

**Short scientific note**

Submitted: September 20<sup>th</sup>, 2021 – Accepted: June 8<sup>th</sup>, 2022 – Published: December 15<sup>th</sup>, 2022  
DOI: 10.13133/2284-4880/549

**Severe attacks caused by *Macrolenes dentipes* (Olivier) on Feijoa, *Acca sellowiana* (O. Berg) Burret (Myrtaceae) in Italy (Coleoptera: Chrysomelidae)**

Thomas VATRANO<sup>1</sup>, Milena PETRICCIONE<sup>2</sup>, Silvia DI SILVESTRO<sup>3</sup>, Salvatore BELLA<sup>3,\*</sup>

<sup>1</sup> Agronomist – Via Einaudi, 9, 88021 Borgia (CS) Italy

<sup>2</sup> Council for agricultural research and economics. Research Centre for Olive, Fruit, and Citrus Crops – Via Torrino, 3, 81100 Caserta (Italy)

<sup>3</sup> (CREA) Council for agricultural research and economics. Research Centre for Olive, Fruit, and Citrus Crops – Corso Savoia 190, 95024 Acireale (CT), Italy – salvatore.bella@crea.gov.it

\* Corresponding author

**Abstract**

During recent surveys of tropical fruit plants in Southern Italy, severe infestations were observed on young vegetation of Feijoa, *Acca sellowiana* (O. Berg) Burret inflicted by the leaf beetle *Macrolenes dentipes* (Olivier, 1808) (Coleoptera, Chrysomelidae, Cryptocephalinae) which occurs in the Mediterranean area. Feijoa is a species that belongs to the Myrtaceae family and bears an edible interesting fruit. From 2016 we observed adults of *M. dentipes* feeding on *Acca sellowiana* leaves in orchards located in the Calabria and Sicily regions. We identified the phenological stages of Feijoa leaves in 12 trees according to the Biologische Bundesanstalt, Bundessortenamt und Chemische Industrie (BBCH) scale. *M. dentipes* feeds on young leaves (BBCH scale: principal stage 1, substages 10-17). Its adult life cycle on feijoa trees lasts from early June until the end of flowering in late June (BBCH scale: principal growth 7, substage 65) and when the fruits begin to develop (BBCH scale: principal stage 7, substage 70). Details on the current distribution, host plants, biological traits, and natural enemies are given for *M. dentipes*.

**Key words:** tropical fruit tree, Feijoa, Chrysomelidae Cryptocephalinae, pest.

**Introduction**

In recent years, severe infestations by a leaf beetle were observed on fruit trees of Feijoa, *Acca sellowiana* (O. Berg) Burret (Myrtaceae) in Southern Italy (Calabria region) and on the island of Sicily. Subsequent investigations identified the chrysomelid *Macrolenes dentipes* (Olivier, 1808) (Coleoptera, Chrysomelidae, Cryptocephalinae). This species is spread throughout Southern Europe, Northern Africa, and Asia Minor (Tomov 1970), and is widely distributed in the Mediterranean region (Gruev 2005; Regalin & Medvedev 2010; Rozner & Rozner 2014; Maican & Serafim 2015).

The authors of the present study observed that this insect pest is potentially dangerous because it feeds in high numbers and in a restricted period of the year on young feijoa leaves, and in a few weeks it completely devours the new vegetation of the year. The objective of this paper is to document the negative impact of *M. dentipes* in Italian agro-ecosystems.

**Material and methods**

The current study was carried out in Southern Italy, Calabria (Catanzaro province, Borgia municipality) and Sicily (Catania province, Acireale municipality). Adults of this chrysomelid were observed continuously from the middle of May to June from 2016 to 2021. In Calabria, the commercial orchard we investigated is located at 22 m a.s.l. (38°48' N, 16°35' E). The average annual temperature is 18.5 °C, average annual precipitation is 810 mm, and average relative humidity is 64%. Observations were carried out on 12 five-year-old feijoa trees. Trees were planted in an open field and tree spacing was 3.5 x 3.5 m. In Sicily, field studies were conducted at the experimental fruit field of CREA (Council for Agricultural Research and Economics, Research Centre for Olive, Fruit, and Citrus Crops), located at 206 m a.s.l. (37°37' N, 15°09' E), in an organic orchard of 4 hectares, with the presence of numerous species especially of *Citrus* L. and *Persea* Mill. genera. Other infestations, caused by *Macrolenes dentipes* on leaves of

*Quercus ilex*, were detected by the authors in June 2021 (first author), in the territory of Policoro (Matera province), Basilicata region, and in May-June 2021 (last author), on *Q. ilex*, in Acireale, locality the Timpa (Catania province), Sicily, Italy.

