COMPATIBILITY OF BEAUVERIA BASSIANA WITH THREE COMMERCIAL PESTICIDES VIZ. ENDOSULFAN, CHLOROPYRIFOS AND MENCOZEB

MANJULA R. THOMAS AND MADHUP R. BAILEY

Department of Botany, St. John's College, Agra – 282 002, India

I. INTRODUCTION

Pesticides are extensively used to control a wide array of agricultural pests for growing crops. As several pests attack vegetables, they are produced under very high input pressure. For better yield and quality, insecticides are repeatedly applied during the entire period of growth and sometimes even at the fruiting stage. The pesticides are absorbed by the vegetables & consumed by human beings, it may be hazardous if safe waiting period is not adopted (Beena Kumari et. al. 2002).

Three pesticides were selected, out of which Chlorophyrifos and Endosulfan are insecticides while Mancozeb is fungicide. Endosulfan is one of the promising pesticides found effective against pests of brinjal, it acts as a poison to a wide variety of insects and mites on contact. Chloropyrifos was originally used to kill mosquitoes, now it is effective in controlling cutworms, cockroaches, termites and ants etc. It acts as a contact poison.

Mancozeb is used to prevent crop damage in the field and to protect harvested crops from deterioration during storage or transport. It is used to protect fruits, vegetables, nuts and field crops against a wide spectrum of dIseases, including potato blight, leaf spot, scab (on apples and pears) and rust (on roses).

Over 750 fungal species are known to infect insects. The most promising mycoinsecticide among them is *B. bassiana*, its hyphae penetrate cuticle and proliferate in the insects body. The infected insect dies in 3-5 days of hyphal penetration. *B. bassiana* is insect specific.

Recently compatibility studies on *Beauveria bassiana* with insecticides, fungicides and some neem based formulation wer carried out (Anderson et al 1989, Keller 1983, Loria et al, 1983, Aguda et al, 1984; Margues et al, 1984, Gardner and Story 1985, Preveling and Weyrich 1992, Firoj et al 1993, Keller et al 1993 Quintela and Meliy 1997, Alves et al, 1998. Delgado et al. 1999, Dobrowolski and Popowska 1999 and Gupta et al, 1999).

Annderson et al, 1989 assessed formulation combination of *B. bassiana* and 5 insecticides for compatibility and efficacy for the control of Leptinotarsa decemlineata. Natural pesticides offer a unique opportunity in improving safety to applicators and consumers and protecting the environment, they are much less hazardous to non target species and prevent of atleast delay, the development of resistance in target pests.

II. MATERAILS AND METHODS

Beauveria bassiana was isolated in pure culture on Sabouraud's Dextrose Agar (SDA) medium.

Three commercial pesticides viz., Endosulfan (Excel Industries Ltd. Mumbai), Chloropyrifos (Thakur Chemicals Ltd., Bahadurgarh) and Mancozeb (Indophil Chemicals, Mumbai) were selected. Three different dilutions, for each i.e. 0.2%, 0.15%, 0.05%, 0.025%, 0.0125% and 0.03%, 0.0225%, 0.015% were prepared of Mancozeb, Endosulfan, and Chloropyrifos respectively, taking the active ingredient of chemicals into consideration in PDA medium. Beside these three pesticides one biocides (Multineem) is also chosen and two dilutions i.e. 300 and 600 ppm were prepared in PDA medium.

The effect of all above preparations was tested on growth of *B. bassiana*byh poisoned food technique (Nene and Thapliyal, 1993). With the help of sterile cork borer, discs of 6 mm diameter were cut from actively growing culture of the fungus and transferred to centre of petridishes containing the desired diluton together with the medium. The inoculated dishes were incubated at 22-25ºC and observation on radial growth of colony (cm) on 4^{th}, 6^{th}, 8^{th}, 10^{th} and 12^{th} days after inoculation (days) on PDA were recorded. Four replicats in PDA medium were maintained for each treatment including one set of control.

III. OBSERVATION

The data recorded in Table No. 1, 2, 3 and 4 revealed differential radial growth of experimental organism i.e. *B. bassiana* in response to different concentration of various chemicals.

