

## SHORT COMMUNICATION

# Report of the Geranium Bronze Butterfly, *Cacyreus marshalli* for mainland Greece

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**Summary** In July and September 2010, two samples of infested geranium plants (*Pelargonium* spp.), which were originally collected from Kifissia, Attica-Greece, were received at the Laboratory of Biological Control at Benaki Phytopathological Institute, Greece. Larvae were taken from infested plants and kept under laboratory conditions at  $25\pm 1^{\circ}\text{C}$ ,  $70\pm 5\%$  RH and under a photoperiod of 16L:8D h until adults emerged. Adults were identified as the Geranium Bronze Butterfly, *Cacyreus marshalli* Butler (Lepidoptera: Lycaenidae). This species is recorded for the first time for mainland Greece. *Cacyreus marshalli* is on the EPPA A2 List of pests recommended for the regulation as quarantine pests. Geranium Bronze Butterfly has the potential to establish in Greece and the rest of the Mediterranean basin as climatic conditions can allow this pest to overwinter outdoors and its host plants are commonly propagated.

*Additional keywords:* biodiversity, butterfly, geranium, invasive, *Pelargonium* spp.

The identification of the species was based on two infested geranium plant samples received at the Laboratory of Biological Control at Benaki Phytopathological Institute in July and September 2010. The plant samples (leaves and stems) were originally collected from Kifissia, Attica-Greece and were kept at  $25\pm 1^{\circ}\text{C}$  and  $70\pm 5\%$  RH until adult emergence. Based on the adult morphological characteristics, the species was identified as the Geranium Bronze Butterfly *Cacyreus marshalli* (Lepidoptera: Lycaenidae) (Figures 1, 2). Eggs of the Geranium Bronze are whitish to light-yellow or brown in colour (Figure 3); 0.5 mm in diameter x 0.3 mm in height (2). Eggs are laid near the flower buds or less frequently on the leaves. Caterpillars (Figure 4) are found within the flower buds or inside the stem, where they bore through. Entrance holes in buds and stems are easy to detect. Once attacked, the stems turn black-



Figure 1. Adult of *Cacyreus marshalli* (upperside).



Figure 2. Adult of *Cacyreus marshalli* (underside).

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**Figure 3.** Egg of *Cacyreus marshalli*.



**Figure 4.** Caterpillars of *Cacyreus marshalli*.

ish. The first-instar larvae have an average length of 1 mm which increases to 2 mm within 8 days. Second, third and fourth-instars grow to 3, 6 and 13 mm, typically in 8, 8 and 9 days, respectively. Their colour varies, with extremes of yellow and/or greenish shades with or without pink markings (2). Pupae are very hairy in shades of green, pale-yellow or brown, with brown mottling and an average length of 9 mm (2). Female adults have a wingspan of 18-27 mm while male adults have a wingspan of 15-23 mm. The two sexes are similar in appearance. Adults have a bronze-brown colouring at the upper surface with white spots on the fringe and highly-patterned undersides. They also bear substantial tails on their hindwings, along with a nearby eye spot, which diverts attacks from birds and other predators away from the critical body parts.

The species is indigenous to Southern Africa (2). According to the EPPO distribution maps of quarantine pests, *C. marshalli* is present (with no detailed records) in Botswana, Lesotho, Mozambique, South Africa, Swaziland and Zimbabwe. To date it has been observed in European countries such as Belgium and Italy with a few occurrences, France and mainland Spain, where it is recorded as present with a restricted distribution, and finally Germany, Portugal and the Balearic and Canary islands, where it is reported as present but with no detailed records. This is the first record for mainland Greece while there are previous records for the species from the Ionian island of Corfu

(7, 10).

*Pelargonium* spp., commonly known as geraniums, are the main host plants of this pest but the butterfly also has the capacity to infest native *Geranium* spp. (8).

