

## ENTOMOFAUNA AND ACAROFAUNA OF *CLEMATIS VITALBA* L. IN YUGOSLAVIA

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Potential agents of biological control of *Clematis vitalba* L., a dangerous forest weed in many European countries were investigated in Yugoslavia. Five species of mites and insects were recorded: *Aceria vitalbae* (Can.) and *Eptrimerus heterogaster* (Nal.) (Acarina, Eriophyoidea), *Xylocleptes bispinus* Duft. (Coleoptera, Scolytidae), *Phytomyza vitalbae* Kalt. (Diptera, Agromyzidae) and *Monophadnus spinolae* Klug. (Hymenoptera, Tenthredinidae). All above mite and insect species are widely distributed in Yugoslavia and are potential agents of *C. vitalba* biological control.

KEY WORDS: *Clematis vitalba*, biological control, Eriophyoidea, Agromyzidae, Scolytidae, Tenthredinidae.

### INTRODUCTION

There are for species in the genus *Clematis* (Angiospermae, Ranunculaceae) in Yugoslavia: *C. recta* L., *C. integrifolia* L., *C. alpina* (L.), and *C. vitalba* L., with four forms: *f. vestita* Fritsch, *f. vitalba* Beck, *f. integrata* Nyar and *f. syriaca* Boiss. (GAJIĆ, 1970; SARIĆ et. al., 1986).

*Clematis vitalba* L. - traveler's joy is the most frequent forest weed species in the genus *Clematis* in Europe. It is a perennial deciduous climbing plant. Its stem is up to 3cm wide and 10 m long (exceptionally more). It flowers abundantly, and its flowers attract bees. It reproduces by seed. In Yugoslavia, it is very frequent in different types of broadleaf forests, especially in degraded forests, forest plantations, poplar and willow cultures and forest nurseries. Dense populations develop very quickly in forest sites and forest trees are endangered. The trees covered with clematis are often deformed and, owing to insufficient light, they weaken physiologically and

very often die. During winter, wet snow remains on such trees in greater quantities leading to snowbreak, uprooting and tree bending. Consequently, *C. vitalba* is considered a dangerous forest weed. Foresters often undertake control measures but, for the time being, clematis suppression is reduced to mechanical destruction. The effect of such measures is not satisfactory, because clematis population recovers very soon. Therefore, biological control of *C. vitalba* is a more efficient and longer lasting method of control. In this aim *C. vitalba* entomofauna and acarofauna in Yugoslavia were studied in order to determine potential agents of biological control. Insect and mite species identified as potential agents of *C. vitalba* biological control will be studied in more detail in the following period.

### MATERIAL AND METHODS

*Clematis vitalba* plants were surveyed at various sites in Serbia and Monte Negro and samples of plant parts attacked by insects and mites were collected. The samples of insect larvae were raised in the laboratory and adult insects were determined. Adult mites were taken from the samples attacked by mites and microscopic preparations were made for determination. Damaged plants were herbarized. The collected and determined material of insects and mites as well as the damaged parts are kept in the collections of the Faculty of Forestry and Faculty of Agriculture in Belgrade.

### RESULTS AND DISCUSSION

The fauna of phytophagous mites and insects feeding on clematis (*Clematis vitalba* L.) in Yugoslavia consists of five species (2 mite and 3 insect species):

#### **Eriophyoidea: (Acarina, Prostigmata)**

Three species of eriophyid mites have been identified to date on *C. vitalba* in the world: *Aceria vitalbae* (Can.), *Eptrimerus heterogaster* (Nal.) and *Platyphytopus vitalbae* Farkas. *P. vitalbae* was described based on only one female and consequently and also probably based on the fact that the species in the genus *Platyphytopus* have to date been identified only on gymnosperms, it was concluded that clematis most probably is not the hostplant of this eriophyid mite species (ARMINE & STASNY, 1994).

The species *Eptrimerus heterogaster* (Nal.) (Fig. 1) and *Aceria vitalbae* (Can.) (Fig. 2) were described in 1891 in Austria, i.e. in 1892 in Italy. Both species cause significant damage on clematis young leaves and buds.

