

Impatiens glandulifera as a commonly used host plant for *Pristerognatha fuligana* (Lepidoptera: Tortricidae) in Belgium

Ruben Meert & Regis Nossent

Abstract. In autumn 2018 several full-grown larvae of *Pristerognatha fuligana* (Denis & Schiffermüller, 1775) were found in stems of *Impatiens glandulifera* (Indian balsam), an invasive plant species. Until then this species was only known to feed on *Impatiens noli-tangere* (touch-me-not balsam) in Belgium. Information about these observations and about the biology of *P. fuligana* is provided.

Samenvatting. In de herfst van 2018 werden verschillende volgroeide rupsen van *Pristerognatha fuligana* (Denis & Schiffermüller, 1775), springzaadbladroller, gevonden in stengels van *Impatiens glandulifera* (reuzenbalsemien), een invasieve plantensoort. Tot dan toe was de soort in België enkel bekend van *Impatiens noli-tangere* (groot springzaad). In dit artikel wordt informatie gegeven over deze waarnemingen en over de biologie van *P. fuligana*.

Résumé. Pendant l'automne de 2018 plusieurs chenilles de *Pristerognatha fuligana* (Denis & Schiffermüller, 1775) ont été découvertes dans des tiges d'*Impatiens glandulifera* (Balsamine de l'Himalaya) qui est une plante invasive. Jusqu'à ce moment, toutes les chenilles de cette espèce trouvée en Belgique se nourrissaient d'*Impatiens noli-tangere* (Balsamine des bois). Dans cet article on donne des informations concernant ces observations et la biologie générale de *P. fuligana*.

Key words: *Pristerognatha fuligana* – *Impatiens glandulifera* – *Impatiens noli-tangere* – Tortricidae – Lepidoptera – Belgium.

Meert R.: Grote Snijdersstraat 75, 9280 Lebbeke, Belgium, ruben_meert@hotmail.com

Nossent R.: Florastraat 96, 9050 Gentbrugge, Belgium, nossent_regis@yahoo.com

Introduction

The tortricid moth *Pristerognatha fuligana* (Denis & Schiffermüller, 1775) is known to be a very rare species in Belgium (De Prins *et al.*, waarnemingen.be 2019). Until October 2018 Waarnemingen.be, the data portal of the NGO Natuurpunt for nature observations by citizen scientists, contained thirty reported specimens. Twenty-one of them were caterpillars found by the first author in stems of their host plant *Impatiens noli-tangere* (touch-me-not balsam). Adult moths, nine in all, were mostly observed in the field. Only one of them was caught using a light trap (waarnemingen.be 2019).

In autumn 2018, several larvae were found in stems of *Impatiens glandulifera* (Indian balsam). Very little information is available on *I. glandulifera* being a host plant for *Pristerognatha fuligana*.



Fig. 1. *P. fuligana* (adult) resting on *I. glandulifera* leaf – Mechelen (AN) 08.vi.2016 © Olivier Fuchs.

Fig. 1. *P. fuligana* (adult) rustend op blad van *I. glandulifera* – Mechelen (AN) 08.vi.2016 © Olivier Fuchs.

Distribution

Pristerognatha fuligana occurs in most countries of Central and Western Europe and has a more scattered distribution in Northern and Eastern Europe. It has not been observed in Great Britain nor in G. D. Luxembourg (Aarvik 2013). In Belgium it is known from six Provinces (OV, AN, VB, BW, NA and LG) (De Prins *et al.* 2019), but it might be overlooked. Outside Europe it is present in Kazakhstan, Siberia, some Far East Russian regions and the Japanese islands Hokkaido and Honshu (Razowski 2003).

Impatiens glandulifera is an invasive plant species (Van de Meutter *et al.* 2012) originating in the Himalayas, especially in Tibet and India. It was introduced in Europe in the middle of the 19th century as an ornamental plant (Burkhart & Nentwig 2008) and it soon started spreading into the wild. Since 1915 it has been considered as an invasive pest, occurring now in most parts of Western Europe (Kesters & Gorissen 2010).

