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SEX ATTRACTANT OF THE GRAPE VINE MOTH, *LOBESIA BOTRANA*

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Electroantennogram data correlated with gas chromatographic retention times of natural pheromone extract indicated *trans*-7, *cis*-9-dodecadien-1-yl acetate to be a sex attractant of *Lobesia botrana* (Lepidoptera: Tortricidae). This compound was synthesized and found to be very attractive to *L. botrana* males in laboratory and field tests.

Elektroantennogramdaten in Verbindung mit Gaschromatographie von Pheromonextrakten wiesen auf 7-*trans*-9-*cis*-Dodecadienolacetat-(I) als möglichen Sexuallockstoff des bekreuzten Traubenwicklers hin. Diese Substanz wurde synthetisiert und erwies sich in Labor- und Feldversuchen als höchst attraktiv auf Männchen von *L. botrana*.

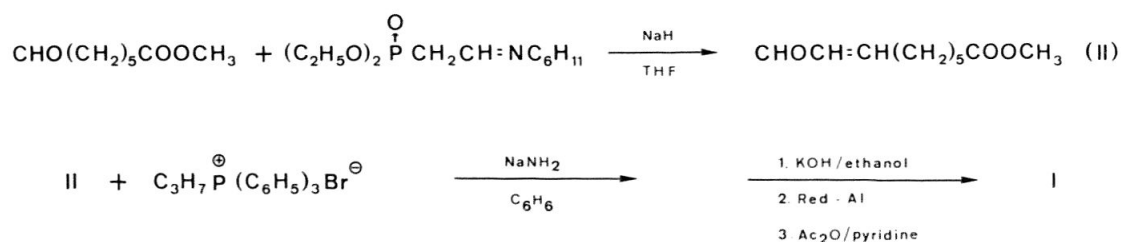
The two European grape vine moth species *Lobesia (Polychrosis) botrana* (Schiff.) and *Eupoecilia (Clysia) ambiguella* (Hb.) were among the first insects of agricultural importance whose sexual attractancy was studied in detail in the field (GÖTZ 1941 a, b). In both species control attempts with live female traps were partially successful (GÖTZ 1941 a, CHABOUSSOU and CARLES 1962). The occurrence of these two vineyard pests is monitored extensively with live female traps in Switzerland (BOLLER et al. 1970) and the South of France (TOUZEAU 1969). A synthetic sex attractant would be extremely valuable for these monitoring programs and for further insect control experiments.

The electroantennogram (EAG) technique (ROELOFS et al. 1971) was used to predict a sex attractant for *Lobesia botrana*. Methylene chloride extract of ca. 10 virgin female pheromone glands was injected on each of a polar (3 % cyclohexanedimethanol succinate on Chromosorb Q at 160°) and a nonpolar (3 % OV-1 on Chromosorb Q at 160°) gas chromatographic column. Fractions collected at 1 min. intervals from the columns were tested for EAG activity with the male moths. The retention time of largest activity compared to dodecyl acetate was 2.0 on the polar and 1.2 on the nonpolar column, indicating a C₁₂ acetate with more polarity than a single double bond.

Male antennal responses to a series of monounsaturated C₁₂ alcohol, acetate and aldehyde standards showed that the *trans*-7 and the *cis*-9 compounds were almost twice as active on the antennae as all other standards. These data indicated the attractant to be *trans*-7, *cis*-9-dodecadienyl acetate.



This compound was synthesized by the following route and purified by preparative gas chromatography (3 % phenyldiethanolamine succinate) to give ca. 90 % *trans*-7, *cis*-9- and 10 % *trans*-7, *trans*-9-dodecadienyl acetate:



Activity of the synthetic compound with laboratory-reared males was studied in an olfactometer similar to that used by SOWER et al. (1973) consisting of an 80 cm horizontal glass tube of 3 cm dia. supplied with an air stream of 30 cm/second. The chemical was applied on a 1 cm dia. ground glass disc near the entrance of the air stream. Typical upwind orientation toward the odor source observed with female extracts was elicited by the synthetic chemical. Male orientation was still quantitative with 100 picograms. Quantitative excitation was elicited with 10 pg, although there was little orientation.

Carrier ¹	Attractant		Mean no. males/trap ²		
			wild ³	released ⁴	
polyethylene cap, large	5	mg	4.3	de	
	1	mg	8.0	bc	
	0.2	mg	10.0	b	
	0.05	mg	5.8	cde	
	0.01	mg	3.0	ef	
	0		0	f	
polyethylene cap, small	1	mg	5.5	cde	
	0.1	mg	12.8	a	
	0.01	mg	3.3	e	
rubber septum	0.1	mg	10.8	ab	
	0.01	mg	6.3	cd	
	5 virgin females		2.8	ef	
				3.0	h

Table 1. *L. botrana* trapping with *trans*-7, *cis*-9-dodecadien-1-yl acetate and virgin females.

1) Large polyethylene cap and rubber septum as described in ROELOFS et al. (1973). The small polyethylene cap is 10 mm dia. with an 8.5 mm dia. cap inserted as cover (Semadeni & Co., Bern).

2) Means followed by the same letter are not significantly different at the 5 % level.

3) Wild males trapped during first flight May 17–June 3, 1973 at Stäfa ZH; treatments replicated 4 times and sampled and rotated 8 times.

4) Trapping of released laboratory-reared males May 28–30, 1973 at Wädenswil, treatments replicated 5 times.

The attractancy of the synthetic product to *L. botrana* males in the field was first demonstrated toward the end of the second flight of 1972 in vineyards at Stäfa ZH and Fully VS. Large catches during the first flight of 1973 at Martigny VS again showed that the synthetic compound was very attractive. Catches

obtained with a cylindrical trap similar to the codling moth standard trap (BAGGIOLINI and GRANGES 1972) and various formulations are given in Table 1. Amounts of synthetic compound ranging from 0.01 mg to 5 mg caught significant numbers of *L. botrana* males, clearly showing the attractant to be superior to live females.

The identity of *trans*-7, *cis*-9-dodecadien-1-yl acetate as the natural sex pheromone of *L. botrana* remains to be proven. The above results demonstrate that the compound is a promising tool in vineyard pest management.

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Note: In field tests conducted after completion of the manuscript, the purified *trans*-7, *cis*-9 isomer was not quite as attractive as the synthetic product described above. This indicates that secondary compounds contained in the latter may contribute to the activity.

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