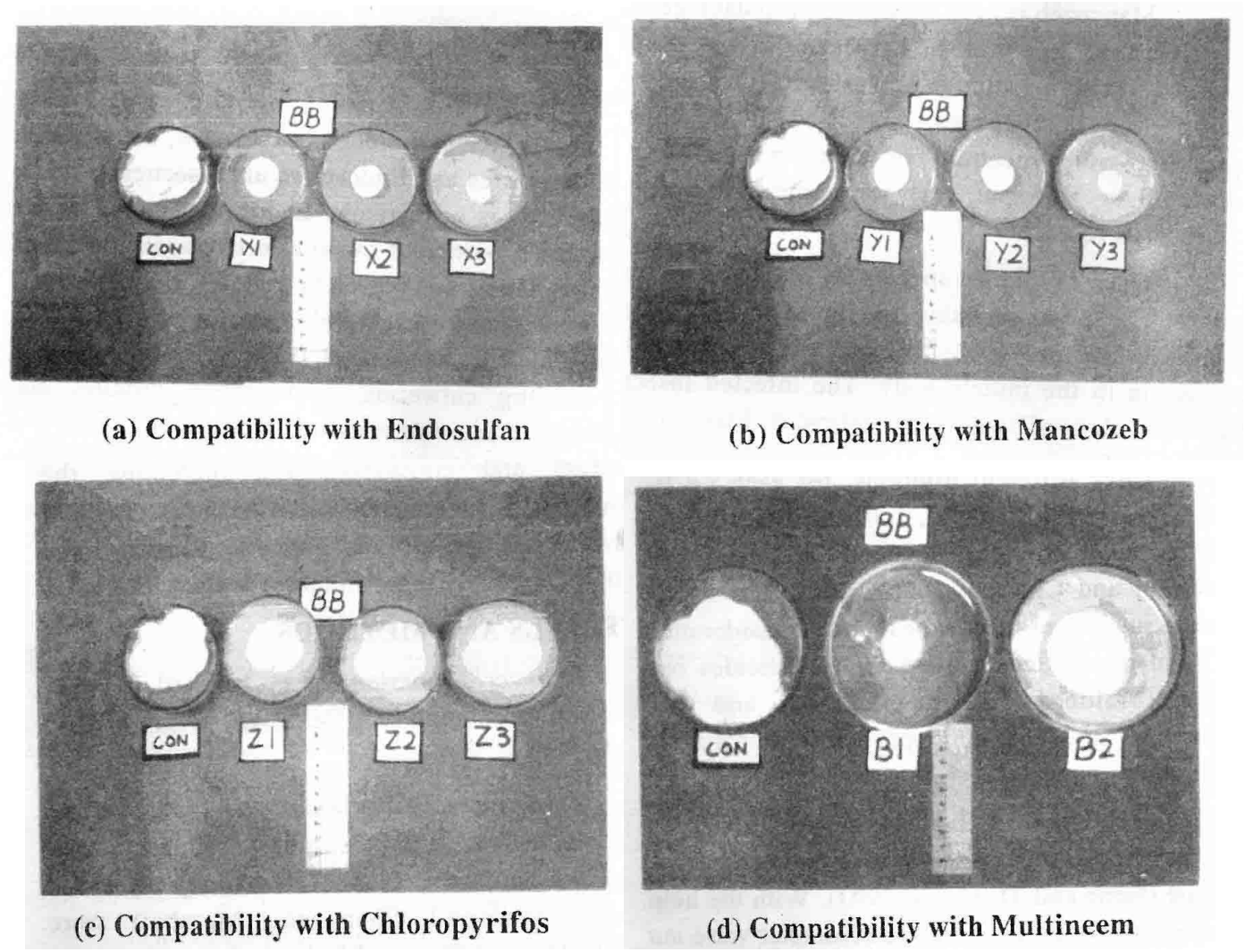
In Endosulfan maximum radial growth 3-50cm was recorded in 0.0125% concentration after 12 days (Table No. 1) where as minimum radial growth of fungus 2.60 cm was found in 0.05% concentration. Based on radial growth, the effect of different concentration of Endosulfan on growth of *B. bassiana* after 12 dayhs was in following order.

Table-1 : Effect of Different Concentration of Endosulfan on Growth of *Beauveria bassiana*.

Pestidide	Conc. (%)	No. of days (radial growth in cm)				
		4	6	8	10	12
Endosulfan	0.05	1.30	1.70	2.10	2.20	2.60
	0.028	1.50	2.10	2.50	2.70	3.10
	0.0125	1.60	2.4	2.90	3.10	3.50
Control		2.60	3.40	4.00	5.10	6.00

0.0125% (3.50cm) > 0.025% (3.10 cm) > 0.05% (2.60 cm).

