Pak. J. Agri. Sci., Vol. 42(3-4) 2005

CHEMICAL CONTROL OF MUSHROOM MITE (TARSONIMIDAE) AT DIFFERENT TIME INTERVALS AND CONCENTRATIONS OF DICOFOL, ABAMECTIN AND HEXYTHIAZOX

Muhammad Hussnain Babar, Muhammad Afzal, Muhammad Hamid Bashir and Muhammad Asif Ali
Department of Agri. Entomology, University of Agriculture, Faisalabad.

Present studies were carried out on chemical control of mushroom mites (Tarsonimidae) at different time intervals and concentrations of Dicofol, Abamectin and Hexythiazox. The acaricides used included dicofol 18.5 EC with three concentrations (1.5ml/L, 2.0ml/L, and 2.5ml/L), abamectin 1.8 EC (1.5ml/L, 2.0ml/L, and 2.5ml/L) and hexythiazox 10WP (0.25g/L, 0.35g/L and 0.45g/L). All the acaricides used gave significant reduction in the mite's population and gave satisfactory results as compared to untreated check. On numerical basis the highest mites population suppression (92.37%) was recorded by the application of dicofol 18.5 EC with 2.5ml/L after 72 hours, followed by (92.29%) and (75.91%) with abamectin 1.8 EC with 2.5ml/L after 72 hours and hexythiazox 10 WP with 0.35g/L after 72 hours.
Key words: Mushroom mite, chemical control, acaricides and wheat straw compost.

INTRODUCTION

Mushroom is a very important crop which served as delicacy on the menu of metro-politon hotels of Pakistan. The fresh mushrooms contain 85.90% moisture, 3% protein 4% carbohydrates, 0.3-0.4 % fat and vitamins (Tewari, 1986). The mushroom protein is considered intermediate between that of animals and vegetables (Kurtazman, 1975). Mites are serious pest of mushroom which causes 10-50% loss of the crop (Zou *et al.*, 1993). Tarsonemid mites feed on mycelium and causing the infested mushroom to develop an "off white" colour. Sometimes the base of the stem can become reddish-brown, development of mushrooms is restricted. *Brennandania lambi* is one of the most serious mite pest of mushrooms in Australia and China (Ferragut *et al.*, 1997). In the past, efforts have been made in some countries on chemical control of mushroom mites. Some scientists who made significant contributions in this regard are Clift and Terras (1989), Heungens and Tirry (2001), Rathia *et al.* (1997) and Wu and Zhang (1993). In Pakistan no work has been carried out in this regard.

MATERIALS AND METHODS

The experiments were carried out in the Acarology Research Laboratory Department of Agri. Entomology University of Agriculture Faisalabad. Wheat straw compost was prepared under the shade.

Material of compost

1. Wheat straw = 150kg
2. Chicken manure = 60kg
3. Gypsum = 5.25kg

Procedure for preparation of compost

150 kg wheat straw was well moisturized daily up to three days to make it soft for microbial activity. After it 60kg chicken manure was mixed in wet and moist wheat straw , the moisture of compost material was maintained up to 80-90%, then heap was made one meter high and 6 turnings was done according to given schedule. After mixing the chicken manure in the moist wheat straw microbial activity was started and temperature of the compost material was increased due to microbial activity. The turnings were done to maintain the moisture, temperature and aeration to increase the microbial activity in the compost material.

Turning method

First the heap of compost was divided in to three layers
Lower layer (1^{st} layer),
Middle layer (2^{nd} layer)
Upper layer (3^{rd} layer),
Then changed their position by placing 1^{st} layer at the position of 3^{rd} layer, 2^{nd} layer at the position of 1^{st} layer and 3^{rd} layer at position of 2^{nd} layer. This fashion was repeated in the same manner at the time of turning.

Turning schedule

0 day = prepare the heap.
5^{th} day = 1^{st} turning
9^{th} day = 2^{nd} turning
12^{th} day = 3^{rd} turning + half quantity of gypsum.
15^{th} day = 4^{th} turning + next half quantity of gypsum.
18^{th} day = 5^{th} turning
21^{st} day = 6^{th} turning (last turning)

Before last turning 100 g sample of compost was processed through Berlease's funnel for at least 24 hours and mite population was counted. To control the mite three acaricides [dicofol (18.5 EC), abamectin (1.8 EC) and hexythiazox (10WP)] with three concentrations of each acaricide along with control were tested. The data were collected at 24 hours, 48 hours and 72hours after each spray respectively. Two factor factorial experiment under Completely Randomized Design (CRD) was applied. The significance of difference between the treatments means were sorted through the Duncan's Multiple Range Test, after the analysis of variance as given by Steel and Torrie (1980).