During the last five years, the first author observed the occurrence of *M. dentipes* on *Acca sellowiana* cv. “Apollo” in the Calabria region and monitored severe damage on young vegetation caused by colonies of this leaf beetle. Leaf erosion was calculated as percentages of the remaining leaf area: 0-25, 25-50, 50-75, and 75-100%.

To better detect the impact of the attacks on the plants, the first author in 2020 randomly collected 120 leaves in total, 10 per fruit tree. We used the feijoa BBCH phenological scale proposed by Ramírez and Kallarackal (2018) to determine the impact of *M. dentipes* on the leaves. This scale depicts the growth stages of leaves and shoots and assigns a numerical code for each principal stage and its substages. The codes were used to record the alterations produced by *M. dentipes* on feijoa leaves. Specimen identification was supported by Borowiec (2021), and Lompe (2021). The classification and nomenclature used in this paper followed Biondi (2005-2013). The studied specimens are preserved in the collections of the authors and in the entomological collections of CREA-OFA.

#### Notes on the leaf beetle

Family Chrysomelidae Latreille, 1802

Subfamily Cryptocephalinae Gyllenhal, 1813

Tribe Clytrini Kirby, 1837

Genus *Macrolenes* Chevrolat, 1837

#### *Macrolenes dentipes* (Olivier, 1808)

The genus *Macrolenes* includes the species *M. dentipes* and *M. bellieri* (Reiche, 1860), the latter being recorded only in Sicily. *Macrolenes dentipes* in Europe was reported for Albania, Austria, Bosnia-Herzegovina, Bulgaria, Croatia, France, Gibraltar, Greece (including Corfu), Italy (including Sicily), Macedonia, Montenegro, Portugal, Spain (including the Balearic Islands) and Slovenia; in Africa for Algeria, Morocco and Tunisia; in Asia for Iran, Israel, Lebanon, Syria and Turkey (Debreuil 2010; Regalin & Medvedev 2010; Agoiz-Bustamante et al. 2019). This species is discontinuously distributed throughout the Italian peninsula and Sicily (Gruev 2005; Regalin & Medvedev 2010). It is also known for the Eolian Archipelago (Lo Cascio et al. 2006).

Adults of *M. dentipes* are phytophagous, and its host plants include *Rubus coriaria* L. and *R. ulmifolius* Schott (Rosaceae), *Pistacia lentiscus* L., *P. terebinthus* L., *P. vera* L. and *Rhus* L. (Anacardiaceae), *Paliurus* Mill. and *Ziziphus* Mill. (Rhamnaceae), *Quercus frainetto* Ten., *Q. ilex* L. and *Q. pubescens* Willd. (Fagaceae), *Fraxinus* L. (Oleaceae) and *Salix alba* L. (Salicaceae). Adults are active from May to August and prefer to feed on *P. lentiscus* and *Q. ilex* (Rozner & Rozner 2013; Bezděk 2016; Agoiz-Bustamante et al. 2019).



Fig. 1 – Adults of *Macrolenes dentipes* (Olivier) on Feijoa with damaged leaves. Calabria, Borgia, 29.V.2021.

*Pistacia lentiscus* was also the preferred host plant in recent observations in Southern Italy (Tzanakakis 1962; Viggiani et al. 2021). The presence of *M. dentipes* on Feijoa plants was occasionally reported in Italy by Bollino (2012).

Egg clusters are attached by females to the leaf surface. Eggs are subcylindrical and distally truncated, 0.7-0.9 mm in length, and 0.4 mm in width, with the chorion of the egg coated with brown material. The number of eggs per cluster varied from 4 to 38 (average: 18), and after hatching showed the distal cap completely detached. The eggs hatched at the beginning of June (Viggiani et al. 2021). Larval stages are phyto-zoo-saprophagous (Schöller 1998), and the first instar larva is undescribed. Larval development occurs in the soil, and the third instar was collected in an ant nest under a *Quercus ilex* tree (Medvedev & Schöller 2002). *Macrolenes dentipes* is one of the ant-nest beetles but its larvae have lost the ability to enter the nests of *Tapinoma* Förster species, remaining at the entrance (Schöller & Witte 2007).

