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INTEGRATED MANAGEMENT OF PESTS FOR BIODIVERSITY MEINTEINING AND ECOSYSTEMS HEALTH

Stanca Moise Cristina

„Lucian Blaga" Univetsity, Sibiu, Romania, cristinamoise1@yahoo.com

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Abstract. The biological methods used for the limitation of phytophagous populations surfaced as a necessity, following the un-rational usage of pesticides that became a real danger both for humans and environment. The paper presents the most important biological methods used for the limitation of phytophagous populations under the harm economic threshold.

INTRODUCTION:

The environmental pollution is in general one of the most current mankind's problems. The pollution represents "the process of the alteration of the biotical and no biotical environment factors, through introduction into the environment the dump goods as a results of the human activities", in the same time represents "an impending danger for human life, for flora and fauna on the Earth, both through the harmful effect of the pollutants and the unbalances that arise at the planetary level" (Mogan & Ardelean, 1993).

Biological control and modern biotechnological methods, in the context of the limitation of the different organism that compete for food the human being, arise as a necessity not only to control, but also to balance the ecological derangements through nonscientific or unilateral interventions.

The biological methods for limitation of the phytophagous insects populations under the damage level for environmental protection that are proposed to be utilized in Romania on a large scale are the following: the utilization of the biological products on a base for virus (polyedric viruses), bacteriums (*Bacilus thuringiensis*), and fungi (*Beauveria bassiana, B. tenella* etc.); introducing of zoophagous (*Prospaltella perniciossis; Aphelinus mali, Trichogramma spp*. etc.), pheromonal treatments; utilization of the biological active substances (growth regulators, drying factors etc.), treatment with repellents etc.

METHODS TO BE UTILIZED FOR THE BIOLOGICAL CONTROL

1. THE ZOOPHAGOUS INTRODUCTIONS

Another biological method of the animal pest control is also the introduction of zoophagous, this method being based on the trophic relationship established between the pest animals and the consumers species of them.

Taking into consideration the way of acting, they can be divided in parasites and predatories.

A. Parasites: different species of *Trichogramma,* parasites eggsphagous for limitation the populations of the many species of phytophagous insects. *Prospaltella perniciossis*; *Aphitis proclia-* parasites of coccidal and especially of San Jose louse (*Quadraspidiotus perniciosus*). *Apanteles glomeratus* – is parasite of many Lepidoptera larval etc. *Aphidius spp*. – parasites of different aphid species.

B. ***Predatories***: *Coccinella spetempunctata, Adalia binotata* (Ord. Coleoptera, Fam. Coccinellidae)- aphidiphagous; *Chrysopa perlla, Ch. carnea* (Ord. Neuroptera, Fam. Chrysopidae)– predator of aphids; *Perillus bioculatus* (Ord. Heteroptera) - predator of larvae and adults of Colorado (*Lepinoptarsa decemlineata*) etc. The majority of species from Carabidae, Staphilinidae, Cantharidae etc.

2. THE BIO-PREPARATES FOR PHYTOSANITAR USE

The biopreparates for phytosanitary use, investigated and applied to us, as one from the biological method for pest control, were introduced by different scientific researchers in the field of agriculture and forestry from different research institutes of ASAS, MEC and MAS. These biopreparates were obtained in labor conditions and in micro-bio-stations existing in different research Institutes or in some antibiotics factories. Using these products on avoid the environment pollution, made by utilization the chemical pesticides. Bioinsecticides with a base *Bacillus thuringiensis* approved for utilization in Romania are the following:

Table 1

Biopreparates of phytosanitary use tested and used in Romania

The product	The test for what was apprpved	Dose/Culture
DIPEL 2XWP	*Mamestra brassicae* L. *Pieris rapae* *Hyphantria cunea* Drury. *Lobesia botrana* Den. et Schiff.	0,05%/cabbage-field 0,05%/ cabbage-field 0,5-0,75l/ha/fruit trees 0,5% /grape vine
DIPEL ES	*Hyphantria cunea* Drury. *Lobesia botrana* Den. et Schiff.	1,0 l /ha / plum tree 1,0 l /ha / grape-vine
DIPEL WP	*Pieris brassicae* L. *Mamestra brassicae* L. *Cydia funebrana* Tr. *Hyphantria cunea* Den. et Schiff. *Lobesia botrana* Den. et Schiff.	0,1% / vegetable 0,1% /vegetable 0,1% / fruit trees 0,1%/ fruit trees 0,1% /grape-vine
ECOTECH EXTRA	*Leptinotarsa decemlineata* Say. *Lobesia botrana* Den. et Schiff.	4,5 l/ha / potatoes 1,5 l/ha grape-vine

