



## ***Spodoptera frugiperda* AND OTHERS SPECIES CAPTURED IN PHEROMONE TRAPS IN COTTON CROPPING SYSTEMS (MATO GROSSO STATE, BRAZIL) (\*)**

Pierre Silvie (Cirad / [psilvie@terra.com.br](mailto:psilvie@terra.com.br)), Jean-François Silvain (IRD)

**ABSTRACT** - The early detection of the arrival of pests on a crop is a decision tool for the spraying of pesticides. Observation of pest dynamics and especially adult Lepidoptera is becoming essential with the use of direct sowing systems using plant cover crops and the development of crops sown out of season ('safrinha'). At Fazenda Mourão, the use of sexual pheromones of different Lepidoptera species such as the member of the Gelechiidae family *Pectinophora gossypiella* (distributors: Biocontrole and Isca Tecnologias) and the noctuids *Spodoptera frugiperda* and other species of the genus (*S. exigua*, *S. latifascia*, *S. albula* (= *sunia*), from Biocontrole) was started in the 2003/2004 cropping season. *S. frugiperda*, *S. eridania* and *S. cosmioides* were found in the traps. The average number of adults of the first, dominant, species varied from 0 to 25 per trap per week, with the highest value recorded at the beginning of July. Three other species of the same genus, *S. descoinsi*, *S. dolichos* and *S. albula*, were detected for the first time and identified by study of their genitalia. Annual curves of the population dynamics of adult *P. gossypiella* trapped in 2004 did not reveal any differences between the two pheromone sources. Two population peaks were recorded in mid-July and the end of August 2004, with 124.8 and 133.5 adults per trap per week respectively.

**Key words:** *Spodoptera* spp., pheromones, cropping systems

## ***Spodoptera frugiperda* E OUTRAS ESPÉCIES CAPTURADAS EM ARMADILHAS DE FEROMÔNIO NOS SISTEMAS DE CULTIVO ALGODOREIRO (MATO GROSSO, BRASIL)**

**RESUMO** - A detecção precoce da entrada de pragas numa lavoura é uma ferramenta para ajuda na decisão de aplicação de produtos químicos (fumigação). Com o desenvolvimento dos sistemas de cultivo em plantio direto, implicando coberturas vegetais e desenvolvimento de cultivos em safrinha, a observação da dinâmica das pragas, em particular dos adultos de lepidópteros, tornou-se imprescindível. Na fazenda Mourão, o uso de feromônios sexuais de diferentes espécies de lepidópteros tais como o Gelechiidae *Pectinophora gossypiella* (distribuidores: Biocontrole e Isca Tecnologias) ou dos Noctuidae *Spodoptera frugiperda* e outras espécies do mesmo gênero (*S. exigua*, *S. latifascia*, *S. albula* = *sunia*) (do Biocontrole) começou no decorrer da safra 2003/2004. *S. frugiperda*, *S. eridania* e *S. cosmioides* foram encontradas nas armadilhas. No caso da primeira espécie, dominante, o número médio de adultos capturado por armadilha e por semana variou de 0 a 25, valor máximo observado no início de julho. Três outras espécies do mesmo gênero, *S. descoinsi*, *S. dolichos* e *S. albula*, foram detectadas pela primeira vez e identificadas através do estudo das genitálias. As curvas anuais de flutuação populacional dos adultos de *P. gossypiella* capturados em 2004 não mostraram diferença entre as duas origens do feromônio. Dois picos de população foram visualizados no meio de julho e final de agosto no ano 2004, com os valores de 124,8 e 133,5 adultos/armadilha/semana, respectivamente.

