

## OCCURRENCE OF NOCTUID SPECIES CAUSING SPRING DAMAGE IN VINEYARDS

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### ABSTRACT

Noctuid moth caterpillars are capable to cause severe damage of grapevine buds in spring. Bud loss caused mostly by Lesser Yellow Underwing (*Noctua comes* Hübner) and Broad-bordered Yellow Underwing (*Noctua fimbriata* [Schreber]) was significant in south eastern Slovenia in the period from 2000 to 2005. Before that, migratory noctuids were not noticed as pests and they appeared only sporadically. In 2014 severe damages appeared again, reaching 75-80 % of damaged buds in the most exposed areas. Besides previously recorded, Large Yellow Underwing (*Noctua pronuba* [L.]) is recognized as an additional pest species. Occurrence of other Noctuidae and Geometridae species is marginal. Every noctuid has specific life cycle, feeding or other habits, which slightly differ from each other. Caterpillars of determined species are found in the spring on different terrains, but their abundance is greater on southern hill slopes and knolls where females in autumn lay eggs in habitats with favourable host plants. As noted on previous occurrences, their effect appears to be greater on ridges. Damages on grapevine buds are more likely after mild winter conditions with a low rate hibernation mortality. In such circumstances greater number of noctuid caterpillars survives and in the spring they struggle for food. When phenological development of major herbaceous host plants progresses slowly, they prefer vine tree.

**Keywords:** damaged buds, *Noctua comes*, *Noctua fimbriata*, *Noctua pronuba*, vineyard

### IZVLE EK

#### POJAVNOST METULJEV SOVK, POVZRO ITELJEV SPOMLADANSKIH POŠKODB BRSTOV V VINOGRADIH

Gosenice metuljev sovk lahko spomladi na brstih vinske trte povzro ijo obsežne poškodbe. Velike škode smo v jugovzhodni Sloveniji beležili med leti 2000 do 2005 in jih pripisali predvsem vrstam *Noctua comes* Hübner in *N. fimbriata* (Schreber). Pred tem so se migratorne sovke pojavljale le ob asno in niso povzro ale gospodarske škode. V letu 2014 je prišlo do ponovnega obsežnega pojava, ko je na najbolj izpostavljenih legah škoda dosegle 75-80 % poškodovanih brstov. Kot dodatno škodljivo smo prepoznali tudi vrsto *Noctua pronuba* (L.). Obseg poškodb zaradi drugih gosenic iz skupine sovk (Noctuidae) in pedicev (Geometridae) je zanemarljiv. Vsaka vrsta ledvi astih sovk ima specifi en razvojni krog, prehranske ali druge navade, po katerih se vsaj malenkostno lo ujejo med seboj. Gosenice navedenih vrst najdemo spomladi na razli nih terenih, a je njihova gostota najve je prav na južnih pobo jih hribov in gri ev, kjer na rastiš a najustreznejših gostiteljskih rastlin v jeseni samice odlagajo jaj eca. Ve ja škoda se pojavlja predvsem po milih zimah, saj je takrat stopnja umrljivosti med hibernacijo manjša. V takšnih okoliš inah preživi ve je število li ink, ki spomladi iš ejo hrano. e je fenološki razvoj glavnih gostiteljskih zeli upo asnjen, se najraje usmerijo na vinsko trto.

**Klju ne besede:** *Noctua comes*, *Noctua fimbriata*, *Noctua pronuba*, poškodbe brstov, vinska trta

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## 1 INTRODUCTION

Noctuid moth caterpillars are capable to produce severe damage on grapevine buds in spring. Bud loss caused by Lesser Yellow Underwing (*Noctua comes* Hübner) and Broad-bordered Yellow Underwing (*Noctua fimbriata* [Schreber]) was significant in south eastern Slovenia in period 2000 to 2005 (Tomše; 2003a, 2003b, 2003-2008, 2007). Before that, migratory noctuids were not noticed as pests and they appeared only sporadically. In 2014 severe damages appeared again, reaching 75-80% of eaten buds in the most exposed areas. Besides previously recorded, Large Yellow Underwing (*Noctua pronuba* [L.]) is recognized as additional pest species. Participation of other Noctuidae and Geometridae caterpillars is marginal. Every noctuid has specific life cycle, feeding or other habits, which slightly differ from each other (Figure 8). Caterpillars of identified species are found in the spring on various terrains, but their abundance is greater on southern hill slopes and knolls where females in autumn lay eggs in habitats with favourable host plants. As noted on previous occurrences, their effect appears to be greater on ridges. Damages on grapevine buds are more likely after mild winter conditions (Figure 7) with low rate hibernation mortality. In such circumstances greater number of noctuid caterpillars survives and in the spring they struggle for food. When phenology of major herbaceous host plants progresses slowly, they prefer grapevine.

## 2 MATERIAL AND METHODS

### 2.1 Field survey and pest species identification

Samples (caterpillars feeding on grapevine buds) were collected at four locations (Trška gora, Križe, Bizeljsko and Semi ) in day and night time, while only 24 hour field inspections can give relevant insight (Wright, 2014). Caterpillars were reared in separated terrarium to adults and identified.