NALEPA (1910) identified the species *E. heterogaster* on *C. recta*, *C. cirrhosa* and *C. alpina*. This mite causes leaf curl along the veins and abnormal hairiness of the adaxial. Young leaves of shoot tops are especially intensively attacked. CANES-



Fig. 1 *C. vitalba* leaf edge rolling caused by *Epitrimerus heterogaster*



Fig. 2 *C. vitalba* young leaves damaged by *Aceria vitalbae*

TRINI (1892) recorded bud damage and leaf curl caused by *Aceria vitalbae* on *C. vitalba* in Italy. An additional description of the species. *A. vitalbae* was given by BOCZEK & PETANOVIĆ (1994).

*E. heterogaster* is considered an European species (FARKAS, 1965), although there are few precise data on the findings (only Austria, Poland, Bulgaria and Yugoslavia). In the former Yugoslavia, it was recorded in Slovenia, Serbia and Croatia (PETANOVIĆ et al., 1966). Until recently, *A. vitalbae* was known only in the surroundings of Verona in Italy.

By the directed study of phytophagous mites of *C. vitalba* recently, *A. vitalbae* was identified at several localities in Serbia: Belgrade, Obedska Bara, Vrnjačka Banja, Lepenski Vir (PETANOVIĆ & STANKOVIĆ in press). *E. heterogaster* was recorded at several localities in Serbia (Belgrade, Donji Milanovac, Niš, Knjaževac, Valjevo, Mountain Goč) and in Montenegro (Mountain Durmitor).

Both species can coexist at the same micro-site, primarily as phyto-bionts. Together, they can cause a significant damage of clematis shoot tops which, in more severe attacks especially by *E. heterogaster*, can have rusty color.

Bearing in mind their monophagy, i.e., oligophagy within the genus *Clematis*, and the type of damage which they cause by their diet, both species can be considered as potential agents of *C. vitalba* biological control. To be able to discuss their potential application, it is necessary to study in more detail their distribution, harmful effects to *C. vitalba*, as well as their bioecology.

### **Scolytidae (Insecta: Coleoptera)**

In the family Scolytidae, there are two species whose host plant is *Clematis vitalba*. They are: *Xylocleptes bispinus* Duf. and *X. biuncus* Reitt. The former ranges in Central and South Europe, Asia Minor, Krimea, Caucasus and North Africa, while the latter ranges in South Europe and North Africa (KARAMAN, 1971). In Serbia, only the species *X. bispinus* has been identified (KARAMAN, 1971, RADONJIĆ & TOMIĆ, 1993).

The species *Xylocleptes bispinus* Duf. was observed at several localities in Serbia and Montenegro, both in Vojvodina lowland forests and in mountainous regions at about 1.000 m above sea level. Its larvae live under *Clematis vitalba* stem and branch bark. Adults hibernate at places of development and swarm in early spring. There are two generations. The first one swarms in April and the second one - in July. It develops in physiologically weakened or dead clematis. Most often it infests clematis in the forest after winter felling, when clematis stems are cut simultaneously with timber. In spring, the swarming adults prefer such plants. As *X.*

*bispinus* infests physiologically weakened or dead clematis, it is not very prosperous as the agent of biological control. Still the species should be studied in more detail, as it is known that some representatives of this family are the vectors of phytopathogenic microorganisms.

### **Agromyzidae (Insecta: Diptera)**

In Europe, nine species and one subspecies have been identified in the family Agromyzidae, which live on the plants in the genus *Clematis*. Five of them are leaf miners (SPENCER, 1990). During our investigations, three leaf miner species were identified on *Clematis* spp.: *Phytomyza vitalbae* Kalt., *Ph. kaltenbachi* Hd., and *Ph. rectae* Hd., of which only one species (*Ph. vitalbae*) was recorded on *C. vitalba*.

*Phytomyza vitalbae* Kalt. was reared from leaf mines on *C. vitalba* collected in Serbia and Montenegro (SPASIĆ, 1993, 1996). Its larva forms an irregular snake-like mine on the adaxial (Fig. 3). The puparium is light brown and it appears outside the mine. The species ranges in Central European countries: Austria, Hungary, Romania, Slovenia. According to literature data, its larva feeds on the leaves of *C. vitalba*, *C. alpina* and other *Clematis* species, except for *C. recta* (S, 1976).