Observations on *Impatiens glandulifera*

On 7 October 2018 the second author went on a field trip to search for larvae of *Pristerognatha fuligana* in Mechelen (AN), more specifically in the Nature Reserve 'Battenbroekbos'. In this wet forest, managed by the Agency for Nature and Forests of the Flemish Government, an adult specimen was seen on August 6, 2016 (waarnemingen.be 2019).

Inspired by the observations of larvae in *Impatiens noli-tangere*, the second author searched without success for decaying stems of this plant. This is in accordance with the distribution map of *I. noli-tangere*, which – apparently – has never been seen in the Battenbroekbos (table 1) (waarnemingen.be 2019). On the other hand, *Impatiens glandulifera* is very abundant there.

Table 1. Observations of *P. fuligana* larvae in stems of *I. glandulifera* from 07.x.2018–22.ix.2019.Table 1. Waarnemingen *P. fuligana* rupsen in stengels van *I. glandulifera* van 07.x.2018–22.ix.2019.

Province	Municipality	Area	Date	Observer	#
Antwerpen	Mechelen	Battenbroekbos	07.x.2018	R. Nossent	3
			10.x.2018	R. Nossent	3
			17.iv.2019	R. Nossent	2
	Puurs-Sint-Amands Willebroek	Lievezele Blaasveld Biezenweiden	10.x.2018	R. Meert	4
			2.xi.2018	R. Nossent	1
			18.xi.2018	R. Nossent	3
Oost-Vlaanderen	Dendermonde	Vlassenbroek	10.x.2018	R. Meert	2
			22.ix.2019	R. Meert	1
	Lebbeke	Sint-Gillis-bij-Dendermonde , Oud Klooster Wachtbekken Fochel	11.xi.2018	R. Meert	1
			13.x.2018	R. Meert	1
	Aalst	Erembodegem , Gerstjens	16.x.2018	R. Meert	1
	Berlare	Uitbergen, Nieuwdonk	17.x.2018	R. Meert	2
			12.viii.2019	R. Meert	2
	Lebbeke	Dorp Heizijde	29.i.2019	R. Meert	1
			31.vii.2019	R. Meert	1
	Luxemburg	Bouillon	Sensenruth	08.iii.2019	R. Meert
Namen	Vresse-sur-Semois	Laforêt	13.ix.2019	R. Nossent	3

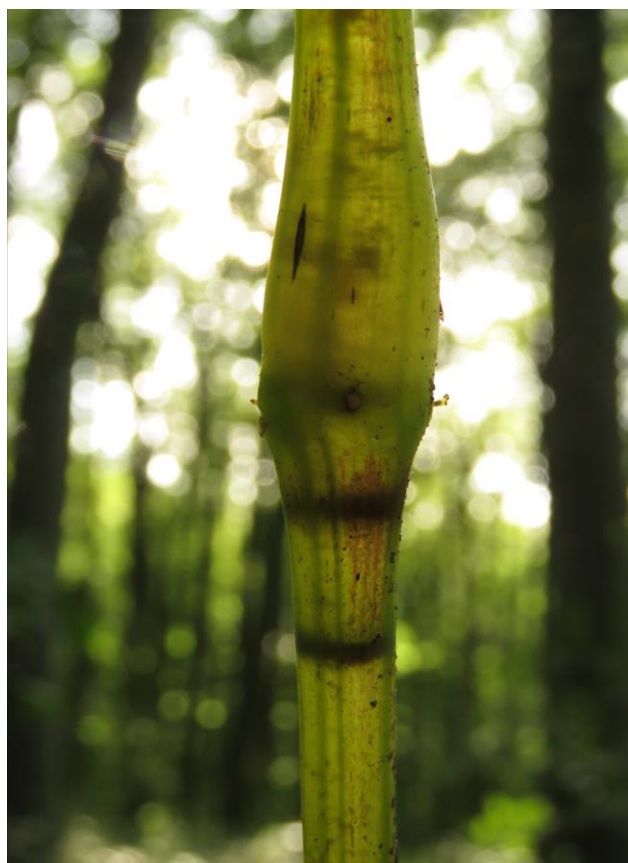
**Fig. 2. Discoid webs of *P. fuligana* in a stem of *I. noli-tangere*, visible from the outside – Brakel (OV) 13.ix.2017 © Ruben Meert.**

Fig. 2. Schijfvormige spinsels van *P. fuligana* in een stengel van *I. noli-tangere*, zichtbaar vanaf de buitenzijde – Brakel (OV) 13.ix.2017 © Ruben Meert.

