Behavioural response of the predatory mite *Phytoseiulus persimilis* in inert materials of application

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INTRODUCTION

A large-scale application of the predatory mite *Phytoseiulus persimilis* for use in the biological control of spider mites involves specific problems. To mechanize the method of application, an inert material for transport and distribution of the predatory mites must be provided. This material has to hold the mites for the duration of the application and must be suitable for use in a mechanical procedure. In experiments, the behaviour of *P. persimilis* was tested in different materials.

MATERIALS AND METHODS

10 ml of the application material (0%, 5%, 10% or 20% humidity) were put into a petri dish. 50 mites *P. persimilis* were positioned centrally on this material and immediately covered with additional 10 ml of the same material. The effect on the emigration of the mites was observed after 5, 10, 15, 30 and 45 minutes by controlling the number of individuals that vacated the material.

Material used in the laboratory studies:
1. buckwheat husks; 2. millet husks; 3. wood shavings (0.8–2.0 mm); 4. Vermiculite (1-3 mm); 5. spelt husks

In a second experiment, small transparent pipes (ø = 3.7 cm, h = 12 cm) were filled with 10 ml of the application material (10% humidity); 50 mites were centrally positioned and immediately covered with 40 ml of the same material. The pipe was closed with gauze and stored for 2 h, 4 h and 16 h at 10°C, 8°C and 6°C. The time until resumption of movement and the moment of emigration after the cooling was recorded quantitatively.

RESULTS

Experiment I

Emigration from dry materials was completed within 15 minutes. Emigration from dry buckwheat husks and spelt husks was especially fast.

The humidity of the material extended the duration of lifetime in the material. In this Respect Millet husks and wood shavings showed the most favourable effect at 10% humidity.

Material	Buckwheat husks 10%			Millet husks 10%			Woodshavings 10%			Vermiculite 10%		
Temperature	10 C			10 C			10 C			10 C		
Time of Exposure	2h	4h	16h	2h	4h	16h	2h	4h	16h	2h	4h	16h
BE in min	5	12,6	24,3	5	15,3	22	6	16	29	6	10	23
ER 50% in min	16,3	25,6	80	15,6	29	35	14	35	40	14	19	39
ER 100% in min	36,6	53,3	125	29	48	75	38	57	101	32	48	65
Temperature	8 C			8 C			8 C			8 C		
Time of Exposure	2h	4h	16h	2h	4h	16h	2h	4h	16h	2h	4h	16h
BE in min	15	25,3	28	13	19	47	17	23	48	12	21	18
ER 50% in min	35	55	140	28	35	140	45	51	166	22	43	55
ER 100% in min	125	135	175	58	98	207	67	117	204	57	77	72
Temperature	6 C			6 C			6 C			6 C		
Time of Exposure	2h	4h	16h	2h	4h	16h	2h	4h	16h	2h	4h	16h
BE in min	24	28	50	20	43	46	24	42	48	17	16	42
ER 50% in min	50	80	101,3	42	138	158	51,3	169	176	44	54	68
ER 100% in min	130	175,6	206,3	92	207	227	107	204,3	226	75	75	97

BE in min = Begin of Emigration in minutes after cooling; ER 50% in min = Emigration of 50% of mites after cooling; ER 100% in minutes = Emigration of 100% of mites after cooling

Experiment II

In general brief (2 h) and moderate cooling (10°C) was not effective.

The strongest effect on delaying the resumption of movement was recorded after cooling for 16 h at 6°C. The emigration was delayed by up to 40-50 minutes

CONCLUSION

The time of remaining in the dry materials proofed to be relatively short. Through increasing the dampness of the materials to 10% in combination with the effect of cooling the time can be prolonged considerably. The effect of slowing down the mobility of the mites in the material has to be judged positively in respect of a mechanised application. Whether this effect is sufficient regarding the mechanised application process depends on the chosen form of application technology . Further factors that might have an impact on the mobility and distribution in the materials are still beeing examined.