

## The pest of the white acacia (*Robinia pseudacacia* L.)

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### Rezumat

#### Dăunători ai salcâmului (*Robinia pseudacacia* L.)

În perioada 1992-1994, în rezervația naturală a Stațiunii de Biologie Marină Agigea (Constanța) au fost efectuate studii privind insectele dăunătoare organelor de fructificare ale salcâmului alb (*Robinia pseudacacia* L.). Au fost identificate speciile *Apis craccivora* KOCH. (păduchele verde al leguminoaselor), *Etiella zinckenella* TR. (molia păstăilor de soia) și *Bruchophagus robiniae* ZER. (viespea semințelor de salcâm). Au fost evidențiate daunele și s-a constatat că 50% din distrugerile observate la semințe au fost cauzate de *E. zinckenella* (44,4%) și *B. robiniae* (5,6%).

**Keywords:** *Robinia pseudacacia* L., *Apis craccivora* KOCH., *Etiella zinckenella* TR., *Bruchophagus robiniae* ZER.,

White acacia (*Robinia pseudacacia*), original from North of America and introduced on Europe during 18<sup>th</sup> century, is a precious wooded tree, decorative and mielat. In our country, acacia has a large dissemination, being cultivated either like isolated trees (in farms or parks) or in masive plantations (in protection curtain, against of winds) or for snows stopping, or for the fixation of the slop soil with tendency of slide. The wood of acacia has a large utilisation in bilding, furniture industry, in farms like precious fuel (PRODAN & BUIA, 1968).

The multiplication capacity of acacia is great; it is realised by vegetative (by shoot from roots) or generative way (by seeds). Beginning by second or third year of vegetation the saplings of acacia blossing abundently and forme numerous pods, and are distributed in inflorescences. Every pod contain 3-15 seeds. Within the framework of species it can distinguish varieties, that are diferentiated by their size, pods colours and the number of seeds from pod.

Production of seeds of the acacia trees is strongly influenced by the seminiphagous insects activity. They create difficulties in plant multiplication by seed way, respectively for nursery estabilishments for production of samplings and for their plantation for diverse aims.

The principal seed eating insects of the acacia trees are: the grey louse of leguminouses plants (*Aphis craccivora* KOCH.), the moth of pods (*Etiella zinckenella* TR.) and the wasp of seeds (*Bruchophagus robiniae* ZER.), (KALTENBACH 1874; PRISEANU 1948; CEIANU, 1963; MANOLACHE et al. 1946-1959; ZEROVA 1978).

Because in our literature there are relative poor data regarding fauna of the acacia plantations, some species being unknown to us, we were porposed to point out the presence of those seminiphagous species which are most important; to describe their biological cycle and to establish the damage degree of those pests. On the basis of this data, if it is necessary, it can be elaborate an effective system for pest control.

### Material and methods

During 1990-1994, there were collected pods of white acacia from different places in the country and at different data. After the opening of the pods and the dissection of the seeds, were put in evidence the development stages of the pests and the damage degree produced. Parallel, samples of pods were kept in the laboratory and was pursued the evolution of the pests. The pods, were introduced in the cloth-bag



or paper-bag and were installed in the climatic cupboard. These offer the best conditions of development for both phytophagous and zoophagous insects. On the base of the number of the phytophagous and zoophagous insects appeared from pods and infested seeds, were established the seminiphagous species, their biological cycle, the damage degree and the parasitism percentage of the phytophagous species by the entomophagous.

For the grey louse, the observations and the data concerning the density of populations and the damage, were registered by establishing of the frequency of pods attacked and the medium number of the aphids on the pod. Data concerning the damage degree of the seminiphagous species which were pointed out, are presented in table nr. 1.

### Results and discussion

Following of the investigations concerning the presence, evolution and the damage degree caused by the main seminiphagous insects, that produce damage in the white acacia plantation, it was evidenced the presence and it was established the bioecological parameters concerning the species: grey louse of the leguminosae (*Aphis craccivora* KOCH.). The moth of the soya - bean pods (*Etiella zinckenella* TR.) and the wasp of the white acacia seeds (*Bruchophagus robiniae* ZER.).

#### The grey-louse of Fabaceae - *Aphis craccivora* KOCH. (Aphididae, Homoptera).

The insect is well known in our country, it harming a lot of leguminosae plants, both, annual or perennial (MANOLACHE et al. 1946-1959). Around of Cluj area the aphidian appear like pests on the white acacia, too, infesting strong the peak of the shoot and of the pods informing. In the dense colony of the virginogene females which populate these organs- vegetative and generative- the insects determine deformation of the infested organs, they flood them with mielat, on which they are installed and there are developing microorganisms. The attacked pods stagnate in their development, remain smaller, and the seeds production is quantitative reduced and of the inferior quality.