**Palavras-chave:** *Spodoptera* spp., feromônio, sistemas de cultivo



## INTRODUCTION

The use of synthetic pheromones in the South American cone has developed in cotton growing, especially since the arrival of the cotton boll weevil in Brazil in 1983. The use of pheromones for pest monitoring is sometimes used for *Pectinophora gossypiella* (Saunders). The use of the pheromone gossypure for sexual confusion has been reported in several countries. Fazenda Mourão (Mato Grosso State, Brazil) installed a pheromone trap set-up during the 2003/2004 season within the framework of the entomological evaluation of cotton cropping systems. The results presented in this summary concern the species *P. gossypiella* and Lepidoptera of the genus *Spodoptera* in delta traps containing pheromones of several species.

## MATERIAL AND METHODS

Trapping started at end of February 2004. The firms Biocontrole and Isca Tecnologias supplied synthetic pheromones of *P. gossypiella* in 2004 and a comparison was made using 6 traps installed in pairs 50 m apart from 14 May to 22 September. Eight traps for *S. frugiperda* were installed along the whole length of the set-up and equipped with the synthetic pheromone supplied by the firm Biocontrole and manufactured by Chemtika. The same firm also enabled us to test other synthetic pheromones of *Spodoptera*, of the species *albula* (= *sunia*), *exigua* and *latifascia*, with two traps (13 April) and then three traps (from 14 May 2004) for each of these species. The traps were replenished on the following dates in 2004: 18 March, 2 April, 22 April, 11 May, 14 June, 23 July, 28 August and 17 September.

The adults trapped were counted weekly unless the numbers were very small. The number of specimens is therefore the catch of the week preceding the observation date mentioned in the tables. No observations were made at the end of the year, but catches started again on 5 January 2005. Adults of *Spodoptera* species were recovered and kept in alcohol at 70° before dissection and observation of genitalia to confirm the identification.

## RESULTS AND DISCUSSION

The average numbers of adult *P. gossypiella* and *S. frugiperda* caught per trap per week are shown in Table 1. The species identified in the *Spodoptera* synthetic pheromone traps in April and May 2004 are shown in Table 2.

Two population peaks of *P. gossypiella* were observed with parallel movement of catches with the two synthetic pheromone origins used. The pheromone supplied by Isca Tecnologias captured more adults during the peaks of 9 July and 20 August, with an average of 124.8 and 133.5 adults per trap per week. In comparison, the highest average number of adult *S. frugiperda* caught per trap was 25.0 on 9 July 2004.

Six species of the genus *Spodoptera* were identified, according to POOLE (1989), with *S. frugiperda* (J. E. Smith) being that most commonly observed. *S. cosmioides* (Walker) was trapped above all with the pheromone of *S. latifascia*. It is reminded that *S. latifascia* is not present in South America and that *S. cosmioides*, whose status of 'good species' was recognised by Silvain and Lalanne-Cassou (1997), occupies the same ecological niches in South America as *S. latifascia* in Central and North America. Although the compositions of the pheromones of the two species are identical with regard to the types of compounds they contain, they differ in the ratio of the two main components.



However, the pheromone release times of the females of the two species are identical (LALANNE-CASSOU *et al.*, 1999).

**Table 1.** Average number of adults caught per trap per week in 2004 and early 2005

Observation days	<i>P. gossypiella</i>		<i>S. frugiperda</i>
	Isca Tecnologias	Biocontrole	
26-02-2004	0	-	4.8
11-03	0	-	2.3
23-03	0	-	0.4
13-04	1.0	-	17.9
16-04	0.5	-	0.8
21-04	9.8	-	0
29-04	2.2	-	4.1
5-05	4.3	-	2.0
14-05	8.0	9.5	4.9
21-05	14.5	16.3	0.6
28-05	29.2	42.7	6.5
4-06	15.2	25.3	0.4
11-06	14.5	55.0	0
17-06	11.0	16.5	5.9
28-06	28.2	23.8	3.1
2-07	9.7	15.5	0.6
9-07	124.8	79.7	25.0
17-07	45.0	30.8	5.1
23-07	34.8	18.7	0.3
31-07	39.5	30.7	1.5
7-08	37.5	24.2	0.9
20-08	133.5	89.7	2.9
28-08	33.2	31.3	2.1
9-09	25.0	41.7	0
14-01-2005	-	3.7	13.4
2-02	-	4.8	5.3
17-02	-	2.3	6.1
24-02	-	0	0.9
23-03	-	0	12.9
1-04	-	0	3.6
8-04	-	0	9.3
20-04	-	5.7	5.5
29-04	-	0	0



