

TOXICITY AND TERATOMORPHIC EFFECTS OF MATCH (IGR) ON THIRD INSTAR LARVAE OF CITRUS BUTTERFLY *PAPILIO DEMOLEUS* LINN

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ABSTRACT: - Different concentration of Match (IGR) viz, 0.0625%, 0.125%, 0.25%, 0.5 and 1% were applied against 3rd instar larvae of citrus butterfly, *Papilio demoleus*, L. Mortality count was made at 24 hours post treatment and data analyzed statistically. The LD₅₀ value was calculated upon probit analysis and was found to be 0.52%. Morphological abnormalities produced by the compound in larvae pupae and adults were also observed. It was found, that at the dose of 0.0625%, larvae pupal intermediate was observed and at 0.25% pupa was found entirely hollow inside and at 1% butterfly completely failed to emerge out.

KEY WORDS: Toxicity, Teratomorphic effects, *Papilio sp.*, MATCH (IGR)

INTRODUCTION

Papilio demoleus L., lemon butterfly is a serious pest of citrus plants. It is recorded in Pakistan, Iran, Saudi Arabia, India, China, Japan and Africa (FAO 1970, 1972, Badawi 1981, Talbot 1939, Mushtaque 1974, and Atwal 1976). The larvae of this pest are voracious foliage feeders. In case of severe infestation, citrus plants seriously affected and the young seedling get completely defoliated (Atwal 1976). In view of environmental protection and safety IGR's belong to a good candidate group.

Lot of work has been done (IGR) in respect of their effects on various life stages of insects. These included the works of Hsieh & Steelman (1974), Mulla *et al* (1974) Schaefer *et al* (1974) Dame *et al* (1975) Mulla & Darwazeh (1975) Busuine *et al* (1976), Naqvi *et al* (1976) Bhakshi *et al*, (1982). Naqvi (1986) Temuri (1987). The present work bases on the toxic effect and insect growth regulating effect of the given IGR against citrus butterfly larvae.

MATERIALS AND METHODS:

The under test compound MATCH 25 E.G. (IGR) was applied with the help of micro applicator to third instar larvae of *P. demoleus* L. The concentration of the chemical were 0.0625%, 0.125%, 0.25%, 0.5% and 1%, while the applied doses volume were kept constant. A control batch was kept for the determination of environmental effects. The treated larvae were kept in 6 inches high glass chimneys with one end of chimney capped with musline cloth. Observations were made upto 24, 48, 72 hours of post treatment. The unconscious and immovable larvae were considered as dead. Each experiment was repeated five times.

RESULTS AND DISCUSSION

Toxicity:

Third instar larvae of *P. demoleus L.* were treated with MATCH (IGR) by injection method. Average mortality was calculated at 0.0625%, 0.125%, 0.25%, 0.5% and at 1% concentration as 36%, 36%, 48%, 52% and 60% respectively after 24 hours of treatment. Prolonged toxic effects were reduced, upto emergence (Table 1, 2, and 3).

TABLE 1: Toxicity of MATCH (IGR) third instar larvae of *P. demoleus L.*, after 24 hours of treatment.

S. No.	Doses %	Mean mortality (%)	Standard deviation
1.	0.0625	36	8.366
2.	0.125	36	8.366
3.	0.25	48	5.477
4.	0.5	52	5.477
5.	1	60	7.07

$$Y = p^1 (p) = 0.03430 + 0.6494xi$$

The adequacy of model determined by comparing the value of deviance 2.3136 with 3 d.f. at p-value = 0.509405. The fitted model is significantly adequate describe the mortality behavior of larvae with MATCH concentration. The L.D₅₀ obtained from fitted pro-bit regression is 0.5281788(%).

Teratomorphic effects of MATCH (IGR) was studied on 3rd instar larvae, pupa and emergence, after treatment. The is given in Table 2.

TABLE 2: Percent pupation and emergency after the treatment with MATCH (IGR) in various doses.

S.No.	Doses %	Number of larvae treated	Mortality at pupation stage (%)	Mortality at emergence stage (%)
1.	0.0625	10	37.5	25
2.	0.125	10	53.12	33
3.	0.25	10	42.3	33
4.	0.5	10	58.3	50
5.	1	10	50.0	50

The data of table 2 analyzed by fitting the two separate probit regression model to describe the pattern of mortality at pupation and emergence stage respectively. The fitted probit regression line, the LD₅₀ given in the following table.