Depending on population density, the number of mines on one leaf can vary from one to about ten. The harmful effect of *P. vitalbae* on the host plant can be considered only in the conditions of very high population levels. The leaves affected by numerous mines lose a great part of the assimilation area, and are often killed, which is unfavorable for plant development, especially flowering intensity and seed yield.

As this is an oligophagous species, further research is by all means necessary. Special attention will be focused on the study of *P. vitalbae* biology and its natural enemies.

### **Tenthredinidae (Insecta: Hymenoptera)**

In Europe, four species have been identified in the family Tenthredinidae which feed on the leaves of the plants in the genus *Clematis*. They are: *Eurhadinocera ventralis* Panz., *E. fulviventris* Scopoli, *Pseudodineura clematidisrectae* Hering and *Monophadnus spinolae* Klug. (ŽELOHOVCEV, 1988, ZOMBORI, 1990). During our investigations, only one species was recorded.

*Monophadnus spinolae* Klug. is distributed in South, West and Central Europe and Asia Minor (ŽELOHOVCEV, 1988). During our study, it was recorded in Belgrade and its surrounding in very high population densities. The larvae of this species caused a double complete defoliation of clematis populations. Mass swar-



**Fig. 3** *C. vitalba* leaves with *Phytomyza vitalbae* mines

ming of adults was observed between 10 and 20 July and from 20 to 30 August 1988. Defoliation occurred in mid August and mid September. The adults swarm exclusively around clematis plants on in their vicinity. Larvae develop exclusively on *C. vitalba* leaves (Fig. 4). During our study of *M. spinolae* life cycle, we observed its egg parasitoid which parasitized its eggs in a significant percentage, especially the eggs oviposited by the end of August 1998. The species belongs to the family Eulophidae (Hymenoptera, Chalcidoidea) and its determination is in progress.

Based on our study to date, leaf wasp *M. spinolae* can be an excellent reducent of *C. vitalba* populations. In our further study, this species will be paid special attention to.



Fig. 4 *Monophadnus spinolae* larvae on *C. vitalba* leaves

Table 1.  
Acarofauna and entomofauna of *Clematis vitalba* in Yugoslavia

No	Species	C. vitalba plant parts			
		Bud	Young leaf	Mature leaf	Stem
1	<i>Epirimerus heterogaster</i> (Nal.) (Acari, Eriophyoidea)	+	+		
2	<i>Aceria vitalbae</i> (Can.) (Acari, Eriophyoidea)	+	+		
3	<i>Xylocleptes bispinus</i> (Coleoptera, Scolytidae)				
4	<i>Phytomyza vitalbae</i> (Diptera, Agromyzidae)			+	+
5	<i>Monophadnus spinolae</i> (Hymenoptera, Tenthredinidae)		+	+	

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ЕНТОМОФАУНА И АКАРОФАУНА *CLEMATIS VITALBA* L.  
У ЈУГОСЛАВИЈИ

Љ. МИХАЈЛОВИЋ, Р. СПАСИЋ,  
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**И з в о д**

На подручју Југославије су истраживани потенцијални агенси за биолошко сузбијање павити (*Clematis vitalba* L.) која представља опасан шумски коров у многим земљама Европе. Констатовано је пет врста гриња и инсеката и то: *Aceria vitalbae* (Can.) и *Epirimerus heterogaster* (Nal.) (Acarina, Eriophyoidea) које изазивају деформације младих избојака и пупољака, *Xylocleptes bispinus* Duft. (Coleoptera, Scolytidae) чије ларве живе у стаблу физиолошки ослабелих или сувих биљака, *Phytomyza vitalbae* Kalt. (Diptera, Agromyzidae) чије ларве минирају листове и *Monophadnus spinolae* Klug. (Hymenoptera, Tenthredinidae) чије пагусенице брсте лишће павити. Све констатоване врсте гриња и инсеката су широко распрострањене на подручју Југославије и представљају потенцијалне агенсе за биолошку борбу против *C. vitalba*.

Received February 9, 1999

Accepted March 19, 1999