**Table 2.** Species identified in the synthetic pheromone traps (April and May 2004)

Pheromone type	Species trapped
<i>S. frugiperda</i>	<i>S. frugiperda</i> , <i>S. cosmioides</i> (females), <i>Condica mobilis</i>
<i>S. albula</i> (= <i>sunia</i> )	<i>S. albula</i> , <i>S. frugiperda</i> , <i>S. cosmioides</i>
<i>S. exigua</i>	<i>S. cosmioides</i>
<i>S. latifascia</i>	<i>S. cosmioides</i> , <i>S. descoinsi</i> , <i>S. eridania</i> , <i>S. dolichos</i>

Female specimens of *S. cosmioides* were sometimes trapped with the *S. frugiperda* pheromone. The two known *S. eridania* (Stoll) morphs—one with a spot and the other with a strip on the anterior wing—were captured. *S. albula* (Walker) resembles the first form of *S. eridania*, that has a spot on the anterior wing but it is slightly paler, making it difficult to distinguish between the two. *S. dolichos* is easy to identify by the black stripes of the tegulae that cover the wing bases on each side of the thorax.

This is the first time that the species *S. descoinsi* has been reported in this region. It was previously known in French Guiana (Lalanne-Cassou *et al.*, 1994).

The species *Condica mobilis* (Walker) (Lepidoptera: Noctuidae) was also trapped in 2004 with the *S. frugiperda* synthetic pheromone.

## CONCLUSIONS

1. The results reveal the low specificity of the pheromones of the three *Spodoptera* species other than *frugiperda*. The latter is dominant among the six species;

2. The presence of *P. gossypiella* was observed in particular from April to February of the following year (2005);

3. The possibility of using the data gathered for spraying should be examined. Indeed, according to I. Cruz (Ari Gitz, pers. comm.), the threshold of 2.5 adult *S. frugiperda* per trap per day, that is to say 17.5 adults per week, could be used for maize. This population level was exceeded in this study only on 13 April and 9 July 2004. Complementary observation of damage seems essential;

4. Better characterization of the genus *Spodoptera*, whose biology outside crops is little known, seems necessary in the context of the development of cover crops for direct sowing.

(\*) Financing institutions: FACUAL, COODETEC, CIRAD



## REFERENCES

LALANNE-CASSOU, B.; SILVAIN, J. F.; MONTI, L. ; MALOSSE, C. Description d'une nouvelle espèce de *Spodoptera* de Guyane française: *S. descoinsi* (Lepidoptera: Noctuidae: Amphipyrinae), découverte grâce à des attractifs sexuels. **Annales de la Société Entomologique de France**, v. 30, p. 25-32, 1994.

LALANNE-CASSOU B. ; SILVAIN, J. F. ; MONTI, L. ; MALOSSE, C. Mécanismes d'isolement reproducteur chez les espèces du complexe néotropical *Spodoptera latifascia*-*S. cosmioides*-*S. descoinsi*. **Annales de la Société Entomologique de France**, v. 35, p. 109-116, 1999.

POOLE, R. W. **Lepidopterous Catalogus** Noctuidae, part 2, Leiden : E.J. Brill/Flora & Fauna Publications, 1989. (New Series, Fascicle 118).

SILVAIN, J.-F.; LALANNE-CASSOU, B. Distinction entre *Spodoptera latifascia* (Walker) et *Spodoptera cosmioides* (Walker), bona species (Lepidoptera, Noctuidae). **Revue fr. Ent.**, v. 19, n. 3-4, p. 95-97, 1997.