



FA1203: Sustainable management of *Ambrosia artemisiifolia* in Europe (SMARTER)

Short Term Scientific Mission Report

Assessing the impact of *Ophraella communa* on ragweed performance

STSM details

COST STSM Reference Number: COST-STSM-FA1203-34209

Timing of STSM: 9 – 30 June 2016

Applicant details

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Host details

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Summary of the STSM

In 2013, the ragweed leaf beetle, *Ophraella communa*, was detected for the first time in Europe (Borioni et al. 2013, Müller-Schärer et al 2014). It had already established in an area of approximately 100 x 200 km in southern Switzerland and Northern Italy, where it occurs at outbreak densities. The arrival of *O. communa* may be seen as a break-through with regard to the sustainable management of ragweed in southern Europe, since this insect is a successful biological control agent of *A. artemisiifolia* in China, but it is unclear how the species affects ragweed under European conditions, and what beetle densities are needed to inflict enough damage to reduce plant performance and plant population growth.

To assess the effect of beetle density on size-dependent plant damage and the consequent individual size-dependent plant performance, we have set up an experiment at 4 field sites that are colonized by the leaf beetle in Piemonte and Lombardia (northern Italy), with plants varying in size across and within sites. By the application of insecticides onto small parts of the sites, some plants are kept free from the beetle as an internal control. We have installed an additional experiment in an *Ophraella*-free cage outdoors to test the potential direct effects of the insecticide on plant performance.

Purpose of the STSM

The specific aim of this STSM was i) to set up a field impact experiment assessing the impact of *Ophraella communa* on individual ragweed performance, using insecticides to experimentally exclude this beetle from some plants as controls; ii) install a cage experiment

to assess the potential side-effects of the insecticides on ragweed performance; iii) strengthen collaboration between the host institution (University of Torino) and the group of the applicant (group Müller-Schärer, University of Fribourg).

Description of the work carried out during the STSM

Week 1

- Finalised experimental protocols, planning, material, forms, and division of labour with the host, finalised arrangements with owners of all sites
- Set up insecticide cage experiment (selection & transplantation of plants, initial measurements, application of the first treatment)
- Training in insecticide application
- Applied insecticides on all experimental sites

Week 2-3

- Set up the field impact experiment in Grugliasco (Piemonte), Magenta (Lombardia), Magnago (Lombardia), and Busto Arsizio (Lombardia), and conducted the first assessment.

Description of the main results obtained

- The insecticide cage experiment has been set up, with 12 trays containing 3 individually potted *Ambrosia* seedlings for each of the 2 treatments (insecticides and control), which were placed randomly in an insect-free cage of ca 3x3m (Fig. 1).



Fig. 1. Set-up of the insecticide cage experiment

- The field impact experiment has been set up on 4 sites. On each site equal numbers of plants in 3 size classes (small, medium, large) were randomly selected, 48 of them in the unsprayed parts of the site, and 12 of them in the insecticide treated parts (Fig. 2).

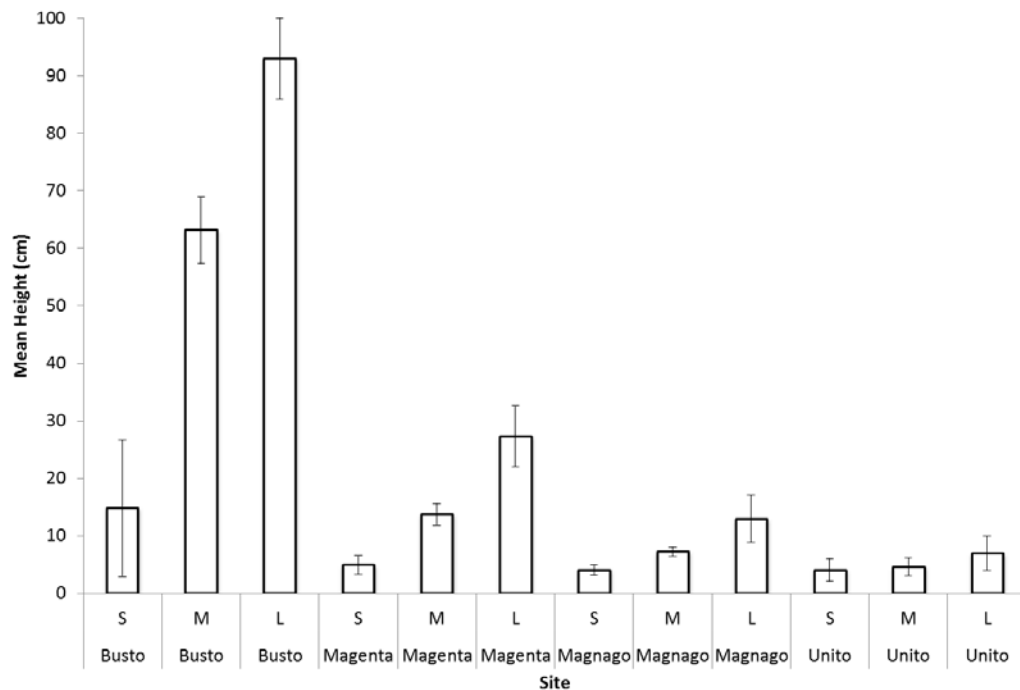


Fig. 2. Sizes of the *Ambrosia* plants at all sites (in cm, mean \pm SD) at the first assessment

- In all field sites, only very few *Ophraella* were present at the time of monitoring, but damage was observed. A preliminary analysis of the data on 2 sites revealed the efficacy of the insecticide treatment (Fig. 3) and suggested that small plants tended to be relatively more damaged by *Ophraella* (Fig. 4).