## Results

To measure the impact of the attack of *M. dentipes* on the plants, namely the damaged leaf area, 120 leaves were collected randomly in 2020 in the Calabria region, 10 for each plant, and analysed using the BBCH phenological scale. The average length of the 120 leaves was 5.6 cm, and the average width was 2.7 cm. The percentage of leaf damage for each range was 29% for the first scale (0-25% damage), 41% for the second (25-50% damage), 20% for the third (50-70% damage), and 10% for the last (75-100% damage) (Fig. 2).

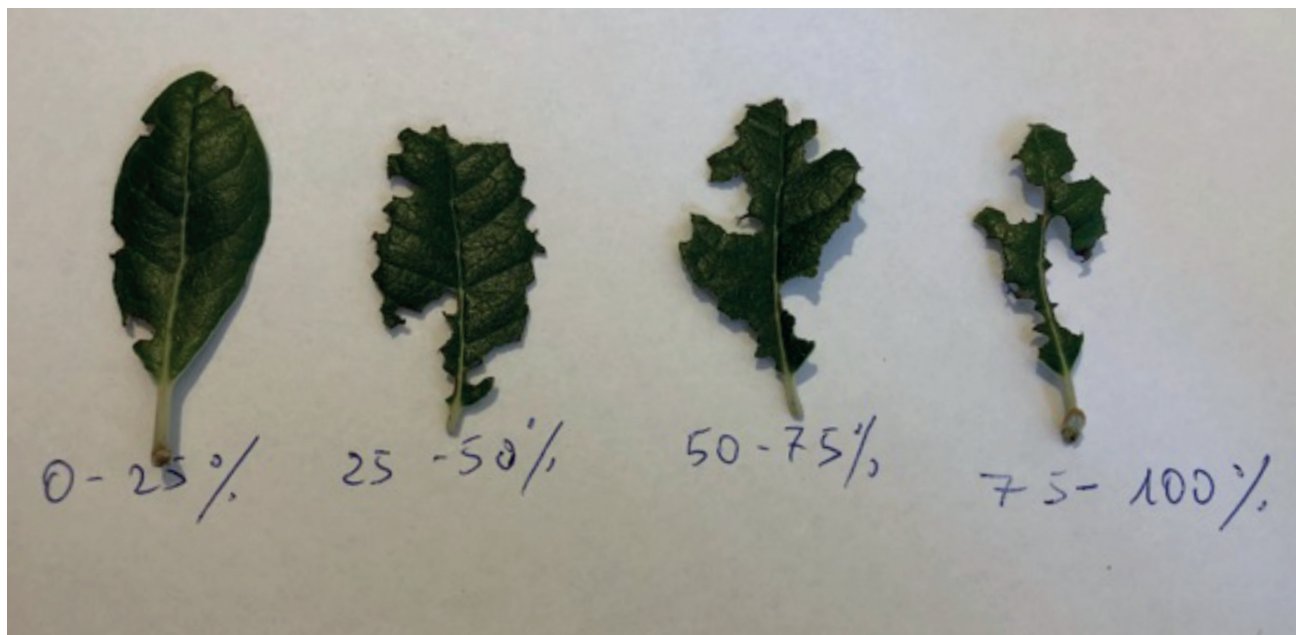


Fig. 2 – *Macrolenes dentipes* (Olivier). Calabria, Borgia, 10.VI.2020. Percentage of leaf damage for each range.

The life cycle of *M. dentipes* begins at the end of May and the beginning of June, when the air temperature is around 25 °C, thus allowing the females to lay their eggs. The life cycle of *M. dentipes* lasts until the end of flowering in late June (BBCH scale: principal growth 7, substage 65) when fruits begin to develop (BBCH scale: principal stage 7, substage 70). Ten egg clusters were collected and the eggs counted, and the average presence was 60 eggs per cluster; the latter are preferably fixed on the leaves of previous years because they are more resistant.

