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## RESPONSE OF THE FALL ARMYWORM<sup>1</sup> AND OTHER LEPIDOPTEROUS PESTS OF BOLIVIA TO SYNTHETIC PHEROMONES<sup>2</sup>

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### ABSTRACT

Pheromones for the fall armyworm, *Spodoptera frugiperda* (J. E. Smith), and 4 other lepidopterous pest species were field tested for attractancy in Bolivia in February 1978. The fall armyworm in Bolivia responded to the pheromone [(Z)-9-dodecen-1-ol acetate] identified for this species in the United States. Positive responses for respective species were recorded also for gossyplure [1:1 mixture of (Z,Z)- and (Z,E)-7,11-hexadecadien-1-ol acetate], the pheromone for the pink bollworm, *Pectinophora gossypiella* (Saunders); (Z)-7-dodecen-1-ol acetate, the pheromone for the cabbage looper, *Trichoplusia ni* (Hübner), and soybean looper, *Pseudoplusia includens* (Walker); and an attractant for the tomato pinworm, *Keiferia lycopersicella* (Walsingham).

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The fall armyworm, *Spodoptera frugiperda* (J. E. Smith), female produces a sex pheromone, (Z)-9-dodecen-1-ol acetate (Z-9-DDA), (Sekul and Sparks 1976) which is highly attractive to fall armyworm males in the

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<sup>2</sup>This paper reports the results of research only. Mention of a commercial or proprietary product in this paper does not constitute a recommendation or an endorsement of that product by the USDA. Accepted for publication 26 September 1979.

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United States (Mitchell and Doolittle 1976); however, attractancy of Z-9-DDA to fall armyworms occurring elsewhere has not been reported. We report here the results of tests conducted during February 1978 to determine if fall armyworms in Bolivia were responsive to the synthetic pheromone identified from females of North American populations. In addition, we tested the synthetic pheromones of several other moth species known to occur in North and South America.

#### METHODS AND MATERIALS

Trapping experiments were conducted at the Saavedra Experiment Station near Santa Cruz (437 m above sea level) in south-central Bolivia. Pherocon® 1C sticky traps were baited with either 25 mg Z-9-DDA dispensed from a 1.25 ml polyethylene vial (4 traps) or 5 virgin female fall armyworms (2 traps). The females were reared at Gainesville, FL, and taken to Bolivia as pupae. The females were 1-2 days old when placed in the traps, and they were replaced after 2 nights. One unbaited trap served as the control. The traps were positioned ca. 200 m apart along fence rows adjacent to field corn (ca. 1.5 m high) which had just begun to tassel. The traps were checked daily (February 8-10), and fresh sticky liners were installed if more than 10 insects were captured.

Several other synthetic pheromones were screened for attractancy to Bolivian insect pests. The baits were evaporated from various types of dispensers including Conrel® hollow fibers [gossyplure, a 1:1 mixture of (Z,Z)- and (Z,E)-7,11-hexadecadien-1-ol acetates for *Pectinophora gossypiella* (Saunders)]; plastic vials [(Z)-7-dodecen-1-ol acetate (Z-7-DDA) for *Trichoplusia ni* (Hübner) and *Pseudoplusia includens* (Walker)]; and rubber septa [for *Keiferia lycopersicella* (Walsingham)]<sup>8</sup>. Sticky traps (3) baited with Z-7-DDA (25 mg ea.) were set out in a soybean field at the Saavedra Experiment Station. Three sticky traps baited with gossyplure were placed in a cotton field ca. 25 km from the Saavedra Station. An attractant for *K. lycopersicella* males was tested (3 traps) in a small tomato field near the San Benito Experiment Station in central Bolivia (altitude ca. 2550 m). One unbaited trap was used as a control in each test. Virgin females were not available for comparison with the synthetic baits used here.

#### RESULTS

The data presented in Table 1 show that the fall armyworm in Bolivia is equally attracted to Z-9-DDA and U.S. stock of female fall armyworms (Table 1). The decreasing numbers of males captured during the nights of 7, 8, and 9 February indicated that the adult fall armyworm population was declining rapidly for this generation. The status of the population was verified by field observations on moth activity throughout the night of 9 February. The few fall armyworm adults observed on the corn plants were older moths as indicated by poor markings caused by the loss of scales from the wings and body.

<sup>8</sup>The sex attractant pheromone for *K. lycopersicella* was supplied by W. L. Roelofs and colleagues, Entomology Department, Cornell Experiment Station, Geneva, NY 14456 (personal communication).

TABLE 1. CAPTURE OF FALL ARMYWORM MOTHS IN PHEROCON 1C STICKY TRAPS BAITED WITH 25 MG (Z)-9-DODECEN-1-OL ACETATE\* OR 5 VIRGIN FEMALES AND PLACED NEAR TASSELING FIELD CORN. SAAVEDRA, BOLIVIA. 8-10 FEBRUARY 1978.

Bait	Mean no. moths captured/trap per night**		
	8-II-78	9-II-78	10-II-78
Z-9-DDA	64.3 a	29.0 a	9.3 a
Females	52.0 a	34.0 a	6.5 a
Control	0 b	3.0 b	0 b

\*Pheromone was dispensed from a 1.25 ml polyethylene vial.

\*\*Means in the same column followed by the same letter are not significantly different at the 5% level by Duncan's multiple range test.

Results on capture of other moth species attracted to traps baited with synthetic pheromone are summarized here:

Bait	Species	Total no. moths captured
Z-7-DDA	<i>Trichoplusia ni</i>	8
Z-7-DDA	<i>Pseudoplusia includens</i>	20
Gossyplure	<i>Pectinophora gossypiella</i>	140
Unknown <sup>s</sup>	<i>Keiferia lycopersicella</i>	51

Unbaited control traps in tests involving these attractants failed to capture males of these species.

Previous international studies of pheromone attractancy with the European corn borer, *Ostrinia nubilalis* (Hübner), in the United States and Europe indicated that a given species may respond differently to the identified and synthetic pheromone on different continents (Klun et al. 1975). Our results show that at least 5 pest species in Bolivia, *S. frugiperda*, *P. includens*, *T. ni*, *P. gossypiella*, and *K. lycopersicella*, respond to the pheromone identified from their conspecific relatives in the United States.

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