

Reproducibility and shelf-life of pheromone lures

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Abstract: Standards are needed to assure a continuous quality of lures used in pheromone traps. A logical way to obtain comparable results with pheromone lures is the batch certification applied by the Phero.Net organisation. Field tests were carried out in 1999 following the Phero.Net standard certification procedure to establish attractivity and specificity of lures of the majority of tested species. We also confirmed a high reproducibility of pheromone lures which were produced with the same chemical batch, but using a new batch of dispensers. Correct storage conditions which are essential for the performance of lures were studied in field tests. Based on these results, we assume that storage of lures in the original package at ambient temperatures for short-term storage by the grower is safe, whereas for insects using doubly-unsaturated compounds, and long-term storage in general, we recommend low temperatures.

Keywords: pheromone lures, reproducibility, batch certification, quality control, shelf life,

Introduction

Pheromone lures in combination with sticky traps are useful and inexpensive tools to detect harmful insect species in a crop. This information can be used to predict infestations at an early stage and to apply insecticides at the right moment. In some cases, low trap catches indicate that the population level of a pest is too low to result in an economical damage and that no treatment is needed.

However, users of pheromone traps often complain that lures from different suppliers and years of manufacture, even if prepared with the best quality control, may differ from others in attractiveness to target and non-target species.

Batch certification

This problem can be resolved with a batch certification proposed by the Phero.Net organisation (Bengtsson et al. 1999) applying the following rules:

1. A quantity of lure is prepared, set aside under appropriate conditions and given an identification code which carries chemical information. This batch should last for several seasons (Arn et al. 1997).
2. The batch is formulated on dispensers and field-tested to verify if the lure is attractive for the target species and which non-target species are caught.
3. Applied rules for the field tests: a) to establish a distinction between an effective and an ineffective lure, we used at least 3 replicates; b) quantitative differences between lures were based on tests with 5 to 10 replicates; c) trap catches of less than 10 specimens per trap and season were considered insufficient to claim efficacy (Arn et al. 1979; 1986).

The above procedure defaults to step one on two occasions: a) if the results of the field tests are not satisfactory or b) as soon as the stock is close to depletion.

Reproducibility of Pheromone Lures

The reproducibility in the preparation of pheromone lures was studied in 1999 in various crops and different regions of Switzerland. Fresh lures (Phero.Net 99) were compared with lures of a previous production, made with the same chemicals but with a new batch of dispensers (Table 1).

The obtained data confirm a high reproducibility in attractiveness for the majority of the tested lures with no significant changes in various habitats. As an exception, the *G. lobarzewskii* caps of 99 caught some *C. pomonella*, possibly due to contamination. As a result of this test a considerable number of lures could be certified for the Phero.Net organisation.

Shelf Life of Pheromone Lures

Correct storage conditions are essential to assure the performance of pheromone lures. Phero.Net lures are formulated on gray rubber caps which are mounted on holders and individually packaged in sealed PVDC-laminated bags to reduce risk of deterioration and contamination during storage and handling.

The shelf life was verified in a field test with lures kept for one or two years either at 4°C or ambient. As standard we used lures which were stocked at -18°C (Table 2).

Only the lures of *Lobesia botrana* lost attractiveness even after one year outside the freezer. The other lures were not affected by the storage at ambient conditions.

Based on this, we assume that storage of lures in the original package at ambient temperature by the grower is quite safe for most species. For the pheromones of *Lobesia botrana* and possibly other insects requiring doubly-unsaturated compounds, such as *Cydia pomonella*, and long term storage in general, low temperatures are recommended.

Table 1. Reproducibility of pheromone lures

Species	Number of males caught				No. traps	Location
	1st flight		2nd flight			
	Phero.Net cap 99	previous year	Phero.Net cap 99	previous year		
<i>Adoxophyes orana</i>	12	12	40	30	10	Eschenbach LU
	-	-	653	485	10	Martigny VS
<i>Cydia pomonella</i>	116	68	92	74	10	Maur ZH
	-	-	97	171	10	Martigny VS
<i>Eupoecilia ambiguella</i>	-	-	871	610	10	Giornico TI
	117	93	737	679	10	Maienfeld GR
	157	158	533	465	10	Winterthur ZH
	735	777	3776	3289	10	Aigle VD
<i>Grapholita funebrana</i>	25	22	113	75	5	Mezzana TI
	144	133	243	186	5	Porza TI
	101	94	156	77	10	Münsterlingen TG
<i>Grapholita lobarzewskii</i>	42	37			10	Dietenwil SG
<i>Cydia pomonella</i>	48	0				
<i>Grapholita lobarzewskii</i>	42	37				Wädenswil ZH
<i>Cydia pomonella</i>	35	0				
<i>Lobesia botrana</i>	-	-	112	105	10	Giornico TI
	394	246	321	118	10	Maienfeld GR
	66	40	106	118	10	Fläsch GR
	-	-	3032	2682	10	Vétroz VS
<i>Pammene rhediella</i>	0	1			5	Mezzana TI
	7	11			5	Iragna TI
	517	495			5	Entetschwil TG
	13	15			5	Dietenwil SG
<i>Pandemis heparana</i>	84	41			10	Zizers GR
<i>Sparganothis pilleriana</i>	102	189			10	Leytron VS
<i>Synanthedon myopaeformis</i>	53	37			8	Hitzkirch LU
<i>Zeuzera pyrtina</i>	1	-			5	S. Antonino TI
	28	-			5	Fully VS
	20	-			2	Remigen AG
	25	-			3	Roggwil TG

Table 2. Effect of storage on attractivity of pheromone lures

	ageing conditions	1995 males caught ^a caps aged 1 year	1996 males caught ^a caps aged 2 years
<i>Adoxophyes orana</i>	- 18° C	322 a	388 a
	+ 4° C	217 a	340 a
	ambient	383 a	363 a
<i>Cydia pomonella</i>	- 18° C	78 a	
	+ 4° C	85 a	
	ambient	90 a	
<i>Eupoecilia ambiguella</i>	- 18° C	74 a	282 a
	+ 4° C	85 a	240 a
	ambient	90 a	263 a
<i>Lobesia botrana</i>	- 18° C	1162 a	809 a
	+ 4° C	449 b	902 a
	ambient	454 b	306 a

^aNumbers followed by the same letters are not significantly different at P=0.05 (ANOVA, followed by Duncan test)

References

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