#### The moth of the fabaceae pods - *Etiella zinckenella* TR. (Phycitidae, Lepidoptera).

In our country, the red caterpillar of the soy-bean and pea pods, how usually it is preferably named, is a common pest and have a major importance for these crops, particularly in the Moldavia and generally in south of country (MANOLACHE et al. 1946-1959; PEIU 1965; RĂDULESCU & PAULIAN 1973; MEGAHED 1978; REYES & PERJU 1988; GOGOȘĂ et al. 1986; BAICU et al. 1988; PERJU & REYES 1996).

The insect have a vast dissemination in other countries of Europe and America, too (RAFAILSKII 1964; KOGAN & HERZOG 1980; AREPIN et al. 1987). Though, it was pointed out like frequent pests on the seeds and pods of yellow acacia (*Caragana arborescens*) and white acacia (*Robinia pseudacacia*) in Bărăgan (CEIANĂ 1963) and on the seeds of the different annuals leguminosae plants (*Cytisus* spp., *Lathyrus* spp., *Soja* spp., *Pisum* spp. and *Vicia* spp.) in Transilvania (REYES & PERJU 1988); deliberately observations concerning the behaviour of this species on the white acacia weren't done. With the occasion of the gathering of the biological material from the Agiea Natural Reservation (Constanța), were harvested the pods of white acacia, too, in idea to trace out the presence of the wasp of seeds (*Bruchophagus robiniae* ZER.). At the dissection of the pods were found larva belonging to the *Etiella zinckenella* TR. species, from the second generation, which produce a very strong damage to the seeds.

When the caterpillars leave the pods where they developed, they produce circular perforations in the pod-walls and then migrate in soil. The achieved perforations are relatively large, being distinguished from those produced by the wasp of seeds (*Bruchophagus robiniae* ZER.) which have an obviously tight diameter. In the wall seeds were counted until 6 orificies. At the analyse of the pods and seeds of white acacia from Agiea was established that the frequency of the pods attack, touch to 86%, especially to the shorter trees, with the shorter and unpigment seeds, while to the high trees having the long and reddish pods, the frequency of the pods attack is some reduced (Tab. 1).

On an average samples of 100 long pods, 86 of them were been attacked, being registered 76 pods with a one larva and 10 pods with two larvae, these ones having different ages, majority of them reaching at the complete development.

At the other average samples of 100 shorter pods, were registered 96 attacked pods, 96 of them with a one larva, and 4 of them with 2 larvae in a pod.



At the first ages the larvae have a greenish colour of the body, while those of last age, have a reddish colour. They are very eagerly and restless when they are disturbed. If they are kept in the paper and even cloth bags they punch easily their walls.

The larvae are very rapacious and when are two larvae in a pod, many times the seeds are consumed entirely. To these pods are frequently installed saprophyte mushrooms. In captivity the larvae are adapted relatively hard, refusing foods. Usually they are hide and at the protection of a some cocoons from silky fibres, they enter in diapause.

At the samples with the pods strongly attacked, were obtained only some species of parasite hymenoptera, comparative with what it is known in literature, being registered not less than 35 entomophagous species (MANOLACHE 1941; PEIU ET AL. 1961; MEGAHED 1978; VIKTOROV 1956).

From the registered data, regarding the damage degree caused, resulted that in their development a larva eat 5-6 seeds of white acacia. Looking after food, larvae migrate from a pod to another, Considering that a larva destroy half from the number of seeds from a pod, in a case when it exist a larva in a pod, the damage percentage of the seeds, at the first analysed sample, is 43%, and at the second sample, is 48%.

#### **Wasp of the white acacia seeds - *Bruchophagus robiniae* ZER. (Eurytomidae, Hymenoptera).**

This species constitute a faunistic novelty, and a pest species. It is probably that the insect represent a faunistic element naturalised a long time ago, like in the adjacent countries. It was pointed out (from recently data, too) in Ukraina (ZEROVA 1978) and Hungary (FARKAS & TERPÖ-POMOGYI 1974). There are unknown other signals of the insect on the our continent and not even in the other part of world (ZEROVA 1974).

**Morphology.** Data regarding the external morphology of the grown-up insect are detailed presented by ZEROVA (1978) and by FARKAS & TERPÖ-POMOGYI (1974). Underlining few particularities regarding the size, body, colour and nervature of the wings, we register that both sexes-like to the Eurytomidae majority- have a black body, female is 2,3 mm and the male is 2,8 mm length. The antennae at the male are more developed, and adorned with long hairs. The abdomen of the female is more developed and at extremity with an telescopic ovipositor, and at the male the abdomen is little and almost round.

Larva, apodal and eucephal, when is entirely developed, has the body of 2,6 mm length, easy bent, cephalic capsule is yellowish, and the thorax and abdomen is white.

**Biological cycle.** Insects has a generation on year, hibernating like a larva reached at the complete development, in the infested seeds. In course of the May the larvae are transformed in pupa, and in course of the June-July appear the grown-up insects. The wasps gnaw the tegument of the seeds and the pods walls and flying in the course of the July and August. When they arrive to the complete development they remain for hibernate in the infested seeds and pods.