FORAY	*Mamestra brassicae* L. *Pieris rapae* *Anarsia lineatella* Zell. *Cydia molesta* Busk. *Cydia pomonella* L. *Cydia funebrana* Tr. *Hyphantria cunea* Den et Schiff.	0,1% cabbage 0,1% cabbage 0,05%/peach tree 0,05%/peach tree 1 l/ha / apple tree 1 l/ha / plum tree 0,1% / fruit trees
NOVODOR TM	*Leptinotarsa decemlineata* Say. (L1-L2)	5 l/ha /anbergines, potatoes

3. THE UTILIZATION OF THE BIOLOGICAL ACTIVE SUBSTANCES

The scientifically researches made during the time, established that some substances secreted by arthropods and some plants can influence both some physiological processes and the behavior of phytophagous insects, and could be used for their control.

4. THE GROWTH REGULATORS

The growth regulators used as a mean of biological control, based on the knowledge of the physiological action of hormones, that assure the growth and normal development of insects.

The hormones are the substances secreted by endocrine glands of insects under control of nervous system. The youthful hormone and the shed hormone ate the main hormones that contribute active to the development of insects.

- The youthful hormone hat the role to stop or to brake the development process.
- The shed hormone is secreted by the protoracal glands, after the command of the neuroendocrine cells, that determine the shed, namely the passing the larva from an age to another, pupation or transformation into imago.

The limitation of some phytofagous insect species by mean of the growth regulators, was possible by introduction in the body of larva of a higher concentration than those useful for organism, that produce an unbalancing of the development having as a results the damage of metamorphosis in the phenotype aspect. Namely:

- the excess of youthful hormone-prolonge much more the larval ages, obtaining specimen with malformations unable to continue their development.
- The excess of endysonic hormone - shorting the larval ages, obtaining finally specimen uncompleted developed, unable for reproduction, or with a reduced prolificacy.

In the same time were discovered (Beratlief C., 1981) also another natural analogues proving that manifest the same bio-active features.

5. PHEROMONES

Information transmitted and received by insect by mean of the chemical messengers that circulate into the economystems are named ecomones or telergones that are also divided in alomones and pheromones.

Pheromones are considered „substances that are intermediators in order to transmit some messages at intraspecific level. In our country the feromonales substances are produced by „Chemical Research Institute Raluca Ripan – Cluj-Napoca, Romania”(Dr. H & Dr. Oprean I, and their practical applications were made by Researches Institutes of ASAS and partial of MEC).

The pheromonal messages have different significations that are important for pheromones classification.

Feromones are divided in two big categories, namely:

A. Pheromones for development (metabolics), that determine the arising in the receptor organisms of the metabolic or development alterations; these pheromones are important and better studied by social insects and by those with gregarious behavior (Ghizdavu I., Oprean I. 1983).

B. Pheromones for action (for release) that can induce changing of behavior, by the receptors specimen.

The most important pheromones in this category are:

- *pheromones of balize* (of trace) – are used for marking the itinerancy of movement towards a new shelted place or towards the source of food (white ants, larva of processional caterpillar etc.);
- *pheromones of oviposition* – serve to mark the favorable places (mosquitoes) or places of „interdiction" for deposition for the eggs (the fruit flies);
- *pheromones for aggregation* – assure the cohesion and the stability of the insects family at the social insects, or concentration for migration or setting in another biotope (locusts, grasshoppers, bees, wood beetles, ants etc.);
- *alarm pheromones* – assure the dispersion of population in the moment of population in the moment of predator attack (Ciochia 1997);
- *sexual pheromones* – intermediate the relationship between the sexual partners, before, during the sexual act and after copulation;
- *necrophorous pheromones* – give signals to the alive members about the presence of dead specimen.

