Pertanika 9(3), 449 – 453 (1986)

COMMUNICATION I

A Method of Collecting Eggs of *Micromus tasmaniae* Walker (Neuroptera: Hemerobiidae)

ABSTRAK

Satu cara untuk mengumpul telur Micromus tasmaniae, *serangga pemangsa kepada kutu daun yang merosakkan tanaman ubi kentang telah dicatat. Cara ini telah dapat digunakan untuk pengeluaran telur secara besar-besaran untuk percubaan di ladang. Ujian-ujian yang telah terlebih dahulu dijalankan di makmal menunjukkan bahawa larutan naterium hipoklorit (NaC10) berkepekatan 0.75% atau 1.00% tidak mendatangkan kesan buruk terhadap penetasan telur yang telah direndam selama 6 atau 10 minit. Tujuh puluh lima peratus (75%) telur-telur tersebut berjaya ditanggalkan daripada substrat kain dan 95% penetasan telah diperolehi. Naterium hipoklorit berkepekatan 5% telah mengakibatkan kesemua telur gagal menetas sekalipun kesemuanya telah berjaya ditanggalkan daripada substratnya dengan mudah. Cara ini telah dapat mengurangkan kecederaan fizikal ke atas telur dan menjimatkan masa pengumpulan jika dibandingkan dengan cara sebelumnya iaitu dengan memungut telur satu demi satu.*

ABSTRACT

A method of collecting the eggs of Micromus tasmaniae, *an insect predator of the potato aphid attacking the potato plant is described. The method was adopted for use in the mass production of the eggs needed for field release trials. Prior tests conducted in the laboratory showed that a solution of sodium hypochlorite (NaC10) at either 0.75% or 1.00% concentration did not have detrimental effects on egg hatch after immersing them for 6 or 10 minutes, respectively. Seventy-five percent (75%) of the eggs were removed from the cloth substrate and 95% of them hatched. Sodium hypochloride at 5% concentration caused the failure of all the eggs to hatch but all of the eggs were easily removed from the substrate. This method has reduced egg damage and collection time as compared to the conventional method whereby each egg is collected one by one.*

INTRODUCTION

Normally, in the field the eggs of *M. tasmaniae* and other hemerobiids are laid on the underside of leaves, twigs or bark of plants. Usually, the eggs are laid singly, but rarely two or three are in contact with each other. The bottom surface of the egg is placed on contact with the leaf or other support, and adheres firmly by means of a cement secreted by glands which open into a vagina (Killington, 1936).

Hemerobiids eggs are more difficult to remove from substrates than the stalked eggs of chryopids, and a suitable method of removing eggs of *M. tasmaniae* is vital for the mass production of healthy and viable eggs. Prior to this study, very little has been published on methods of removing and collecting eggs of hemerobiids (the brown lacewings). Researchers who have maintained cultures of *M. tasmaniae* (Samson and Blood, 1979 and 1980; Syrett and Penman, 1981) have not described how the eggs were removed from the oviposition substrates.

The following account describes laboratory experiments conducted with sodium hypochlorite solution to develop a safe method of removing eggs of *M. tasmaniae* from cloth and potato leaf as oviposition substrates.

MATERIALS AND METHODS

Four experiments were conducted in 1982 at a room temperature of 20°C. All eggs oviposited on cloth and potato leaves were obtained from an insectary culture of *M. tasmaniae* (Hussein, 1982). A stock solution of sodium hypochlorite NaC10 (containing 13% available chlorine) was used throughout, and required test solutions were obtained by diluting the stock with distilled water. At the end of each experiment, eggs were rinsed thoroughly in distilled water, transferred to small glass tubes (50 mm × 5 mm diameter) and incubated at a constant 25°C under L.D. 12 : 12 photophase lighting conditions.

A small piece of egg-bearing cloth or potato leaf with 20 eggs was first cut out. The egg-bearing cloth or leaf material was completely immersed in the test solution in a petri dish and was left submerged for a specified duration (3 to 10 minutes). The number of eggs removed was determined at the end of each immersion period, and the number of eggs that hatched in each treatment was determined over a period of 3 days after the first eggs hatched.

