

STUDIES ON FACTORS AFFECTING THE STABILITY OF CERTAIN BIOPESTICIDES

By

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APPROVAL SHEET

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SUPERVISION SHEET

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ABSTRACT

Biopesticides especially the entomopathogenic bacterium *Bacillus thuringiensis* (*B.t*) has been used in crop protection for the last 70 years, but most of the biopesticides have macromolecules containing several chemical active groups causing the compounds to be easily broken down, as also less stable under environmental conditions. So, the current study was directed to evaluate the influence of certain environmental conditions on the stability and biological activity of two commercial formulations of *B.t* (Dipel 2X 6.4% WP and Protecto 9.4% WP), two commercial formulations of spinosyns (Tracer 24% SC and Radiant 12% SC) in addition to, two commercial formulations of emamectin benzoate (Proclaim and Broact 5% SG). The tested biopesticides were stored under accelerated hot storage, outdoor and ambient shelf storage. Also, photolysis studies were carried out by exposing samples to UV and sunlight in aqueous solutions. Parallel a bioassay test was carried out to assess the biological activity of each bioinsecticide against neonate and the 2nd larvae instar of the cotton leafworm *Spodoptera littoralis*. The results revealed that the loss% of all tested bioinsecticides after storage for two years was above the permissible limits of WHO and FAO specifications except Dipel 2X. In accordance with this trend, the bioassay tests revealed decreased in their biological activity (LC₅₀'s) against neonate and the 2nd instar larvae of cotton leafworm. Moreover, biological activities of the samples stored under direct sunlight and UV were reduced to half values of their LC₅₀. Photolysis of aqueous solutions for bioinsecticides reduced the half-life especially in the case of emamectin benzoate formulation. Generally, it could be concluded that the stability of bioinsecticides could be properly evaluated prior to submission for registration as these products showed less stability under storage at ambient conditions. Also, the decision makers will take these results into considerations and examine such products case by case.

Key words: *Bacillus thuringiensis*, spinosyns, emamectin benzoate, stability, photolysis, biological activity

DEDICATION

I dedicate this work to the spirit of my father, and my mother Allah save her, and my brothers for all the lovely support they offered during my studies, and whatever I said about them will be little in their right to, I will not forget the role of my wife who helps me during this period and she always close to me, and in the most difficult moments was like the bright candle that illuminated my way, to my children Zeyad and Aisel.

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CONTENTS

	Page
INTRODUCTION	1
REVIEW OF LITERAURE	9
1. General background for utilized bioinsecticides	9
a. <i>Bacillus thuringiensis</i> (<i>B.t</i>).....	9
b. Spinosyns (spinosad and spinetoram).....	12
c. Emamectin benzoate (avermectins).....	15
2. Effect of storage on active ingredient of pesticides formulations	17
3. The effect of sunlight and UV light exposure on stability the active ingredients of pesticides	32
MATERIALS AND METHODS	53
1. Biopesticides	53
a. <i>Bacillus thuringiensis</i> formulations.....	53
(1) Dipel 2X.....	53
(2) Protecto.....	53
b. Spinosyns formulations.....	54
(1) Tracer.....	54
(2) Radiant.....	55
c. Emamectin benzoate formulations.....	56
(1) Proclaim.....	56
(2) Broact.....	57
2. Storage and photodegradation tests	58
a. Storage tests.....	58
b. Aqueous photolysis.....	59
(1) Preparation samples of <i>B.t</i> formulations.....	60
(2) Preparation samples of spinosyns and emamectin benzoate formulations.....	61
c. Photodegradation under UV light	61
(1) Preparation samples of <i>B.t</i> formulations.....	62
(2) Preparation samples of spinosyns and emamectin benzoate formulations.....	62
3. Preparation samples for analyzed	63
a. Preparation samples of <i>B.t</i>	63

CONTENTS (continued)

(1) Strain standard.....	63
(2) Preparation samples of <i>B.t</i> formulations.....	63
(3) <i>B.t</i> Active ingredient determination	64
b. Preparation samples of spinosyns and emamectin benzoate.....	65
(1) Preparation of analytical standard curve	65
(2) Preparation samples of spinosyns and emamectin benzoate formulations.....	65
(3) Active ingredient determination of spinosyns and emamectin benzoate.....	66
4. Half-life calculation	66
5. Insect rearing and bioassays.....	67
a. Insect source.....	67
b. Bioassays.....	68
6. Statistical analysis.....	69
RESULTS.....	70
1. Effect of storage at different temperatures, shelf life, and sunlight on active ingredient stability of commercial formulations.....	70
a. Effect of storage under accelerated hot storage and shelf life.....	70
b. Effect of storage under direct sunlight.....	75
2. Effect of storage at different conditions on the efficacy of bioinsecticides against <i>S. littoralis</i> (Boisd) larvae.....	78
3. Effect of various sources of water on bioinsecticides photolysis.....	90
4. Photodegradation of bioinsecticide formulations under UV light.....	100
DISCUSSION.....	105
CONCLUSIONS.....	116
SUMMARY.....	118
REFERENCES.....	124
ARABIC SUMMARY	