So why not have a quick look? The first plant already showed typical feeding signs of *P. fuligana* and immediately a larva was found fairly high up in the stem. At the end of the search, three larvae were found. Afterwards it turned out that the adult moth from August 2016 in that location, on which this search was based, was photographed at rest on a leaf of *Impatiens glandulifera* (fig. 1).

Having been informed about these remarkable findings, the first author also began searching for larvae of *P. fuligana* in *I. glandulifera*. Between October 10, 2018 and September 22, 2019 several locations in the valley of the rivers Dender and Scheldt in the Provinces of East-Flanders and Antwerp were investigated. In the meantime, the second author went on searching in the Province of Antwerp. In every location at least one larva was found, 33 in all (Table 1).

Nineteen infested stems of *I. glandulifera* were collected and kept in moist sand in jars that were placed indoors from January onwards. Only two of them produced adult moths, on 14 April and 7 May 2019 (fig. 8). Both individuals were collected in early spring. None of the larvae that were collected in the period October 2018 – January 2019 reached adulthood: all were found dried out in the stem.

Observations of larvae of *P. fuligana* in *I. glandulifera* are extremely rare. Only two references were found. Burkhart & Nentwig (2008) mention personal observations in Switzerland. In Sweden there is at least one reliable report of a larva that was collected and bred in February-March 2017 (pers. comm. Stefan Lemurell, Artportalen.se 2019).

Biology

The larvae of *P. fuligana* complete their development endophagously within the stems of *Impatiens noli-tangere* and *I. glandulifera*. Several discoid webs, in which frass is incorporated – are made – sometimes in the hollow nodes, each closing off part of the stem (fig. 3 & 5).

Based on the observations by the first author, larvae found in *I. noli-tangere* live at the base of the stem just above ground level or sometimes even in the roots. Both authors found a different behaviour in *I. glandulifera*: only 1 larva out of 33 was found at the base of the stem. All the others lived much higher in the plant.

This might be because a difference in diameter of the stems of *I. glandulifera*. Compared to those of *I. noli-tangere* most of them are much thicker. Possibly the larva



Fig. 3. Larva and webs of *P. fuligana* in stem of *I. glandulifera* – Uitbergen (OV) 12.viii.2019 © Ruben Meert.

Fig. 3. Rups en spinsel van *P. fuligana* in stengel van *I. glandulifera* – Uitbergen (OV) 12.viii.2019 © Ruben Meert.



Fig. 4. Shaded habitat with infested plants of *I. glandulifera* – Vlassenbroek (OV) 10.x.2018 © Ruben Meert.

Fig. 4. Beschaduwde groeiplaats met bezette planten van *I. glandulifera* – Vlassenbroek (OV) 10.x.2018 © Ruben Meert.

‘fits’ better in the rather narrow stems of *I. noli-tangere*. In *I. glandulifera* the base of the stem might be too broad, but higher up the stem becomes thinner and possibly more suitable to inhabit. Another explanation can be the energy used to produce the discoid webs inside: more silk and time are needed to close off a broader stem.

I. noli-tangere needs moisture and shade. Nearly all infested *I. glandulifera* plants were growing in very similar situations (fig. 4). One infested plant was fully exposed to sunlight and found in a reed bed near the River Scheldt.

Pupation takes place within the larval habitat. Before hatching, the pupa protrudes from the stem through a prepared exit hole (fig. 6). Adults are on the wing between late April and August, suggesting two generations a year (Razowski 2003).

Apparently all previous search efforts for larvae in Belgium were made in autumn. The collected larvae always hibernate inside the decaying stems of the host plant, producing moths the following spring. Waarnemingen.be (2019) shows that most adult moths were seen in May and June. Despite one observation of an adult moth in August, the existence of a (perhaps partial) second generation needs to be confirmed in Belgium.