Experiment 1 was carried out to determine the effect of NaC10 at concentrations of 0.01, 0.1 or 1.0%, on the removal of eggs of *M. tasmaniae* from cloth and potato leaf materials when immersed for a period of 1 and 3 minutes. In Experiment 2, the highest concentration of NaC10 was increased from 1.0 to 5.0% and the longest immersion period was also increased from 3 to 10 minutes. In Experiment 3, an intermediate period of immersion of 6 minutes was further included to give either 3, 6 or 10 minutes of immersion in each of 0 and 1.0% NaC10 solution. In addition, two ages of eggs were used so that each treatment was applied to groups of 1-day and 3-day old eggs. Finally, in Experiment 4, five concentration of NaC10 namely 0, 0.25, 0.50, 0.75 and 1.00% and two immersion periods of 6 and 10 minutes were tested.

RESULTS AND DISCUSSION

The results, given in Table 1, indicate that there were no obvious differences in the hatchability of eggs following immersion in any of the concentrations of NaC10 solutions. However, only the 1.0% NaC10 solution removed some eggs when the substrates were immersed for 3 minutes, namely 30% from the cloth and 10% from potato leaves. The percentages of egg hatch (70 – 100%) were high for all concentrations of NaC10 both at 1 and 3 minutes immersion period. All of the eggs could be removed from the cloth by either increasing the immersion period from 3 to 10 minutes or by increasing the concentration of NaC10 from 1.0 to 5.0% (Table 2). However, the 5.0% NaC10 caused complete failure of all the eggs to hatch, and so was omitted in the subsequent experiments. At 1.0% NaC10, there was no significant reduction in egg hatch after 3 minutes

TABLE 1

Numbers of *M. tasmaniae* eggs (out of 20) that were removed from cloth and potato leaf (in parenthesis), and that hatched following immersion in sodium hypochlorite solution (Expt. 1)

	Concentration of NaC10 (%)			
Immersion time	0	0.01	0.1	1.0
Number of eggs removed:				
1 minute	0 (0)	0 (0)	0 (0)	0 (0)
3 minutes	0 (0)	0 (0)	0 (0)	6 (2)
Number of eggs that hatched:				
1 minute	20 (18)	17 (19)	19 (18)	17 (14)
3 minutes	17 (20)	20 (20)	16 (20)	19 (18)

immersion but fewer eggs hatched ($X^2 = 4.95$ with 1 d.f., $P>0.05$) following immersion for 10 minutes.

In Table 3, the results indicate that the number of eggs removed at 1.0% NaC10 was nearly as high for 6 minutes immersion as for 10 minutes immersion for both 1-day old and 3-day old eggs. All of the 3-day old eggs and nearly all of the 1-day eggs hatched after 6 minutes immersion, whereas a significantly ($X^2 = 2.98$ with 1 d.f., $P>0.01$) smaller number of 1-day old eggs hatched after 10 minutes immersion in 1.0% NaC10. The results suggested that 6 minutes immersion in 1.0% NaC10 would both remove most if not all of the eggs and also allow most if not all of them to hatch. Experiment 4 was thus conducted to find out if the NaC10 could be diluted further. The results presented in Table 4, demonstrated that eggs of *M. tamaniae* that were oviposited on cloth could be immersed in either 1.0 or 0.75% NaC10 for 6 to 10 minutes without their viability being seriously affected, but fewer eggs were removed after 6 minutes in 0.75% NaC10.