### Concluding remarks

The observations carried out in this study in Italy report *Macrolenes dentipes* as a serious pest of the cultivated Feijoa fruit tree. In fact, in the Calabria and Sicily regions, adults of this chrysomelid were observed feeding on this plant continuously from May to June 2016-2021. These attacks have been observed in agro-ecosystems with the presence of *Quercus ilex* and *Pistacia lentiscus* trees.

In this context, the occurrence of different arthropod species and damages were recently mentioned also on pomegranate and fig trees (Massimino Cocuzza et al. 2016; Baviera et al. 2017; Di Silvestro et al. 2021). The adults of *M. dentipes* begins their life cycles on feijoa trees at the end of May, and females lay eggs on the surfaces of the leaves. In about twenty-five days, this chrysomelid species consumes almost all the young leaves (Fig. 1).

Moreover, two solitary egg endoparasitoids have recently been reported for the first time in Italy on *M. dentipes*: *Bloodiella andalusica* Nowicki, 1935 (Hymenoptera

Chalcidoidea: Trichogrammatidae) (Viggiani & Filella 2019) and *Aprostocetus macrolenei* Viggiani, 2021 (Hymenoptera: Eulophidae) (Viggiani et al. 2021). The distribution and biological aspects of these two natural enemies are poorly known, and it would be useful to better analyze the relationships between the two mentioned parasitoids and this beetle.

In addition to direct damage, further serious damage was observed on the plants due to less photosynthetic activity because of the absence of young leaves. At the end of the attack, after *M. dentipes* abandoned the Feijoa plants, they reacted by producing abundant new shoots within a week (BBCH scale stage 0, substage 09). If disturbed, the insect has the habit of detaching, and this behaviour has allowed the easy manual (net) collection of specimens and thus greatly reduce the destruction of young leaves.

### References

- Agoiz-Bustamante J.L., Recalde Irurzun J.I., Prieto Piloña F. 2019. Sobre la presencia de *Macrolenes dentipes* (Olivier) (Col.: Chrysomelidae) en Portugal. *Arquivos Entomológicos*, 21: 117–120.
- Baviera C., Bellavista M., Altadonna G., Turrisi G.F., Bella S., Muscarella C., Sparacio I. 2017. The Cerambycidae (Coleoptera: Chrysomeloidea) of Sicily: recent records and updated checklist. *Atti della Accademia Peloritana dei Pericolanti. Classe di Scienze Fisiche, Matematiche e Naturali*, 95 (1), A2: 1–79. doi: 10.1478/AAPP.951A2
- Biondi M. 2005-2013. Coleoptera: Chrysomelidae. In: *Audisio P. 2013, Fauna Europaea version 2.4*. <https://fauna-eu.org>.
- Bollino M. 2012. *Macrolenes dentipes* (Olivier, 1808) – Chrysomelidae. <http://www.entomologiitaliani.net/public/forum/phpBB3/>

