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COMMUNICATION (II)

A Heat Method of Extracting *Myzus persicae* Sulzer (Homoptera: Aphididae) from Potato Leaves.

RINGKASAN

Satu cara yang mudah dan cepat bagi mengasingkan kutu daun, Myzus persicae *Sulzer dari daun kentang* (Solanum tuberosum) *dengan menggunakan haba telah dibentuk. Dalam cara ini, setiap helai daun kentang dimasukkan ke dalam satu beg kertas dan ditutup rapat semasa berada di ladang. Setelah sampai di makmal, beg-beg tersebut dipanaskan di dalam sebuah 'oven' pada suhu dan jangkamasa tertentu. Empat tahap suhu (40, 45, 50 dan 55° C) dan lima jangkamasa pemanasan (4, 8, 16 dan 32 minit) telah diuji. Keputusan ujian menunjukkan bahawa kombinasi 50° C dan 32 atau 64 minit ataupun kombinasi 55° C dan 8 atau 16 minit memberi peratus pengasingan yang lebih kurang sama tinggi (P>0.05 dengan LSD) tanpa menyebabkan pertukaran warna yang buruk dan kebakaran kutu-kutu daun. Cara ini telah didapati praktikal, mudah dan menjimatkan masa terutama sekali apabila mengendalikan bilangan daun yang banyak di puncak serangan kutu daun.*

SUMMARY

A simple and rapid method of extracting the green peach aphid, Myzus persicae *Sulzer from potato* (Solanum tuberosum) *leaves by heat was developed. In this method, each aphid-infested potato leaf was placed directly into a paper bag and sealed in the field itself. On arrival at the laboratory, the bags were heated in the oven at the specified temperature and duration. Four temperatures (40, 45, 50 and 55° C) and five durations of exposure (4, 8, 16, 32 and 64 minutes) were tested. The results showed that either the combinations of 50° C and 32 or 64 minutes or 55° C and 8 or 16 minutes exposure gave more or less the same high percentage of extraction (P>0.05 by LSD) without causing severe discoloration and burning of aphids. The method was found to be practical, simple and time-saving especially when a large number of leaves were involved during the peak infestation of aphids.*

INTRODUCTION

Live aphids are often difficult to extract from foliage, and when rapidly killed may remain attached to leaves by their stylets. At times they can be removed with relative ease. Heathcote (1972) described several methods of extracting aphids and other small insects from leaves, stems, soil, plant roots and surface trash by using slow acting toxicants or anaesthetics, gradients of light and heat, or brushing and imprinting.

Most of these methods require special apparatus and are time-consuming. Therefore, there is a need to develop a simple method of extracting aphids from potato leaves using heat. The method is based on aphids readily leaving the leaves which have wilted after being exposed to heat for a certain length of time.

The following laboratory experiment was conducted to determine what combination of temperature and duration of exposure would give the highest percentage of aphids leaving or dropping off the leaves without rendering the aphids unrecognizeable.

MATERIALS AND METHODS

Potato leaves infested with *M. persicae* were obtained from the insectary culture (Hussein, 1982). An unknown number of aphids (of mixed instars) were allowed to remain on each leaf and each leaf was then placed in a separate brown paper bag (11 cm × 3 cm).

Four temperatures were chosen namely 40° C, 45° C, 50° C and 55° C. The lowest temperature was selected based on the finding of Broadbent and Hollings (1951) that the thermal death-point of *M. persicae* lay between 38° and 41° C when exposed for 1 hour at 60% relative humidity. Five different durations of exposure were tested, namely 4, 8, 16, 32 and 64 minutes

for for each temperature. Each treatment was replicated three times.

It was not possible to simultaneously use a different oven for each temperature, hence one was used and the temperatures were obtained sequentially, starting at 40°C. For each temperature, the required numbers of bags containing the aphid-infested leaves were placed in the oven and bags were removed at specified intervals according to the duration of exposure to be tested.

Counts of all the aphids found inside the bags and of those that remained on the leaves were made after each test treatment. The aphids were also classified into dead or alive, and burnt or normal. All aphids showing movement were recorded as alive, whereas those that were blackened and rendered unidentifiable were recorded as burnt.

RESULTS AND DISCUSSION

Results, given in Table 1, show that duration and intensity of heat had a significant influence on percent aphids extracted from potato leaflets. Thus with increasing exposure time, the percentage of aphids extracted correspondingly increased and this was apparent especially at 40°C and 45°C. At 50°C a big increase in percentage of extraction was obtained between four minutes and eight minutes, but with exposures of 16 minutes or longer, the percentage of aphids extracted began to level off.

To test for differences between means, the data were subjected to a two-way (exposure X temperature) ANOVA. The analysis is given in Table 2, and the LSDs are given in Table 1 to allow for the comparisons of means.

The LSDs in Table 1 indicate that the means denoted by asterisks were not different from each other. However, the exposure of 32 and 64 minutes at 55°C burnt many aphids and cannot therefore be used. The treatment which was likely to give consistently high percentage of extraction was 64 minutes exposure at 50°C. Also, this combination was used in anticipation that it is safer to use a lower temperature and thus minimize the risk of burning the aphids.

The method described in this paper was subsequently used to extract potato aphids from leaf samples collected from the fields especially during peaks of aphid infestations. The method was not only rapid but also enabled extracted aphids to be stored in glass vials containing 70%

Table 1
Mean percentages of apterous *M. persicae* extracted from potato leaves at various temperatures X duration of exposure.

Duration of exposure (minutes)	Mean % of aphids extracted at temperature[3]			
	40°C	45°C	50°C	55°C
4	0.1	12.9	51.3	5.6
8	24.7	36.9	68.5^{D_1}	82.1^{D*}
16	38.4	42.7^{D}	78.7^{D}	85.4^{D*}
32	33.4	70.3^{D}	82.8^{D*}	89.6^{DB*_2}
64	67.4^{D}	82.2^{D*}	87.3^{D*}	87.1^{DB*}

1^{D} indicates aphids were dead but not burnt

2^{DB} indicates aphids were dead and burnt

The treatments marked with an asterisk are not significantly different.

Lease significant difference between any 2 exposure times at one temperature is 6.1% (P. 05)

Least significant difference between any 2 temperature for one exposure time is 6.0% (P. 05)

3 mean number of aphids per leaf for each temperature was: 172 (40°C); 162 (45°C); 246 (50°C) and 186 (55°C).

Table 2
Analysis of variance of number of aphids extracted from potato leaves at various temperature X durations of exposure

Source	d.f.	s.s.	m.s.	F	P
Total	59	47826.08	810.61		
Exposures	4	18304.66	4576.16	16.56	<.01
Temperatures	3	21120.48	7040.16	25.47	<.01
Interaction	12	3316.85	276.40	2.17	<.05
Error	40	5048.09	127.10		

alcohol for long periods and be counted later. In this method, the use of paper bags has overcome the problem of condensation which is the case when plastic bags are used; especially the difficulty of collecting and counting aphids that tend to cling to the inside of the moist plastic bags.

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