Field search tips

Burkhart & Nentwig (2008) concluded that there are no external signs, such as distorted growth or discoloration, indicating the presence of a larva inside a stem of *I. glandulifera* stem. Personal observations by both authors lead to the same conclusion, at least on large *I. glandulifera* plants. In one small, slender infected plant, wilting was clearly noticeable (fig. 7).

In *I. noli-tangere*, stems become translucent while decaying in autumn. The discoid webs inside the base of the stem are then often visible from the outside while looking against direct sunlight (fig. 2). This technique does not seem to work so well with *I. glandulifera* stems, and it is necessary to split open the whole stem to check for the presence of webs and a larva.

Finding an infested *I. glandulifera* stem was easier in shaded areas: plants there were growing less densely than those plants in sunny conditions and the infestation rate seemed higher. The larva is pale greenish with a light brown head and prothoracic plate (Razowski 2003).

In Europe, another species of *Pristerognatha* occurs, *P. penthinana* (Guenée, 1845), which also uses *I. noli-tangere* as a host plant. It has a more or less similar distribution to that of *P. fuligana*, but is also known from some South European countries and North America and it is the only *Pristerognatha* species recorded from Great Britain (Razowski 2003), where it was known from the Lake District, but has not been seen since 1914 and is thought to be extinct (Barry Goater pers. comm.). It’s a very rare species in Belgium, with only a few old records in the Province of Brabant before 1980 (De Prins *et al.* 2019). Larvae are rather pale yellowish grading into bright canary yellow posteriorly with a blackish head and black thoracic plate (Bland 2014). In case of doubt, both species can be distinguished from each other by looking at the abdomen and cremaster of the pupa (see lepiforum.de 2019, the German web portal of Lepiforum e. V. for more details). In places where this species is known to occur, it might be interesting to look for its larvae too, in stems of *I. glandulifera*.

Because of the softness of the stems of *I. noli-tangere*, they start to decay in early autumn, and hence locating dead stems in winter or spring is quite difficult (Schütze 1931, confirmed by personal observations). Therefore, a good time to search for larvae in this plant is autumn. Stems of *I. glandulifera*, however, are evidently more



Fig. 5. Infested stem of *I. glandulifera* with web (left) and larva of *P. fuligana* – Mechelen (AN) 07.x.2018 © Regis Nossent.

Fig. 5. Bezette stengel van *I. glandulifera* met spinsel (links) en rups van *P. fuligana* – Mechelen (AN) 07.x.2018 © Regis Nossent.



Fig. 6. *P. fuligana*, exuvium e.l. 10.v.2019, larva in *I. noli-tangere* – Jalhay (LG) 30.IX.2018 © Ruben Meert

Fig. 6. *P. fuligana*, exuvium e.l. 10.v.2019, rups in *I. noli-tangere* – Jalhay (LG) 30.IX.2018 © Ruben Meert



Fig.7. Infested and wilting *I. glandulifera* plant – Uitbergen (OV) 12.viii.2019 © Ruben Meert

Fig. 7. Aangetaste en verwelkende *I. glandulifera* plant – Uitbergen (OV) 12.viii.2019 © Ruben Meert



Fig. 8. *P. fuligana*, imago e.l. 07.v.2019, bred from larva in *I. glandulifera* – Mechelen (AN) 17.iv.2019 © Regis Nossent

Fig. 8. *P. fuligana*, imago e.l. 07.v.2019, gekweekt uit rups in *I. glandulifera* – Mechelen (AN) 17.iv.2019 © Regis Nossent

robust and tend to dry out first instead of decaying immediately. This is certainly true in drier habitats and drier weather conditions. In *I. glandulifera*, larvae can be sought with success right up to early spring.

Breeding is easy with larvae found in late winter or spring: place the infested stems should be placed in a large jar, partially filled with some slightly moist sand and covered with some paper tissue: it can be left outdoors, or brought indoors to speed up development. Depending on the conditions under which they are kept, adult moths appear a few weeks or months later. Both authors had difficulties with breeding adult moths from larvae collected in autumn, probably due to a lack of moisture.