- viewtopic.php?t=35786 [accessed on 28 May 2021].
- Borowiec L. 2021. Chrysomelidae. The Leaf Beetles of Europe and the Mediterranean Subregion (Checklist and Iconography). <http://www.cassidae.uni.wroc.pl/European%20Chrysomelidae/clytrinae.htm> [accessed on 28 May 2021].
- Bezděk J. 2016. Identity of taxa proposed in *Clythra* (Coleoptera: Chrysomelidae: Cryptocephalinae) by Carl Peter Forsberg (1821). *Acta Entomologica Musei Nationalis Pragae*, 56: 769–784.
- Debreuil M. 2010. Les Clytrinae de France (Coleoptera, Chrysomelidae). *Supplément Rutilans*, 1: 115 p.
- Di Silvestro S., Strano M.C., Ferlito F., Torrisi B., Allegra M., Neri D., Lodolini E.M., Bella S. 2021. A new emergency for the Mediterranean fruit trees: detection and characterization of a fungal disease on fig (*Ficus carica* L.) in Sicily. *Acta Horticulturae*, 1310: 267–273.
- Gruev B.A. 2005. The Mediterranean leaf beetles in Bulgaria (Insecta: Coleoptera: Chrysomelidae). *Proceedings of the Balkan scientific conference of biology in Plovdiv (Bulgaria) from 19<sup>th</sup> till 21<sup>st</sup> of May 2005* (pp. 339–375).
- Lo Cascio P., Cecchi B., Abbazzi P., Arnone M. 2006. A contribution to the knowledge of the Coleoptera of the Aeolian Islands. *Naturalista siciliano*, S. IV, XXX (2): 315–341.
- Lompe A. 2021. Die Käfer Europas. <http://coleonet.de/coleo/texte/macrolenes.htm> [accessed on 28 May 2021].
- Maican S., Serafim R. 2015. New distribution data for the Cerambycidae and Chrysomelidae (Coleoptera: Chrysomeloidea) collected during the mediterranean expeditions [Results of the “Dakhla” (2012), and “Merzouga” (2013) expeditions in Morocco]. *Travaux du Muséum National d’Histoire Naturelle “Grigore Antipa”*, 57(2): 111–120. doi: 10.1515/travmu-2015-0004.
- Massimino Cocuzza G.E., Mazzeo G., Russo A., Lo Giudice V., Bella S. 2016. Pomegranate arthropod pests and their management in the Mediterranean area. *Phytoparasitica*, 44(3): 393–409. doi: 10.1007/s12600-016-0529-y.
- Medvedev L.N., Schoeller M. 2002. The larva of *Macrolenes dentipes* Olivier (Chrysomelidae, Clytrinae), with a key to the larvae of the Palaearctic genera of clytrine leaf beetles. *Entomologische Blätter für Biologie und Systematik der Käfer*, 98: 15–20.
- Ramírez F., Kallarackal J. 2018. Phenological growth stages of Feijoa [*Acca sellowiana* (O. Berg) Burret] according to the BBCH scale under tropical Andean conditions. *Scientia Horticulturae*, 232: 184–190. doi: 10.1016/j.scienta.2017.12.059.
- Regalin R., Medvedev L. 2010. Tribe Clytrini Kirby. In: Löbl I., Smetana A (eds) *Catalogue of Palaearctic Coleoptera, Chrysomeloidea*, 6. Apollo Books, Stenstrup, pp 564–580.
- Rozner I., Rozner G. 2013. Collection data to North Africa’s (Morocco, Algeria, Tunisia) leaf beetle fauna (Coleoptera: Chrysomelidae). *Natura Somogyiensis*, 23: 159–172.
- Rozner I., Rozner G. 2014. Data to the leaf-beetle fauna of Greece (Coleoptera: Chrysomelidae). *Natura Somogyiensis*, 24: 81–98.
- Schöller M. 1998. Zoosaprophagy and phytosaprophagy in chrysomelid beetle larvae, *Macrolenes dentipes* and *Pachybrachis anoguttatus* (Coleoptera: Chrysomelidae: Clytrinae and Cryptocephalinae). In: Biondi M., Daccordi M., Furth D.G. (eds) *Proceedings of a symposium, 20 International Congress of Entomology*. Museo Regionale di Scienze Naturali, Florence: 281–285.
- Schöller M., Witte V. 2007. A review of the genus *Clytrasoma* (Coleoptera: Chrysomelidae), with description of a new species collected within a nest of *Camponotus* sp. (Hymenoptera: Formicidae). *Senckenbergiana Biologica*, 87: 51–61.
- Tomov V. 1970. *Miopristis* Lac. – a new genus for the fauna of Bulgaria (Coleoptera). *Natura, Eole Normale Superieure – Plovdiv, Bulgarie*, III, 1, Zoologie, p. 147–148 [in Bulgarian with summary in English].
- Tzanakakis M.E. 1962. Some phyllophagous Coleoptera of pistachio. II. Cryptocephalidae. 17 pp. [in Greek with summary in French].
- Viggiani G., Filella F. 2019. First record of *Bloodiella* Nowicki, 1935 (Hymenoptera: Trichogrammatidae) from Italy. *Journal of Entomological and Acarological Research*, 51 (3): 74–76.
- Viggiani G., Filella F., Bernardo U. 2021. The egg endoparasitoids of *Macrolenes dentipes* (Olivier) (Coleoptera: Chrysomelidae), with description of a new species of *Aprostocetus* Westwood and notes on its host (Hymenoptera: Eulophidae). *Fragmenta entomologica*, 53 (1): 57–64.