Sexual pheromones are divided in:

- *sexual attractants* – are produced by one of the partners for attract the partners of the opposite sex, for copulation. At the majority of species these pheromones are produced by females;
- *pheromones aphrodisiacs* – are substances produced of males attracted by females, that have propose to excite the females for accepting the copulation;
- *sexual repellents* – are substances produced in the genital apparatus of male that are transferred together with the seminal product into those of female, in order to mark in this way the fecundates females.

The most important pheromones used for limitation of the phytofagous insects populations, are pheromones that attract the males. Because the small number of phytofagous insects that use this kind of pheromones, in the present on practices the mass capture of males in a proportion big enough, and in this way the majority of females in agrocoenosis remain not fecundates.

6. LIMITATION OF THE PHYTOFAGOUS INSECTS POPULATIONS BY MEAN OF CAPTURE, SEXUAL STERILIZATION AND RELAUNCHING

This method means the males capture, their sterilization in labor by mean of autocids method and their elaboration in habitat, for copulation. After that the ovules are not fecundated and the females depose the sterile eggs.

7. LIMITATION OF PHYTOFAGOUS INSECTS POPULATIONS BY MEAN OF CAPTURE, CONTAMINATION AND RELEASING METHOD

This method is used to determine the epizooties. The success of this method depends on the possibility of spread in the natural population of the pathogens specific agent by mean of simple contact, in copulation or ovipozition (Ciochia, 1977)

In our country the pheromones were used with success in the activities of prognosis and warning by Plant Protection Inspectorates in all the counties, having as a purpose the signal of the mass appearance of phytofagous in order to apply the methods for limitation of their populations.

Table 2

The PHEROMONES used in limitation of the phitofagous populations in orchards

The Product	Sexual pheromones for	Utilization
AtraBLANC	*Phylonorycter blancardella*	Works for prognosis-warning
AtrENAFORM	*Enarmonia formosana*	Works for prognosis-warning
AtraFUN	*Cydia funebrana* Tr.	Works for prognosis-warning
AtraLIN	*Anarsia lineatella* Zell.	Works for prognosis-warning
AtraMAL	Stigmella malella	Works for prognosis-warning
AtraMOL	*Cydia molesta* Busk.	Works for prognosis-warning
AtraNUB	*Hedya nubiferana*	Works for prognosis-warning
atraORG.	*Orgyia antiqua*	Works for prognosis-warning
AtraPOD	*Archips podana*	Works for prognosis-warning
AtraPOM	*Cydia pomonella*	Works for prognosis-warning
AtraRET	*Adoxophyes reticulana*	Works for prognosis-warning
AtrOCELLAN	*Spilonota ocellana*	Works for prognosis-warning

8.STERILIZATION (AUTOCIDIE)

As a method of biological control, sterilization means the impossibility of the specimen to be fecund, no matter what are the means used to have this effect.

Khipling was the first one that put the base of the reduction of some species of insects, using an sterilizing agent observed that a part of population (90% in his case) couldn't be perpetuated.

Sterilization types:

- *female non-fecundity* – by treatment of the females with ionizing radiations or ultraviolet; or after ingeration of radio isotopes.
- *aspermy* or inactivation of sperm of the male, is due, by some authors, because of loosing the fecundation capacity or because of losing the mobility of sperm, or the treatments with radiations.
- *incapacity of copulation* –appeared because of the treatment with irradiation that after the producing of sterilization lead to the impossibility of copulation of the treated insects.
- *the appearance of the lethal mutants* dominant in the reproductive cells of the male and female – made by mean of the electromagnetic radiations and of the particles of radiations (neutrals and alpha particles).

CONCLUSIONS

1. Biological methods are preferable to the chemical methods, because they have secondary effects on the environment and they don't produce substances with cancerigens action on human body.

2. The pheromones and the bacterial products are the most used biological means because of the fact that toxins synthesized by bacteriums act exactly like synthetic chemical preparates on the metabolism of the phytophagous insects.
3. The utilization of the entomophagous insects in the present in our country is practiced on a restricted level especially in the Research Institutes and at the Plant Protection Inspectorates; we recommend the utilization of these methods by all people that want to practice an ecological agriculture rather at a level of a little and medium size farms.
4. As a final conclusion of those presented by me, any of the given methods are preferable to the chemical ones, that have an harmful effect, immediately or on the long term on all the living beings inclusive on human being.

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