### 2.2 Host plants inventory

During field inspections for caterpillars, we also kept notice of vineyard vegetation. We assumed that ground cover plants not only improve performance of natural enemies (Begum, 2006), but also play important role in damage control by diverting and fulfilling their appetite.

### 2.3 Damage evaluation

For damage evaluation we took notes of:

- Location: coordinates, acreages, elevation, position and vegetation.
- Host plants available on location and vegetation coverage.
- Portion and type of damaged grapevine buds: 10 blocks of 10 vines in line evenly distributed on the parcel.

## 3 RESULTS AND DISCUSSION

### 3.1 Field survey and pest species identification

Like a decade ago, 24 hour field inspections confirmed most of the damage created by nocturnal pests. *Noctua comes*, *N. fimbriata* and *N. pronuba* represent 90-95% of the specimens per location. Other recorded species were *Amphipyra pyramidea* and *Peribatodes* sp. Even though *Noctua pronuba* is listed in literature as a possible grapevine pest for some

time (Vrabl, 1999), we acknowledged it for the first time. On inspected locations all recorded *Noctua* species were noted. Their appearance accumulated during four weeks, from middle March – to the second half of April.

All three Noctuid species indicate rivalry for food resources. During larvae rearing we noticed high aggression and even cannibalism tendency. When in stress, caterpillars eject repelling odour secretion from pronotum region gland. The reaction has double impact: it repels intruders and predators as well as makes epidermis hydrophobic.



Figures 1 to 3: Noctuid caterpillars feeding on vine tree buds: Broad-bordered Yellow Underwing (*Noctua fimbriata* Schreber) left up; Large Yellow Underwing (*Noctua pronuba* Linnaeus) right up; Lesser Yellow Underwing (*Noctua comes* Hübner) left down (photos: D. Bajec).

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### 3.2 Host plants inventory

During field examination vineyards vegetation was recorded. The most favourable host plants are dandelion (*Taraxacum officinale*) and grape vine (*Vitis vinifera*) by far. Caterpillars also feed on strawberries (*Fragaria vesca*) and conditionally on hawkbit (*Leontodon hispidus*) or plantain (*Plantago major* and *P. lanceolata*). Other weeds, like daisy (*Bellis perennis*), deadnettle (*Lamium maculatum*), primrose (*Primula vulgaris*) or grass (Poaceae), are less desirable.



Figure 4: Habitat with most favourite host plants. Photo: D. Bajec

### 3.3 Damage evaluation

48 locations were inspected. Damage was evaluated according to:

Location: Caterpillars are found on different terrains, but their abundance is greater on southern hill slopes and knolls where females in autumn lay eggs in habitats with favourable host plants. As noted on previous occurrences, their effect appears to be greater on ridges.

Vegetation coverage and host plants availability: Most parcels were covered with vegetation. As herbal variety increased, lower damage seemed to be recorded. For a proper evaluation more locations should be inspected.

Portion and type of damaged grapevine buds: damaged buds scaled up to 85 %. Some *Vitis* cultivars have characteristics to develop grapes from secondary buds.

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Figures 5 and 6: Pictures show two neighbouring vineyards with different type of vegetation and damage degree. Section with abundant host plants (left) showed 35,96 % damage, while area with no or only grass coverage (right) suffered 86,11 % of eaten buds. The plant protection measures on both areas were the same (photo: D. Bajec).