Discussion and conclusions

As the invasive *I. glandulifera* is a more common plant in Belgium than *I. noli-tangere* (waarnemingen.be 2019) and readily acceptable as a host plant, *P. fuligana* has the opportunity to expand its range in our country and possibly in Western Europe. This hypothesis is supported by the observations of both authors: on every investigated site with a population of *I. glandulifera*, larvae of *P. fuligana* were found.

The map with the combined observation data of *P. fuligana* and *I. noli-tangere* (January 1, 2000 – October 6, 2018) shows a few places where the moth occurs in habitats without the presence of its native host plant (fig. 9). In these locations, only adult moths have been observed. We suppose therefore that *I. glandulifera*, which does occur there, must be the host plant. The authors conclude that *P. fuligana* is more common than generally assumed, as it seems to be a species that doesn't come readily to light and can be easily overlooked: in spring and summer 2019 not a single observation of an adult moth was mentioned on waarnemingen.be (2019).

As the occurrence of a (possibly partial) second generation remains unconfirmed in Belgium, it would be interesting to look for larvae in fresh *Impatiens* stems in late spring or summer. To see whether they produce moths the same year, the infested living plants can be potted and put in a gauze cage in outdoors. On the other hand, to check the phenology, infested stems collected in autumn can be kept outdoors until late summer of the next year or until all the moths have emerged.

