

**INSECT PEST MANAGEMENT USING PHEROMONES IN ROMANIA***Sonica Drosu\**

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e-mail: [sonicadrosu@yahoo.com](mailto:sonicadrosu@yahoo.com)**ABSTRACT**

This paper is a synthesis of the main results reported in the literature generated by the use of the pheromones in Romania. There are many earlier references on this field, presented in the tables; refreshment and actualizing of this knowledge is important to maintain the interest for this field involved for ecological agriculture sustainability and to continue the studies in order to implement the methods of use of the pheromones in integrated management of pests.

**Key words:** *pheromones, integrated pest management*

**INTRODUCTION**

Pheromones are a class of semiochemicals (chemical signals that are produced by the organisms) that insect release to communicate inside the same species. They can be many different chemical types, to serve different functions (attracting mates, marking of territorial boundaries or food sources, warning of damage, etc.). Over the last 40 years scientists have identified pheromones from over 1500 insect species and found wide application in the field of agriculture, forestry and urban pest management. There are companies that specialized in the discovery, manufacturing and sale of pheromones that can play an important role in integrated pest management.

**RESULTS**

In Romania there is Research Institute in Chemistry “Raluca Ripan” at Cluj Napoca that had synthesized more than 30 pheromones even during 70th decade of the last century. Table 1 presents the list of pheromones produced in Romania. The scientists in agricultural research field had checked the efficacy of different pheromones species, their attractiveness and specificity and than they found the methods of use. It was a transition period when it was reduced interest for using pheromones; in the last years the chemists manufactured pheromone products to control same apple and vine pests using *Attract and Kill* method.

This paper is a synthesis of the main results reported in the literature generated by the use of the pheromones in Romania (Table 1.).

Table 1

List of Pheromones Produced in Romania

Cod	Product name	Species	Presented form
POMICULTURE			
1	atraPOM	Cydia pomonella	Set of 3 complete traps
2	atraFUN	Cydia funebrana	Set of 3 complete traps
3	atraMOL	Cydia molesta	Set of 3 complete traps
4	atraLIN	Anarsia lineatella	Set of 3 complete traps
6	atraRET	Adoxophyes reticulana	Set of 3 complete traps
7	atraNUB	Hedya nubiferana	Set of 3 complete traps
8	atraENAFORM	Enarmonia formosana	Set of 3 complete traps
11	atraVIR	Tortrix viridana	Set of 3 complete traps
17	atraBLANC	Phylonorycter blancardella	Set of 3 complete traps
19	atraPOD	Archips podana	Set of 3 complete traps
20	atraORG	Orgyia antiqua	Set of 3 complete traps
26	atraSCIT	Leucoptera scitella	Set of 3 complete traps
32	atraMYOP	Synanthedon myopaeformis	Set of 3 complete traps
35	atraTYP L	Synanthedon typhuliformis	Set of 3 complete traps
FIELD CROPS			
9	atraGAM	Autographa gamma	Set of 3 complete traps
10	atraNIG	Amathes c-nigrum	Set of 3 complete traps
21	atraSEG	Agrotis segetum	Set of 3 complete traps
22	atraPAS	Cnephasia pasquana	Set of 3 complete traps
25	atraEXCLAM	Agrotis exclamationis	Set of 3 complete traps
27	atraOL	Mamestra oleracea	Set of 3 complete traps
28	atraTRIF	Discestra trifolii	Set of 3 complete traps
29	atraXYL	Plutella xylostella	Set of 3 complete traps
30	atraVIRG	Diabrotica virgifera virgifera	Set of 3 complete traps
33	atraYPS	Agrotis ypsilon	Set of 3 complete traps
VITICULTURE			
13	atraMBIG	Eupoecilia ambiguella	Set of 3 complete traps
16	atraBOT	Lobesia botrana	Set of 3 complete traps
STORED PRODUCT			
36	atraDEP	Plodia interpunctella; Ephesia kuehniella	Set of 3 complete traps
GREEN SPACIES			
xxx	atraCAM	Cameraria ohridella	Set of 3 complete traps

The main applications of the pheromones are:

- *Detection* of the species to determine if they are present or absent in an area; for example it was important for the Western corn rootworm (*Diabrotica virgifera virgifera*) after the apparition in Romania to monitor his expansion in Eastern areal.
- *Monitoring* a population of insects to determine if enough insects are present to justify the treatment.
- *Warning the perfect time for the treatment*; the captures in the traps show us the dynamic of the population and it can appreciate the most vulnerable biologic moment in the life time of the insect in order to have a good efficacy of the treatment product.
- *Direct control methods*:
  - a) *mass trapping* was checked for codling moth with 40 traps/hectare and for grape vine moth with 10 traps/hectare; the efficacy was good when the population was not to high and the plot was isolated;

- b) *attract and kill* method was used in experimental plots in the last years for codling moth and summer fruit tortrix moth in apple orchards and for grape vine moth in vineyards; the results was comparable with those from standard.

There are many earlier references on this field, presented in the table number 2-6; refreshment and actualizing of this knowledge is important to maintain the interest for this field involved for ecological agriculture sustainability and to continue the studies in order to implement the methods of use of the pheromones in integrated management of pests.

