THE RUSSIANS ARE COMING–AREN'T THEY? SIBERIAN MOTH IN EUROPEAN FORESTS

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ABSTRACT

Dendrolimus superans sibiricus Tschtv. (Lepidoptera: Lasiocampidae) is the most destructive defoliator of the coniferous taiga forest in Siberia and the Russian Far East. Outbreaks of this pest species are the primary biological factor influencing change in forest cover in the southern taiga subzone with enormous ecological and social consequences (Baranchikov et al. 2001). The species has a range that extends from the Pacific Ocean (Russian Far East, Japan and Northern Korea) across Siberia, Northern China and Mongolia to the Ural Mountains (Rozhkov 1963). At the beginning of the 20th century the species was documented to have spread 500 km to the west of the Urals to the Republic of Udmurtiya.

Since the year 2000, a 1:1 mixture of aldehyde Z,E-5,7-dodecadienal and alcohol Z,E-5,7-dodecadienol has been used in pheromone traps to monitor Siberian moth populations in the Asian part of Russia (Baranchikov et al. 2000, Klun et al. 2000, Pletnev et al. 2000). In 2001, a series of traps were placed in the center of European Russia. Many males were caught in the Republic of Mariy El (500 km east of Moscow); two moths were even trapped in a Moscow neighborhood (Lebedeva et al. 2005). Unfortunately the absence of insecticide strips in the traps did not protect the captured specimens and all were damaged making an accurate identification difficult. The trapped moths were automatically referred to *D.s.sibiricus*. These results received enormous international attention (Gninenko & Orlinskii 2002). The Panel on Quarantine Pests for Forestry of European and Mediterranean Plant Protection Organization (EPPO) added Siberian moth to the EPPO A2 quarantine list as a species of serious risk for the forests of Byelorussia, Poland, Baltic and Scandinavian countries. This action automatically demands special plant health certificates on all imports of Russian raw timber and it may have serious economic consequences (EPPO 2005). For example, Finland imports 6 million m^3 of Russian timber every year in about 150,000 shipments. If every shipment has to have its own pest-free certificate, the inevitable delays and confusion at the borders could shut down the sawmills and pulp mills of Eastern Finland and will slow wood exports from Russia.

In June-July 2004, we tested different mixtures of Z,E-5,7-dodecadienal and Z,E-5,7-dodecadienol in the Scots pine forests in the foothills of the eastern Sayan mountains in the southern part of Krasnoyarsk Kray—the mutual habitat of two species of *Dendrolimus: D. superans* and *D. pini* (pine moth). Pine moth is a common pest of pine in the western Palaearctic Region. It is distributed from Western and Northern Europe through southern Siberia to Transbaikalia. We used box carton traps with insecticide strips and folgaplen dispensers (Baranchikov 2003).

Both the pheromone and the dispensers were manufactured by the Institute of Chemical Means for Plant Protection in Moscow. Five different mixtures of attractant (Table 1) were tested in 10 replicates. The traps were placed in a line 150 m apart in 1-2-3-4-5-1-2 etc. sequence in a park type pine forest. For a period of 40 days traps were checked twice—23 males of *D. pini* and 17 males of *D. superans* were caught. The distribution of catches demonstrated that 1:1 and 1:0.5 mixtures had equal attractivity to both species. The 1:0.1 mixture was not attractive for Siberian moth males and the aldehyde did not attract either species.

The experiment demonstrated the similarity of sex attractants of Siberian moth and pine moth. Possibly the pheromones of these species, in addition to the main components, contain some minor ones which determine the specificity of the communication signal. Males of the two species are morphologically very similar, the only real difference can be found in male genitalia. The lower branch of the valvae of Siberian moth is much longer and thinner than that of the pine moth (Fig. 1).

Table 1. Attractivity of different mixtures and concentrations of Z,E-5,7-dodecadienal (Z5E7DDDAL) and Z,E-5,7-dodecadienol (Z5E7DDDOL) for males of two Dendrolimus species in Krasnoyarsk Kray

	Attractant components mkg per lure Z5E7DDDAL:Z5E7DDDOL	% of the total males caught	
		Dendrolimus pini	*D. superans sibiricus*
1	1000 : 1000	30.4	41.2
2	1000 : 500	39.1	47.1
3	1000 : 250	8.7	11.7
4	1000 : 100	21.8	0.0
5	1000 : 0	0.0	0.0
	Total	100	100

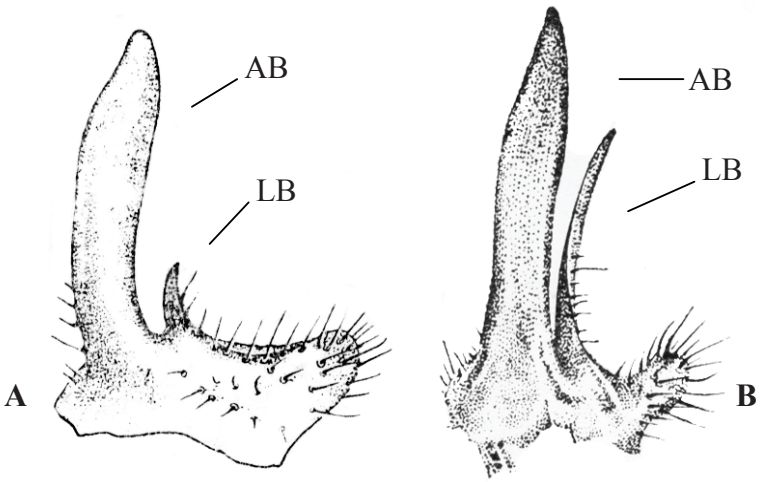

Figure 1. Part of genitalia (valvae) of Dendrolimus pini (A) and D. superans sibiricus (B) males; AB – upper branch, LB—lower branch of valvae.

In the regions occupied by both species of *Dendrolimus* use of Siberian moth sex attractant in pheromone traps should be accompanied by an obligatory morphological examination of male genitalia. During the summer 2004, the 500:500 mkg per lure mixture of aldehyde and alcohol attracted *Dendrolimus* males in a few areas of Lithuania (Ponomarev et al. 2005). The morphological analysis of samples proved it was *D. pini*, not Siberian moth. Morphology of moths trapped in Mariy El and near Moscow in 2001 was not studied.

To conclude, for the moment there is no definitive evidence of Siberian moth occurring in the center of the European part of Russia. Both the structure and species composition of European forests are quite unfavorable for this pest. Its complex life cycle with obligate winter and facultative summer diapause of larvae strongly depends on photoperiod and temperature and will complicate the process of local adaptation. The possibility of Siberian moth distribution to Western and Northern Europe is highly questionable.

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