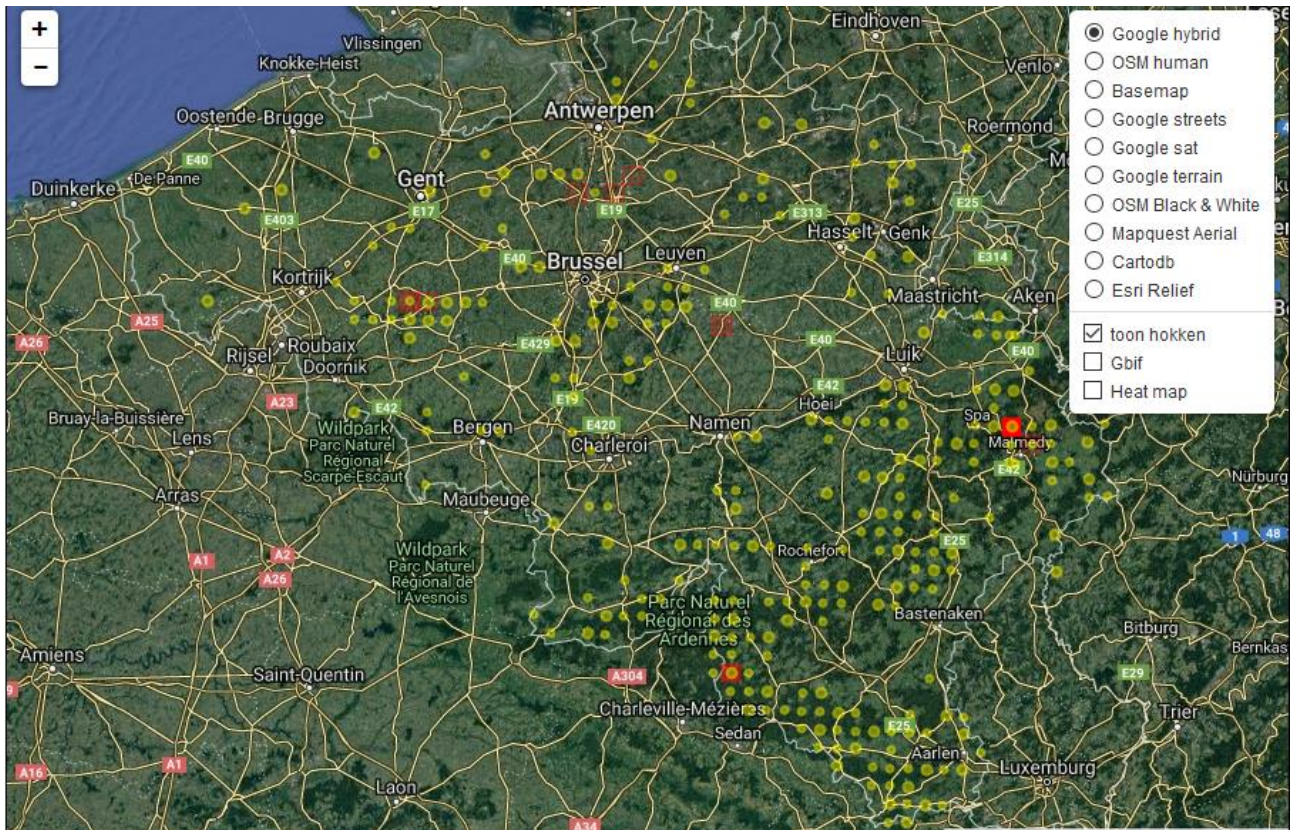


Fig. 9. Map with the combined observations of *P. fuligana* (red squares) and *I. noli-tangere* (yellow dots) in period 2000–2018 (waarnemingen.be 2019)
 Fig. 9. Kaart met de gecombineerde waarnemingen van *P. fuligana* (rode vierkantjes) en *I. noli-tangere* (gele stippen) in de periode 2000–2018 (waarnemingen.be 2019)

Three more species of *Impatiens* occur in Belgium, none of which is originally native: *I. balfourii* (Kashmir balsam), *I. capensis* (orange balsam) and *I. parviflora* (small balsam) (waarnemingen.be 2019). When possible, they too should be checked for the presence of *P. fuligana* larvae.

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References

- Aarvik L.E. 2013. *Fauna Europaea: Tortricidae*. – In: van Nieuwerkerken E.J. & Karsholt O. (Eds), *Fauna Europaea: Lepidoptera, Moths*. – Fauna Europaea version 2017.06. — <https://fauna-eu.org> [accessed on 7.iii.2018].
- Artportalen.se 2019. *Pristerognatha fuligana*. — <https://www.artportalen.se/search/sightings/taxon/102484#> [accessed on 16.i.2019].
- Bland K.P. 2014. *The moths and butterflies of Great Britain and Ireland. Volume 5: Tortricidae*. — Brill, Leiden, 377 pp.
- Burkhardt K., Nentwig W. 2008. Control of *Impatiens glandulifera* (Balsaminaceae) by Antagonists in its Invaded Range. — *Invasive Plant Science and Management* 1: 352–358.
- De Prins W., Steeman C. & Garrevoet T. 2019. *Catalogue of the Lepidoptera of Belgium*. — <https://projects.biodiversity.be/lepidoptera/> [accessed on 12.i.2019].
- Kesters E., Gorissen A. 2010. Bestrijding van invasieve exoten: Reuzenbalsemien. *Ervaringsrapport gebiedsdekkende bestrijding 2010*. — Watering De Dommelvallei, Peer.
- Lepiforum.de 2019. Bestimmungshilfe: *Pristerognatha fuligana* — http://www.lepiforum.de/lepiwiki.pl?Pristerognatha_Fuligana [accessed on 17.i.2019].
- Razowski J. 2003. *Tortricidae of Europe Volume 2*. — František Slamka, Bratislava, Slovakia, 301 pp.
- Schütze K.T. 1931. *Die Biologie der Kleinschmetterlinge unter besonderer Berücksichtigung ihrer Nährpflanzen und Erscheinungszeiten. Handbuch der Microlepidopteren. Raupenkalender geordnet nach der Illustrierten deutschen Flora von H. Wagner*. — Frankfurt am Main (Verlag des Internationalen Entomologischen Vereins e.V.).
- Van de Meutter F., Vanderhaeghe F., Raman M. & Van Kerckvoorde A. 2012. Invasieve uitheemse planten langsheen bevaarbare waterlopen in West- en Oost-Vlaanderen. Inschatting van het voorkomen en een afwegingskader voor beheer. *Rapporten van het Instituut voor Natuur- en Bosonderzoek 2012 (INBO.R.2012.13)*. — Instituut voor Natuur- en Bosonderzoek, Brussel.
- Waarnemingen.be 2019. *De website voor natuurinformatie van Stichting Observation International, Natuurbank Nederland (NBNL) en Natuurpunt. Impatiens glandulifera, Impatiens noli-tangere and Pristerognatha fuligana*. — www.waarnemingen.be [accessed on 16.i.2019 and 13.viii.2019].