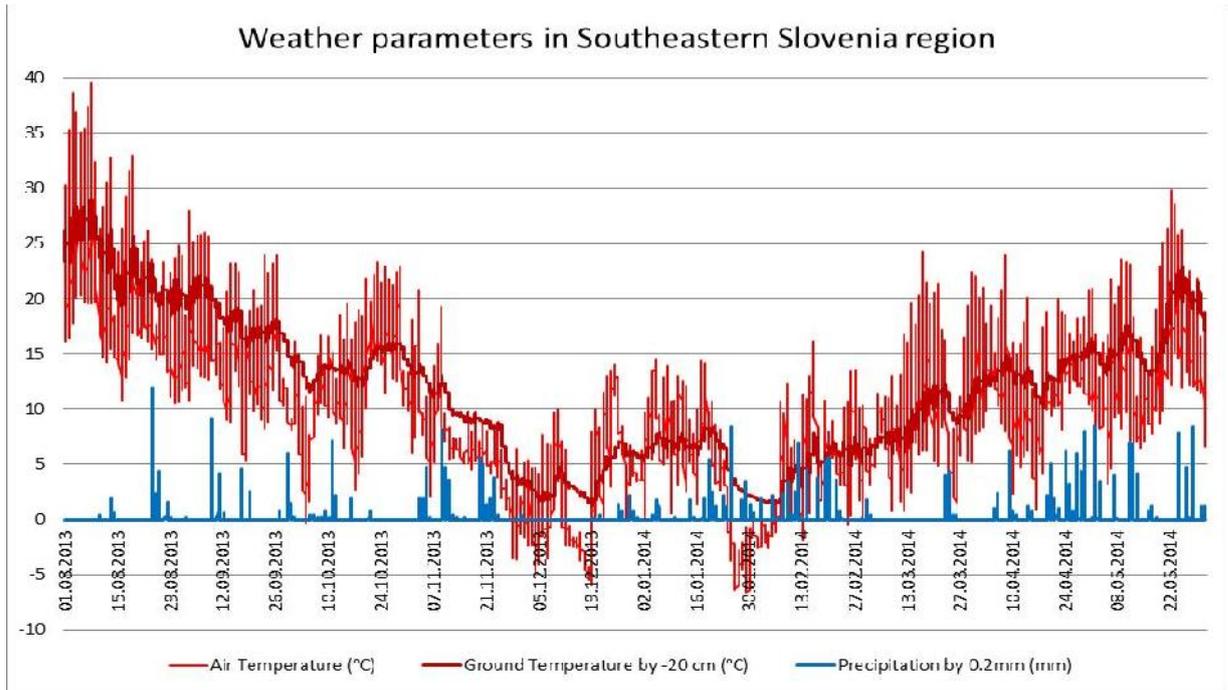


Figure 7: Weather parameters in south eastern Slovenia in period from August 2013 to July 2014, when Noctuid larvae hatched from eggs, developed and pupated. Overwintering time shows mild temperature conditions with sporadic below zero air temperatures and lowest ground temperatures reaching only 2,5 °C twice in December 2013 and first decade of January 2014. Otherwise average winter ground temperatures settled around 5 – 7.5 °C. Data was collected by Adcon Telemetry weather stations and processed on hourly bases.

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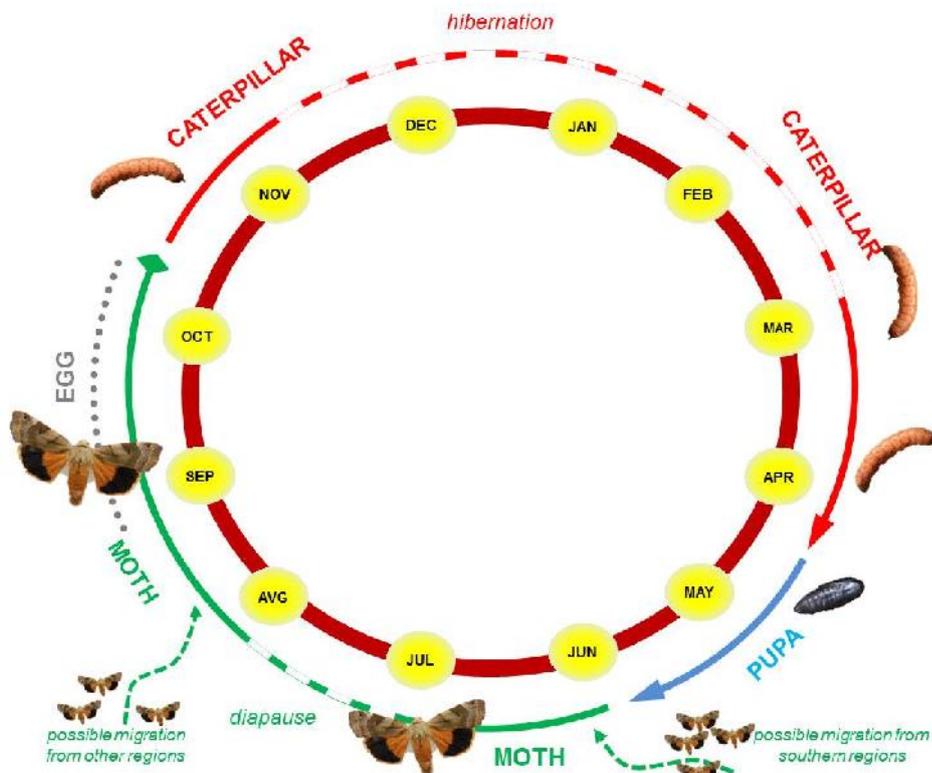


Figure 8: *Noctua fimbriata* and *N. comes* life cycle (Bajec, 2005). Scheme: D. Bajec

## 4 CONCLUSIONS

After the damage on grapevine buds in the period from 2000 – 2005, we expected the phenomenon to occur again. In the late summer of that period we used pheromone and automated light traps to detect moths. Later in autumn we also monitored hatched caterpillars. The prediction and forecasting of spring occurrence was unproductive, since the abundance of noctuids we assessed, had almost no correlation with the spring damage.

Caterpillars of *Noctua comes*, *N. fimbriata* and *N. pronuba* are polyphages in the heterogeneous vineyard environment. They can feed on weeds, but also on grapevine and many nearby apple, birch or willow trees. When phenological development of major herbaceous host plants progresses slowly, they prefer grapevine.

While *Noctua fimbriata*, *N. comes* and *N. pronuba*, though 'close related', have their own biological timetable and feeding habits (Fibinger, 1993), they leave vineyards in devastation when participating each in high density. The longevity of spring feeding time determines damage degree.

## 5 ACKNOWLEDGEMENTS

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