RESULTS AND DICUSSION

Table 1 represents the interaction values of dicofol. The mean values of data reveal that there was a strong correlation between time intervals and concentrations of dicofol. Maximum mortality (92.37%) was observed at 2.50ml/L after 72 hours. While minimum mortality (20.09%) was observed at 1.5ml/L after 24 hours.

Table 2 indicates the interaction values of abamectin. The mean values of data reveal that there was a strong correlation between time intervals and concentrations of abamectin maximum mortality (92.29%) was observed at 2.5ml/L after 72 hours. While minimum mortality (44.82%) was observed at 1.5ml/L after 24 hours.

Table 3 shows the interaction values of hexythiazox. The mean values of data reveal that there was a strong correlation between time intervals and concentrations of hexythiazox. Maximum mortality (75.91%) was observed at 0.35g/L after 72 hours. While minimum mortality (8.39%) was observed at 0.25g/L after 24 hours.

The present studies were carried out on chemical control of mushrooms mites. Acaricides gave effective control against mushroom mites. Hexythiazox (0.35g/L) after 72 hours gave less mortality (75.91%) as compared to the dicofol (2.50ml/L) and abamectin (2.50ml/L) where mortality was (92.37%) and (92.29%) respectively against (Tarsonimidae) mite.

Table 1. Comparison of means of the interaction of exposure time regarding the percent mortality of mite (Tarsonimidae) at different concentrations of dicofol.

Concentrations	Time			
	24 hours	48hours	72hours	Means
C1 (1.5ml/L)	20.09 G	76.07 E	88.21 B	61.46 C
C2 (2.0ml/L)	21.03 G	80.69 D	90.85 AB	64.19 B
C3 (2.5ml/L)	25.97 F	84.55 C	92.37 A	67.63 A
Control	11.75 H	3.863 I	0.00 J	5.203 D
Means	19.71 C	61.29 B	67.86 A	

Table 2. Comparison of means of the interaction of exposure time regarding the percent mortality of mite (Tarsonimidae) at different concentrations of abamectin.

Concentrations	Time			
	24hours	48hours	72hours	Means
C1 (1.50ml/L)	44.82 F	72.35 D	86.48 B	67.89 B
C2 (2.00ml/L)	45.91 F	75.15 D	89.28 AB	70.11 B
C3 (2.50ml/L)	57.60 E	80.46 C	92.29 A	76.78 A
Control	9.257 G	2.833 H	0.356 H	4.149 C
Means	39.40 C	57.70 B	67.10 A	

Table 3. Comparison of means of the interaction of exposure time regarding the percent mortality of mite (Tarsonimidae) at different concentrations of hexythiazox.

Concentrations	Time			
	24 hours	48 hours	72 hours	Means
C1 (0.25g/L)	8.397 F	44.87 D	71.51 B	41.59 C
C2 (0.35g/L)	15.63 E	51.12 C	75.91 A	47.55 A
C3 (0.45g/L)	13.41 E	48.43 CD	72.30 AB	44.71 B
Control	4.460 G	0.436 H	0.000 H	1.632 D
Means	10.47 C	36.21 B	54.93 A	

Clift and Terras (1993) carried out experiments on the relative efficacy of acaricides against mushroom mites. They used acaricides diazinon, malathion, pyrethrins and dicofol, and concluded that only dicofol gave a useful mortality (arbitrarily set at 95%) when tested against *Histiostoma feroniarum.* Dicofol (0.04%) was most effective causing 81.38% reduction in mite population. (Patel *et al.* 1999). Many scientists [clift and terras (1993), Rathaiah *et al.* (1997) and Patel *et al.* (1999)] proved the efficacy of dicofol, abamectin and hexythiazox. In the present studies two parameters time intervals and concentrations of acaricides were studied, which were differ from the parameters of previous scientists [Zou *et al.* (1993), Wu (1995), Reis *et al.* (1998), Heungens and Tirry (2001), Acharya and Misra (2002) and Hardman *et al.* (2003).

In this project the use of dicofol, abamectin and hexythiazox are line with the work of previous scientists Zhang *et al.* (1993), Rathaiah *et al.* (1997), Smith *et al.* (1998) and Acharya and Misra (2002).

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