



## Population Biology & Management

# FROM UNKNOWN TO OUTBREAKING: THE STRANGE CASE OF *BARBITISTES VICETINUS*

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*Barbitistes vicetinus* Galvagni and Fontana, 1993 (Fam. Tettigoniidae), is an endemic north-east Italian flightless bush cricket. Specimens of this species collected before the year of description were not found in collections. *B. vicetinus* remained a very rare species confined in small hilly areas for the following 15 years, confined mostly in the Veneto Region, between 200 to about 600 m a.s.l. After the identification of its bioacoustics pattern, *B. vicetinus* has been more intensively searched and it has been found in other localities.

In 2004 it has been found outside of the Veneto Region, in the Trentino district, in the Adige river valley. During these first years of studies, the species demonstrated to be associated with trees, especially *Ostrya carpinifolia*, *Ulmus* spp. and *Fraxinus ornus*. The first outbreak was recorded in 2006 on the Berici Hills, but since 2008 *B. vicetinus* started to produce severe outbreaks, in both Berici and Euganean Hills, showing high polyphagy and causing intense defoliations on broadleaf forests and on the neighbouring crops (mainly vineyards, olive groves and fruit orchards). In a few years the outbreaks restricted to the Euganean Hills, with limited attacks in Trentino vineyards. In addition, the outbreaks was source of annoyance to people living close to the outbreaking areas, as the bush crickets invade streets and gardens. The current defoliations caused by outbreaks of *B. vicetinus* in north-east Italy are the first ones known for this species, although within the genus *Barbitistes* other species are known to outbreak, causing severe damage to woods or cultivated plants: *Barbitistes constrictus* Brunner v. W., 1878, *B. ocskayi* (Charpentier, 1850) and *B. serricauda* (Fabricius, 1794). During outbreaks, *B. vicetinus* changes its ethology showing a tendency to gather in large numbers in small patches with the appearance of a melanic form with aposematic coloration: black with white and yellow spots or lines and red on the joints and appendixes. The

first instar nymphs feed mainly on shrubs while, in subsequent weeks, the individuals climb up to the trees where they spend most of the time eating leaves. The first adults appear in May while mating and oviposition last for the entire June.

Like many European species of the family, *B. vicetinus* overwinters as an egg laid in the ground. In order to improve the knowledge currently available regarding the phenology and the reproduction of this specie, the nymph population density and the hatching dynamics were inspected. The study was performed over 18 sites across the outbreak area of Euganean Hills in 4 consecutive years (2013-2016), using emergence traps. The hatching period was assessed and the influence of both vegetation type (forest, vineyard and hedgerow) and soil cover (broadleaf litter and grass) on the maternal laying preference was verified. Nymph density was assessed for the first time during outbreaks, showing mean values of over 1 million individuals/ha. In all the sampling years, the whole hatching period occurred in a restricted time, ever in few weeks between mid-March to mid-April. The highest nymph density was recorded in forest with soil covered by broadleaf litter, without a gradient from inner forest to edge. A significantly lower density was found under grass cover. Results indicated, however, that cultivated habitats did not offer suitable oviposition sites to *B. vicetinus*, although the adults are commonly found also in crops where they can cause severe damage. As observed in other species of orthopteran, this species would had survived at absolutely low density population for a long time. The ancient presence of this species in this region has recently been confirmed by molecular analysis

**Key Words:** *Barbitistes vicetinus*, outbreak, bush-cricket, emergence trap, population density, oviposition site preference, hatching period.

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