Sodium hypochlorite has been used with eggs of other insects. Eggs of *Chrysopa sp.* (Neuroptera: Chrysopidae) have been successfully removed from cloth by immersing eggs in

TABLE 2

Number of *M. tasmaniae* eggs (out of 20) that were removed from cloth and that hatched following immersion in sodium hypochlorite solution (Expt. 2)

	Concentration of NaC10 (%)		
Immersion time	0	1	5
Number of eggs removed:			
3 minutes	0	12	20
10 minutes	0	20	20
Number of eggs that hatched:			
3 minutes	20	19	0
10 minutes	20	14	0

TABLE 3

Number of 1-day and 3-day old (in parenthesis) eggs (out of 20) of *M. tasmaniae* that were removed from cloth that hatched following immersion in sodium hypochlorite solution (Expt. 3)

	Concentration of NaC10 (%)	
Number of eggs removed:		
3 minutes	0 (0)	15 (11)
6 minutes	0 (0)	18 (19)
10 minutes	0 (0)	20 (20
Number of eggs that hatched:		
3 minutes	20 (18)	19 (19)
6 minutes	20 (18)	19 (20)
10 minutes	20 (19)	12 (16)

TABLE 4
Number of *M. tasmaniae* eggs (out of 20) that were removed from cloth and that hatched following immersion in sodium hypochlorite solution (Expt. 4)

	Concentration of NaC10 (%)				
Immersion time	0	0.25	0.50	0.75	1.00
Number of eggs removed:					
6 minutes	0	0	4	12	17
10 minutes	0	0	11	17	17
Number of eggs that hatched:					
6 minutes	18	18	20	19	18
10 minutes	19	20	20	17	18

21% NaC10 for 4 seconds (Finney, 1950). Eggs of another insect, *Heliothis virescens* (Lepidoptera: Noctuidae) can be removed from cloth by immersing them in 0.025% NaC10 solution for a period of 15 minutes without causing damage to the chorion of eggs (Hall *et al.*, 1980). Therefore one cannot really develop a standard time of immersion of eggs in NaC10 to remove the eggs from their substrates for all insects; rather a method has to be developed for each insect.

CONCLUSION

The results show varying responses of egg removal from their substrate and their hatchability with varying NaC10 concentrations and immersion times. Using the results as a guide, a method of removing and collecting eggs of *M. tasmaniae* without affecting hatchability was developed to enable mass collection of eggs for various purposes. The method reported here was subsequently used in the small scale production of the hemerobiids eggs for field release plot experiments.

ACKNOWLEDGEMENT

The author wishes to thank the Waite Agricultural Research Institute, University of Adelaide, South Australia for providing research facilities to carry out the experiments and the Australian-Asian Universities International Development Programme for awarding a Ph.D. research fellowship.

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REFERENCES

FINNEY, G.L. (1950): Mass culturing *Chrysopa californica* to obtain eggs for field distribution. *J. Econ. Entomol.* **43**: 97 – 100.

HALL, P.K., W.L. PARROTT, J.N. JENKINS and J.C. MCCARTY JR. (1980): Use of tobacco budworm eggs and larvae for establishing field infestation on cotton. *J. Econ. Entomol.* **73**: 393 – 395.

HUSSEIN, M.Y. (1982): The effects of natural enemies of *Myzus persicae* Sulzer upon its population trends on potato crops in South Australia. Ph.D. thesis, University of Adelaide. South Australia. 257p.

KILLINGTON, F.J. (1936): A monograph of the British Neuroptera. Adlard and Sons Ltd., London. Vol. 1. 269p.

RIDGEWAY, R.L., R.K. MORRISON and M. BADLEY. (1970): Mass rearing: A green lacewing. *J. Econ. Entomol.* **63**: 834 – 836.

SAMSON, P.R. and P.R.B. BLOOD. (1979): Biology and temperature relationship of *Chrysopa* sp., *Micromus tasmaniae* and *Nabis capsiformis*. *Ent. exp. & appl.* **25**: 253 – 259.

SAMSON, P.R. and P.R.B. BLOOD. (1980): Voracity and searching ability of *Chrysopa signata* (Neuroptera: Chrysopidae), *Micromus tasmaniae* (Neuroptera: Hemerobiidae) and *Tropiconabis capsiformis* (Hemiptera: Nabidae). *Aust. J. Zool.* **28:** 575 – 580.

SYRETT, P. and D.R. PENMAN. (1981): Developmental threshold temperatures for the brown lacewing, *Micromus tasmaniae* (Neuroptera: Hemerobiidae). *N.Z.J. Zool.* **8:** 281 – 283.

(Received 23 June, 1986)