

Preparedness in biological control of priority biosecurity threats

Nun moth, *Lymantria monacha* (L.)

Introduction

The nun moth (NM), *Lymantria monacha* (L.) is a lepidopteran species of the family Erebidae whose larvae feed on conifer needles, mostly pine (*Pinus*) and spruce (*Picea*). It is distributed from Western Europe to the Russian Far East and China. Periodic outbreaks have occurred in various parts of its range and it is considered a serious pest of conifers in some areas, in particular on spruce in Central Europe and on pine in Southern Europe. It is a univoltine species overwintering in the egg stage (CABI 2020).

History of classical biological control against *Lymantria monacha*

The nun moth is not yet invasive anywhere and has not yet been the target of classical biological control.

Most promising natural enemies for classical biological control

The NM is attacked by many natural enemies, most of which also attacking the gypsy moth, *Lymantria dispar*. Mills and Schoenberg (1985), Kolomietz (1990); van Driesche et al. (1996) and CABI (2020) provide reviews of the natural enemies of NM with references. Many natural enemies of the NM are polyphagous and not suitable as classical biological control agents. The two most specific and most efficient natural enemies in Eurasia are:

The tachinid fly *Parasetigena silvestris* (Robineau-Desvoidy) is usually seen as the most abundant parasitoid of the NM in Europe and Asia (Mills and Schoenberg 1985; Kolomietz 1990). It is specific to *Lymantria* spp. (Tschorsnig and Herting 1994) and should probably be the first parasitoid to be considered for introduction should the NM become invasive outside its native range. It is a very well-known species because has already been introduced against the gypsy moth, *L. dispar*, in North America, where it has become one of its major parasitoids (Doane and McManus 1981).

The nuclear polyhedrosis virus (NPV) of the NM is specific to its host and is at least partly responsible for the collapse of outbreaks in Eurasia (Van Driesche et al. 1998). It has been also developed as biopesticide and tested during NM outbreaks in Europe but it never became commercially available. However, it would be a priority choice for introduction as classical biological control agent.

Other natural enemies for classical biological control

The braconid *Cotesia melanoscela* (Ratzeburg) is considered as one of the two main parasitoids of the NM in Europe, with *P. silvestris* (Mills and Schoenberg 1985). However, it is known from many hosts (Yu et al. 2016) and is this probably not specific enough for classical biological control. In Europe, at least two parasitoids from the NM are recorded as monophagous by Mills and Schoenberg (1985), the ichneumonid *Casinaria scutellaris* Tschek and *Elachertus charondas* (Walker). These two species are poorly known and apparently not very abundant on the NM, but could be considered for further investigations because of their specificity.



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In the Russian Far East, the two most effective parasitoids of the NM are *P. silvestris* (as *P. agilis* (Robineau-Desvoidy)) and *Blepharipa schineri* Mesnil (Kolomietz 1990). This latter species is recorded from some other hosts in Europe (Tschorsnig and Herting 1994) but not from *L. monacha*. It is possible that the records in the Russian Far East refer to another, more specific parasitoid, which could then also be studied as potential candidate for introduction.

References

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