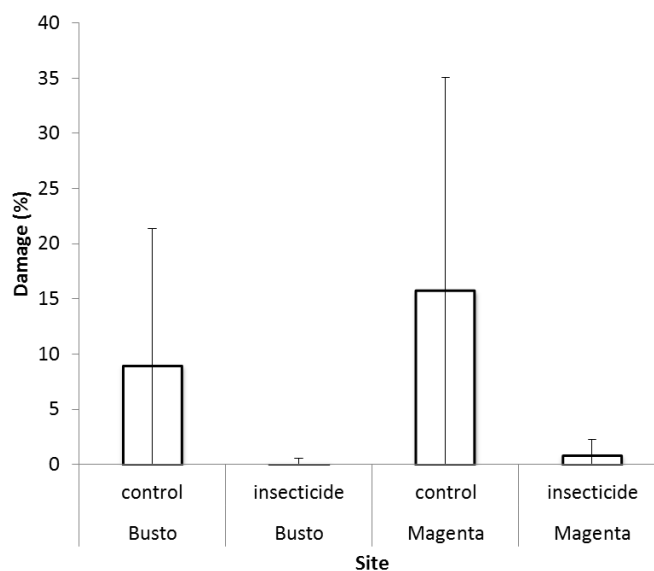


Fig. 3. Damage (% of leaf defoliated, mean \pm SD) of the *Ambrosia* plants in the control (with presence of the beetle) and insecticides treatments

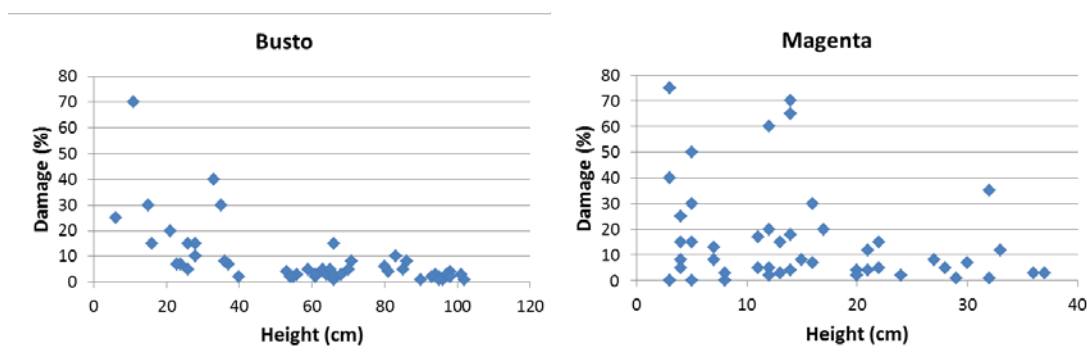


Fig. 4. Damage (% of leaf defoliated) of *Ambrosia* plants of different sizes at two sites

Future collaboration with the host institution

The host and the grantee will collaborate on the application of the insecticides and the assessments of the experiments. For the impact field experiment, plants as well as beetles will be assessed every 3 weeks until plants are harvested and assessed for their reproductive performance and biomass at the end of the season in September. The plants of the insecticide cage experiment will be assessed similarly at the end of the season.

Foreseen publications/articles resulting from the STSM

A joint paper on the impact of *Ophraella* on ragweed performance will be written at the end of the season in a scientific peer-reviewed journal.

Confirmation by the host institution of the successful execution of the STSM

Cf. attached email by the host.

Acknowledgements

I greatly acknowledge Francesco Vidotto and Silvia Fogliatto for the warm welcome, all practical arrangements and the fruitful discussions on our joint experiments.

Fribourg, 5 July 2016

Suzanne Lommen

References cited

Boriani M, Calvi M, Taddei A, Tantardini A, Cavagna B, Andreani F, Montagna M, Bonini M, Lommen S, Müller-Schärer H., 2013. *Ophraella communa* segnalata in Italia su ambrosia. L'Informatore Agrario 34, 2-3.

Müller-Schärer H, Lommen STE, Rossinelli M, Bonini M, Boriani M, Bosio G, Schaffner U., 2014. The ragweed leaf beetle has successfully landed in Europe: fortunate coincidence or threat? Weed Research 54, 109-119.