, premature dropping of leaves, and plant death. Honeydew produced by the whitefly serves as a substrate for the growth of black sooty mold on leaves, and fruit. The mold reduces photosynthesis, and lessens the market value of the plant or yields it unmarketable. In addition to vectoring of plant viruses by this insect plant viruses transmitted by whiteflies cause over 40 diseases of vegetable, and fiber crops worldwide.

In this study we use natural, and artificial light as well as laser radiation with porphyrine, and phthalocyanine derivatives as a novel technique for control eggs, nymphs, and adults of whitefly (*Bemisia tabaci)* (Gennadius). Hematoporphyrine (IX), and phthalocyanine tetrasulfonate posses, several favorable features for such application as photopesticides due to: (1) they are endowed with a high quantum yield for generation of highly cytotoxic intermediates. (2) They absorb essentially all wavelengths in the sun emission spectrum. (3) They typically act at the level of cell membranes minimizing the induction of mutagenic effects, and the onset of photoresistance. (4) They have high photosensitizing activity towards biological systems in addition; they are already approved for medical use in photodynamic therapy of tumors and other diseases.

The efficacy of the used photosensitizers depends on the concentration, the fluence rate of irradiation, and the exposure time.

The results reveal- that- the concentration 10^{-2} mol dm^{-3} of HP caused 100 % mortality for nymphs, adults and 92 % mortality for eggs, that exposed to sunlight (390 - 490 W/m^2). The concentration 10^{-4} mol dm^{-3} of HP caused 72% mortality for adults, 96% mortality for nymphs, and 45 % mortality for eggs at the same sunlight intensity. It is found that, the average of solar irradiance in a sunny day in Cairo was about 550 W/m^2 , and 250 W/m^2 in summer, and winter respectively. The concentration 10^{-2} mol dm^{-3} of HP caused 100 % mortality for adults, 76 % mortality for nymphs, and 33 % mortality for eggs after exposure to He – Ne laser (10 mW).

The concentration 10^{-2} mol dm^{-3} of phthalocyanine gave 100 % mortality of nymphs, adults and gave 84 % mortality of eggs using sunlight (390 - 490 W/m^2). The concentration 10^{-2} mol dm^{-3} of phthalocyanine caused 100% mortality of adults, 49 % mortality of nymphs, and 43 % mortality of eggs after exposure to diode laser (4 mW). From the above results, it can be concluded- that- hematoporphyrine, and phthalocyanine are active, against all stages of the whitefly's lifecycle as a class of useful photopesticides.

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