The insect multiplication is stoped by the activity of the some hymenopterous, which parasite in the larva or pupa stadium, in a percentage, that vary between 5-62%. Between the parasitical species it can remark the hymenopterous from Chalcidoidea superfamily, they being not determinate yet.

**The host-plants and damages.** The wasp is a monophagous insect, infesting the pods, respectively the white acacia seeds (*Robinia pseudacacia*). From the pods of the white acacia, collected in many years from Bucharest (Botanical Garden of the Agriculture University), Constancy (The Natural Reservation from Agigea) and Cluj-Napoca (The Natural Reservation from the Hay Field Valey) was registered the presence of the wasps from hibernate generation, in the lab. The first wasps appeared by the second half of the April and their fly have continued phasing untill the second half of the July (Tab. 1).

From the data presented in tabel nr. 1, result that the highest degree of infestation of the seeds was registered at the pods collected from Bucharest in 1990 (24%), than at those from Cluj, in 1991 (18%) and in a percentage relatively small (12%) at the material collected from Agigea.

Parallel with the seminiphagous wasps appear parasite hymenopterous which, after their relatively great number, comparative with those seminiphagous, control significantly the pest multiplication. Depending on the trees (sbspecies, variety) and respectively on the lenght and the colour of pods and of seeds, in a pod it can developed 3-15 seeds. Taking in calculs an average of 9 seeds/pod, in a mean sample of 100 pods, it is form 900 seeds. Considering that the wasps number appeared at the samples of analysed pods, it comes out that at the first sample (Agigea) the percentage of seeds destruction was 3,0%, at the second sample (Bucharest) was 9,7%, and at the third (Cluj-Napoca) it was 7,0%.



Accumulating the percentages of the destroyed seeds by these two seminiphagous species- the moth of the seeds (*Etiella zinckenella* TR.) and the wasp of seeds (*Bruchophagus robiniae* ZER.), result that, at the collected material in 1992 from Agigea, the pests were destroyed 46,1% from the seeds production of the white acacia.

Table 1

The percentage of the white acacia infested pods and seeds by the larvae of the *Etiella zinckenella* TR. and *Bruchophagus robiniae* ZER. (E. = *E. zinckenella* TR., H. = hymenopterous parasite, B. = *Bruchophagus robiniae* ZER)

Sample/Place Date	Insects number/100 pods				% of the infested pods		% of the destroyed seeds by larvae	
	E.	H.	B.	H.	E.	B.	E.	B.
I. Constanța (Agigea)								
10.08.1992	78	14	20	3	86	21	43	
15.08.1993	78	3	16	2	96	23	48	3,0
II. București								
27.10.1990	-	-	48	80	-	60	-	9,7
10.08.1992	-	-	38	6	-	58	-	
III. Cluj-Napoca								
06.04.1991	-	-	20	2	-	14	-	
15.09.1991	-	-	32	4	-	11	-	7,0
23.08.1992	-	-	29	3	-	28	-	
17.08.1993	-	-	4	40	-	4	-	

### Conclusions

The main pests of the fructify organs of the white acacia are: the grey louse of the fabaceae (*Aphis craccivora* KOCH.), the moth of the fabaceae pods (*Etiella zinckenella* TR.) and the wasp of white acacia seeds (*Bruchophagus robiniae* ZER.).

It is pointed out for the first time in the fauna of the our country, the presence of the wasp of the white acacia seeds (*Bruchophagus robiniae* ZER.), respectively from Cluj, Bucharest and Constanța (Agigea).

The wasp of the white acacia seeds presents one generation on year, hibernating in the infested seeds, respectively in the pods of the host-plant, fell on the soil or in trees maintaining until next summer.

The percentage of the infested pods by the larvae of the *Etiella zinckenella* TR. and *Bruchophagus robiniae* ZER. species, in the south area of the country (Agigea) arrived at 86-96%, and of harmed seeds by *Etiella zinckenella* TR. vary between 43-48% (an average of 45%) and by *Bruchophagus robiniae* ZER., 3,0% at Agigea, 7,0% at Cluj and 9,7% at Bucharest (the average is 6,6%).

The species of the seminiphagous insects, *Etiella zinckenella* TR. and *Bruchophagus robiniae* ZER. are involved like potential factors of reduction of the seeds production at the white acacia populations from our country and constitute in the same time the reserve of infestation of the yearly fabaceae crops (soybean, pea and vetch) by the moth of the fabaceae pods.

The parasite hymenopterous plays an significant role in the maintenance of the biological equilibrium in the case of the populations of those 2 seminiphagous species, especially of the wasp of seeds.

The percentage of parasited in same years outruning 50%; this is available for the grey-louse of which populations are destroyed in great part by the predaceous (*Chrysopidae*, *Coccinellidae*, *Syrphidae*, *Leucospidae*) and parasitoid-insects (*Aphidiidae*).

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