**Table 2**

Studies on the Field Species Pest Pheromones
















Pheromone	Target Species	References
atraGAM	<i>Autographa gamma</i> (Silver y moth) 	Rosca and al., 1985 b
atraSEG	<i>Agrotis segetum</i> (The Turnip Moth) 	Rosca and al., 1984, 1985a, 1986a, 1986a, 1988a; Coroiu I. and al., 1992
atraEXCLAM	<i>Agrotis exclamationis</i> (Heart and dart moth ) 	Ghizdavu I., Rosca I., 1984, 1986; Rosca and al., 1988 b
xxx	<i>Ostrinia nubilalis</i> (European corn borer) 	Crisan Al. and al., 1992; Rosca and al. 1997; Rosca and Barbulescu, 1999
xxx	<i>Mamestra brassicae</i> (Cabbage armyworm) 	Stan Gh. and al.,1986, 1992
atraVIRG	<i>Diabrotica virgifera virgifera</i> (The Western corn rootworm) 	Patent RO 119362 B1 Int.Cl: C 07 C 67/14

Table 3

## Studies on the Orchard Pest Pheromones

Pheromone Product	Method of Use	Target Species	References
a) atraPOM traps b) MESAJ CP 	-detection -monitoring -treatment warning -mass trapping -control by Attract&Kill	<i>Cydia pomonella</i> (Codling moth) 	Maria Iacob, 1976; Hodosan F., Oprean I., 1979; Maria Iacob and Sonica Drosu, 1989c; Ghizdavu I., 1984; Ghizdavu I. And al., 1983  Drosu Sonica and al., 2008, 2009; Lucia Gansca and al., 2008; I. Oltean and al., 2008
atraFUN traps	-detection -monitoring -treatment warning	<i>Cydia funebrana</i> (Plum fruit moth) 	Maria Iacob, 1976; Hodosan F., Oprean I., 1979; Maria Iacob and Sonica Drosu, 1989b
atraMOL traps	-detection -monitoring -treatment warning	<i>Cydia molesta</i> (Oriental fruit moth) 	Maria Iacob, 1976; Hodosan F., Oprean I., 1979; Maria Iacob and Sonica Drosu, 1989a; Sonica Drosu, Anca Bobeanu, 1990
atraLIN traps	-detection -monitoring -treatment warning	<i>Anarsia lineatella</i> (Peach twig borer) 	Sonica Drosu and Anca Bobeanu, 1990
a) atraRET traps b) MESAJ AR 	-detection -monitoring -treatment warning -control by Attract&Kill	<i>Adoxophyes reticulana</i> (Summer fruit tortrix moth) 	Sonica Drosu, 1989a,b; Maria Iacob and Sonica Drosu, 1993b; Oltean I. and al., 2008  Sonica Drosu and al., 2009 c, in press
atraNUB traps	-detection -monitoring -treatment warning	<i>Hedya nubiferana</i> (Green budworm) 	Sonica Drosu, 1989a,b; Maria Iacob and Sonica Drosu, 1993a
atraENAFORM traps	-detection -monitoring -treatment warning	<i>Enarmonia formosana</i> (Cherry bark tortrix moth) 	Sonica Drosu, 1989a,b; Maria Iacob and Sonica Drosu, 1993c





Pheromone Product	Method of Use	Target Species	References
atraBLANC traps	-detection -monitoring -treatment warning	<i>Phylonorycter blancardella</i> (Spotted tentiform leafminer) 	Sonica Drosu 1988; Ghizdavu I. and al., 1990; Sonica Drosu, 1996a, 1996b; Nicolae Tomita, 2001
atraPOD traps	-detection -monitoring -treatment warning	<i>Archips podana</i> (Large fruit-tree tortrix) 	Sonica Drosu, 1986, 1989a,b
atraSCIT traps	-detection -monitoring -treatment warning	<i>Leucoptera malifoliella</i> (Pear leaf blister moth) 	Berar V., 1994; Drosu Sonica, 1996; Nicolae Tomita, 2001
atraMYOP traps	-detection -monitoring -treatment warning	<i>Synanthedon myopaeformis</i> (Red-belted clearwing) 	Teodorescu Georgeta and al., 2006; Patent RO 103877

Table 4

## Studies on the Vine Species Pest Pheromones



Pheromone product	Method of Use	Target Species	References
atraMBIG traps	-detection -monitoring -treatment warning	<i>Eupoecilia ambiguella</i> (European grape berry moth) 	Iacob Maria, 1976; Sonica Drosu, 1987; Filip I., 1985, 1986, 2004; Filip I. and Isac Gr., 1986; Filip I. and al., 1984;
a) atraBOT traps b) PRELUDIUM LB	-detection -monitoring -treatment warning -mass trapping  -control by Attract&Kill	<i>Lobesia botrana</i> (European grape vine moth) 	

Table 5





Studies on the Stored Product Pest Pheromones		
Pheromone	Target Species	References
atraDEP	<i>Plodia interpunctella</i> (Indian meal moth) 	Maria Ciobanu, I. Oprean, 2008; Maria Ciobanu, Sonica Drosu, 2009
	<i>Ephestia kuehniella</i> (Mediterranean flour moth) 	

Table 6

Studies on the Fruit Bushes and Green Spaces Pests		
Pheromone	Target Species	References
atraTYP L	<i>Synanthedon tyuliformis</i> (Currant clearwing) 	Patent RO 103877
atraCAM	<i>Cameraria ohridella</i> (Horse chestnut miner) 	Perju T., Olteanu I., 2001, Sonica Drosu and al., 2005

## CONCLUSIONS

- In Romania, during 1970-1990 were obtained important theoretical and practical results in the chemistry and biology studies about pheromones; in the last decade of the XX th century these studies were neglected.
- In the last time some projects offered the possibility to bring back in actuality the importance of the use of the pheromone products to control key pests in orchards and vineyards.
- The use of the pheromones is based on manipulating insect behavior for extended periods of time and is often a much more complex and difficult process than killing insects with toxic insecticides.
- Monitoring and control with pheromones must be carefully developed in order to prevent control failure and consequently loss of confidence in pheromone technology.



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