PLATE 1



Radial growth of *B. bassiana* in different doses of chemicals

From (Table No. 2) it is clear that 0.015% concentration of Chloropyrifos favoured maximum growth of *B. bassiana*. It is clear that 0.015% concentration of Chloropyrifos favoured maximum growth 2.5cm was recorded in 0.03% of Chloropyrifos after 12 days. The increasing order of inhibitory effect of various concentrations of Chloropyrifos on radial growth was as follows.

Table-1 : Effect of Different Concentration of Chloropyrifos on Growth of *Beauveria*.

Pestidide	Conc. (%)	No. of days (radial growth in cm)				
		4	6	8	10	12
Endosulfan	0.03	0.70	1.50	1.80	2.20	2.50
	0.0225	0.80	1.90	2.50	2.80	3.10
	0.015	1.40	2.00	2.50	3.30	3.50
Control		2.60	3.40	4.00	5.10	6.00

0.015% (3.50 cm) > 0.0225% (3.10 cm) > 0.03% (2.50 cm).

Table No. 3 revealed the compatibility between mancozeb (fungicide) and *B. bassiana*. Maximum radial growth after 12 days of *B. bassiana* was 3.60cm in 0.15% concentration of Mancozeb. In 0.20% concentration of Mancozeb on radial growth after 12 days was in following order.

Table-3 : Effect of Different Concentration of Endosulfan on Growth of *Beauveria*

Pestidide	Conc. (%)	No. of days (radial growth in cm)				
		4	6	8	10	12
Endosulfan	0.05	1.30	1.70	2.10	2.20	2.60
	0.025	1.50	2.10	2.50	2.70	3.10
	0.0125	1.60	2.4	2.90	3.10	3.50
Control		2.60	3.40	4.00	5.10	6.00

0.015% (3.60) > 0.10% (3.30) > 0.20% (3.00 cm)

Results of compatibility studies between biocide (multineem) and *B. bassiana* were tabulated in table No. 4, From the data it is recorded that higher concentration (600ppm) of multineem is detrimental to the radial growth of fungus (3.1cm) where as in 300ppm it was (4.2cm) after 12 days.

Table-4 : Effect of Multineem on the Growth of *Beauveria bassiana*.

Pestidide	Conc. (%)	No. of days (radial growth in cm)				
		4	6	8	10	12
Endosulfan	300	2.1	2.6	3.1	3.4	4.2
	600	1.6	2.1	2.5	2.9	3.1
Control		2.5	3.4	4.0	5.0	6.0

In control, the radial growth of *B. bassiana* was maximum i.e. 6.00 cm after 12 days.

On comparing the radial growth of the experimental organisms in reponse to the three chemicals the overall declining order is;

Biocide > Mancozeb > Endosulfan > chloropyrifos

IV. DISCUSSION

It is clear from tables that with the increase in the concentration of chemicals a declining trend was noticed in the radial growth of *B. bassiana.*

Endosulfan which is chemically an insecticide has inhibitory effect on the growth of *B. bassiana* with increasing concentration. The lowest concentration of 0.0125% concentration favours the growth of the fungus with 3.5cm, which is maximum. Similar results were also obtained with Chloropyrifos (insecticide) compatibility studies between other insecticides and *B. bassiana* were made by Anderson and Roberts (1983); Vyas et al, (1990) and Firoj et al, (1993).

In present investigation compatibility studies of *B. bassiana* with the fungicide Mancozeb showed that in low concentration 0.15% of Mancozeb, the growth of the fungus was maximum 3.60 cm after 12 days. Therefore the particular concentration favours the growth of the fungus, however it is less in comparison with control (6.00cm) but maximum in comparison with Endosulfan and Chloropyrifos. Hsiao and Lin (1995), evaluated eight fungicides "in vitro" commonly used in vegetable fields for their effect on survival and growth of *B. bassiana*.

Todorova et al, (1998) evaluated the effect of 6 funcicides on *B. bassiana*. All fungicides tested with glufosinate inhibited *B. bassiana* mycelial growth on sporulation.

Compatibility studies between B. bassiana and multineem showed that higher concentration of multineem (600 ppm) inhibit the radial growth of fungus. It was 3.1 cm which was too low in comparison to control. In 300 ppm concentration, growth of *B. bassiana* was 4.2 cm.

Arturo et al (1997) observed the compatibility of *B. bassiana* with aqueous exctracts of Azadirachta indica seeds (Easmar). Doses of 0.5, 1.5, 0.5 and 5.309% did inhibit mycelial growth and spore vialibility of the entomopathogen.

V. REFERENCES

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