TABLE 2 (a)

Stages	Probit model	LD50
Pupation	$y = -0.1318 + 0.2262 X_i$	0.58267
Emergence	$y = -0.5664 + 0.6694 X_i$	0.846131

Teratoniorphic effects :

As shown in table 3 the larvae were treated with different concentration of MATCH. In all the concentration, the maximum abnormality was found at 1% however, some difference in the mode of abnormality was noted. At lower dose concentration *i.e.* 0.0625%, larval pupal intermediate was found. Treatment with 0.25% dose concentration larval body shrunked. At 0.5% concentration the 3rd instar larvae entered the 4th instar stage but the body becomes shrunked and the instar duration was prolonged some larva die before entering 5th instar stage. In fifth instar, they showed reduction in size when treated with 0.125% concentration of MATCH. The remaining alive larvae, changed their color. A 0.25% concentration pupal body showed abnormality, becoming hollow inside. After the treatment, with 1% concentration some larvae died in 5th instar with reduced body, while some changed into pupa but soon died, where as some hatched into abnormal adult with short and wrinkled wings or it fails to fully emerge out. It was also observed that percent emergence is also effective when treated with different concentration of MATCH (IGR) and is very less than usual. The life period *P. demoleus* L., is also affected after treatment with MATCH (IGR) and is prolonged (2-3 days) and the duration of instar was also prolonged (2-3 days) more than normal duration.

TABLE 3. Teratomorphic effect of MATCH (IGR) on different instars and in pupa of *P. demoleus* L., with different doses of the compound.

Doses	Teratomorphic effects
0,0625%	Larval body enlarged and elongated larval pupal intermediate was obtained. Most of the larvae remained less active after the treatment.
0.125%	Abnormal 5th instar with reduced body.
0.25%	Larval body shrunked in 3rd instar stage, Pupa were found hollow inside.
0.5%	Larval body shrunked in 3rd instar stage as in 0.25% concentration. Highly melanized abnormal pupa with body colour brownish black.
0.1%	Larvae died in 5th instar, remaining larvae turned into pupae and soon died. In sorrrs pupae, skin become soft and brownish black in colour, adult unable to fully emerge out and died attached with the puparim.

Krishnan and Chockaligam (1989) described the effect of chitin synthesis inhibitor diflubenzuron incorporated with food inhibited the deposition of chitin in the cuticle. Our present studies show that when *P. demoleus* larvae treated with MATCH (another IGR) it failed to emerge out completely, which shows that MATCH inhibited the development of *P. demoleus* larvae. Both results show the same activity of two different IGR's the minor difference is due to nature of compound or the difference in insects species. In the present studied LD₅₀ of MATCH against citrus butterfly larvae was found to be 0.528% FL larva and at different doses larval pupal intermediate and hollow pupae and retarded adult emergence has been observed.

Kasana *et,al;* (1995) determined the toxic effect of Margoson-0 when applied on citrus leaves against the citrus butterfly *P. demoleus* larvae and found that it gives the good control. In present work the effect of Match were tested against the *P. demoleus* larvae and in our study MATCH toxicity result confirms the Kasana *et,al;* (1995), findings.

Munir *et,alf* (1997) tested the toxicity of BF 4Bakayan fruit extract) on *P. demoleus* larvae. After 72 hours of treatment 32% normality was calculated at the dose concentration of 20%. In present studies toxicity of MATCH (IGR) against *P. demoleus* larvae after 24 hours is calculated as 80% at the dose concentration of 1%. The differences in both the results show that MATCH is more effective.

On the basis of the result obtained from present work MATCH (IGR) LD₅₀ was found to be 0.528 uL. Larva against 3rd instar larvae of *P. demoleus* L. MATCH produced 36% mortality at 0.0625% concentration and 0.125% concentration, 40% mortality at 0.25% concentration, 52% mortality at 0.5% concentration and 60% mortality at 1% concentration after 24 hours of treatment. Third generation pesticides *i.e.* IGR's are quite safe and effective in controlling different important plant. These pesticides are now in great use because of less residual effects and proved much safer from the pollution point of view with less mammalian toxicity. They can easily be used by farmers in field with out any harmful effects. Their efficacy may be increased by using several stabilizing agents and synergistic after treatment with MATCH (IGR) morphological abnormalities and percent of emergence were also noted. In the above mentioned concentrations the percent of emergence was reported to be 3%, 2%, 1% and 1% respectively.

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