*Cacyreus marshalli* is on the EPPO A2 List of pests recommended for regulation as quarantine pests. Although on the EPPO A2 List, *C. marshalli* has not been regulated as a quarantine pest by European Regional Plant Protection Organizations and it has managed to spread rapidly in islands and mainland Spain and Italy (4, 9). The potential for natural spread of this pest is very low as its flights are short in duration with frequent rests (3). The most likely means of international dispersal is the movement of infested plant material. The example of the rapid establishment of *C. marshalli* on Mallorca (Balearic Islands) and its spread to the Spanish mainland shows that the pest has the potential to establish in the Mediterranean basin and could pose a threat for the European mainland. Geraniums are extensively grown as ornamental plants almost throughout Europe, but Spain, France, Italy and Greece, as well as North Africa, are at greater risk since their climatic conditions would allow the pest to overwinter outdoors. Furthermore, breeding and propagation of geraniums play an important role in these regions. Elsewhere in Europe, the pest could establish in glass-houses (1).

*Cacyreus marshalli* has never been re-

ported as a pest species in its area of origin, probably due to autochthonous parasitoids and predators that manage to keep its population under the damage threshold. The introduction of the Geranium Bronze into Europe is having a great impact on the nursery sector, with a consequent decrease in the demand of geraniums, which are ever more often replaced by customers with other ornamental plants. Furthermore, the Geranium Bronze could cause problems in the mountainous and hilly habitats where wild *Geranium* spp. commonly exist. Adaptation of *C. marshalli* in these habitats could threaten the native flora and biodiversity through competition with other species such as *Eumedonia eumedon* (Esper) (Lepidoptera: Lycaenidae) and *Aricia nicias* (Meigen) (Lepidoptera: Lycaenidae) (8). *Aricia nicias* has been characterized as rare for Spain (5) while *E. eumedon* has been characterized as vulnerable in Greece (11).

No parasitoids or predators were observed in Italy for *C. marshalli* (4) except of a single case where an egg of the pest was parasitized by *Trichogramma evanescens* Westwood. In South Africa, *Apanteles* spp. have been reported to kill third-instar larvae of the pest (2). Products based on *Bacillus thuringiensis* or diflubenzuron, flufenoxuron, hexaflumuron, lambda-cyhalothrin, alpha-cypermethrin and benfuracarb could be used as insecticides for the control of *C. marshalli* (9). For the long-term control of the Geranium Bronze with *B. thuringiensis*-based insecticides it would be advisable to combine Cry1Ab with Cry1Ba (6). It would be wise to start a monitoring programme for this pest in *Pelargonium* spp. nurseries as well as in urban resident areas of mainland Greece and the islands where these plants are widely used in gardens and in balconies. Additionally, surveys could be undertaken in the monitored areas in order to identify predators or parasitoids that could be used as potential biocontrol agents for this pest.

We would like to thank Mr Timothy Cowles for providing with photos and Mr Rob Parker for sharing with us his interest on butterflies, especially regarding the Geranium Bronze Butterfly.

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Received: 8 November 2010; Accepted: 1 June 2011

## ΣΥΝΤΟΜΗ ΑΝΑΚΟΙΝΩΣΗ

**Αναφορά του *Cacyreus marshalli* στην Ηπειρωτική Ελλάδα**

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**Περίληψη** Τους μήνες Ιούλιο και Σεπτέμβριο του 2010, δύο δείγματα από προσβεβλημένα γεράνια (*Pelargonium* spp.) από την περιοχή της Κηφισιάς εξετάστηκαν στο εργαστήριο Βιολογικής Καταπολέμησης στο Μπενάκειο Φυτοπαθολογικό Ινστιτούτο. Οι προνύμφες από τα προσβεβλημένα φυτά διατηρήθηκαν σε συνθήκες εργαστηρίου στους  $25\pm 1^{\circ}\text{C}$ ,  $70\pm 5\%$  σ.υ. και φωτοπερίοδο 16Φ:8Σ μέχρι την εμφάνιση των ενηλίκων. Τα ενήλικα αναγνωρίστηκαν ως το είδος *Cacyreus marshalli* Butler (Lepidoptera: Lycaenidae). Το είδος αυτό καταγράφεται για πρώτη φορά στην Ηπειρωτική Ελλάδα. Το *C. marshalli* βρίσκεται στην ΕΡΡΟ Α2 λίστα οργανισμών καραντίνας. Το λεπιδόπτερο δύναται να εγκατασταθεί στην Ελλάδα και στην υπόλοιπη Μεσογειακή λεκάνη καθώς οι κλιματολογικές συνθήκες ευνοούν τη διαχείμαση του ενώ τα φυτά ξενιστές του είναι πολύ κοινά.

*Hellenic Plant Protection Journal* **4**: 31-34, 2011

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