Weed Biological Control
Progress Report 2025

CABI Switzerland
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KNOWLEDGE FOR LIFE

Contents


Philip Weyl

Notes from the section leader

I am pleased to share with you the progress of the Team in the first half the year. I would also like to take this opportunity to introduce and welcome the newest member of the team, our garden technician, Julie Parrat. On the project front, many are making great headway and taking potential agents ever closer to the petitioning process and ultimate release.

Some exciting news is that this year we obtained permission for release of the seed-feeding weevil *Ceutorhynchus constrictus* against garlic mustard in Canada and the USDA APHIS Technical Advisory Group (TAG) recommended its release in the US. In spring, we were able to send the first shipment to Canada for release. Despite the differences in the seasons, with Canada being quite a bit later than Switzerland, we were able to synchronise the adults to the flowering period of garlic mustard in Ontario. The culture is thriving and we hope for establishment in the coming years. This will be the second agent released against garlic mustard in Canada to date. Still on the releases front, the massive push to release thousands of individuals of the stem-mining moths *Archanara neurica* and *Lenisa geminipuncta* against phragmites in Canada, continues and is seeing some great results, with the number of dying phragmites stems at release sites becoming more and more obvious.

We are pleased to report that based on the studies at CABI Switzerland, the petition for field release of three agents have been submitted this year. These include the stem-mining weevil *Microplontus millefolii* against common tansy, submitted to the TAG in the US and the Biological Control Review Committee in Canada, the seed-feeding weevil *Ceutorhynchus peyerimhoffi* against dyers woad submitted to the TAG in the US, and the leaf galling Cecidomyiidae *Obolodiplosis robiniae* against black locust in South Africa. We are hoping for a positive response on these petitions and will keep you posted on the progress of these species. In addition to the petitions already submitted, several projects are making great progress and continue to get agents close to the petitioning process. These include agents against oxeye daisy, Russian knapweed, dyers woad, flowering rush and parrot's feather.

The current funding uncertainty has put not only the Weed Biological Control Team under pressure to fill the current deficit, but also CABI as an organisation. In response to this situation, we will need to assess the objectives and workplans in the coming years for the current projects. As ever, we are on the search for project and funding opportunities which align with our skills but also fit with our core values and mission.

Raising awareness of invasive species and the role of classical biological control in a sustainable management plan remains at the forefront of our work. The team is proud of the efforts we make in education and raising awareness of invasive species and biological control. In addition to the conference presentations and outreach we do, this year we have six summer students passing through our lab, originating from Brazil, Portugal, Malaysia, Canada and the US. We also host school and university students from the region for short-term internships to learn about invasive species and biological control.

I would like to take this opportunity to extend my gratitude to our international and local collaborators and funders for their support. I would also like to appreciate the dedication of the Weeds Team, both staff and students, without which, none of this would be possible.

Happy reading and feel free to reach out to me or any of the project scientists if you have any questions about the projects.

All the best

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1 Blueweed (*Echium vulgare*)

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Root-feeding weevil *Mogulones geographicus* in a flower of *Echium vulgare.*

1.1 Test plant list

Together with Rachel Winston (MIA consulting) we have been working on establishing a test plant list for the blueweed project. This preliminary list currently includes approximately 60 species from the family Boraginaceae from which approximately 40 are native to North America. Based on this list we also started obtaining and growing test plant species.

1.2 *Mogulones geographicus* (Col., Curculionidae)

In spring 2025, we continued our observations on the biology of the root-feeding weevil *Mogulones geographicus* and found that females lay eggs in late autumn and in the following early spring. Towards the end of May, a new generation of weevils started emerging from the plants we exposed to *M. geographicus* between autumn 2024 and spring 2025. In summer 2025, we collected approximately 380 weevils from these plants and 80 additional weevils from several sites in Delémont. We will use them in no-choice tests as soon as they become reproductively active in autumn.

Blueweed inoculated with eriophyid mites, but flowering normally.

1.3 Eriophyid mites (Acari, Eriophyidae))

The eriophyid mite *Aceria echii* is reported to induce galls and thereby drastically reducing flowering and seed output of blueweed and we therefore prioritized it for further studies. Blueweed showing symptoms reported to be associated with *A. echii* is relatively common around Delémont and eriophyid mites have been observed on some of these plants. However, these mites have been identified as belonging to a different species that has not yet been described. To study whether eriophyid mites are the cause of the galls, several potted blueweed plants were inoculated with mites in 2024. The inoculation was successful on the majority of the plants, and in spring 2025 mites were still found on the plants. However, all of the plants were flowering normally and none of them produced any galls. We therefore conclude that the galls observed on blueweed are not caused by this undescribed eriophyid mite species but more likely caused by a phytoplasma or virus. Since the mite found on blueweed

Summer student Raquel Fernandes collecting the root-feeding weevil *Mogulones geographicus* from a blueweed plant set up for rearing.

2 European frogbit (*Hydrocharis morsus-ranae*)

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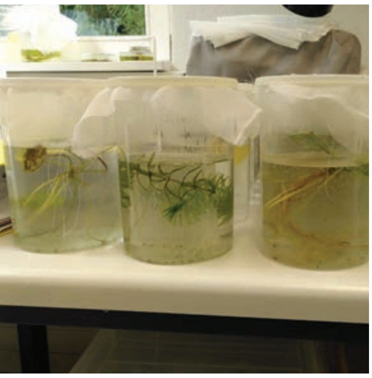
The smut, *Tracya hydrocharidis*, on a bleached European frogbit leaf

2.1 Field surveys

Between end of May and July 2025, we did three main field trips accress Europe and the UK. These trips focused on collecting the weevil *Bagous puncticollis* for rearing purposes and *Hydrellia* flies to confirm that despite contradicting literature records only *Hydrellia albifrons* is developing on European frogbit. The field trip to the United Kingdom was accompanied by Dr. Sarah Thomas, plant pathologist from CABI UK to learn how to identify the smut *Tracya hydrocharidis*. We surveyed a total of 38 sites for European Frogbit in France, Italy, Hungary, Slovenia, Slovakia, Czech Republic, United Kingdom, Sweden and Germany. For water soldier, we have visited a total of 9 sites in UK, Czech Republic and Sweden. We also continued to collect genetic samples from the European frogbit and water soldier populations surveyed.



Setup for no-choice tests with *Hydrellia albifrons*

2.2 *Hydrellia albifrons* (Dipt., Ephydridae)

We started host-range testing with the *H. albifrons* population established in our CABI garden. No-choice larval development tests were set up with seven non-target species; *Hydrocharis laevigata*, *Alisma plantago-aquatica, A. subcordatum, Potamogeton lucens, P. natans, P. crispus* and *Elodea densa*. Single pairs of the fly were set up in cylinders for oviposition on *H. morsus-ranae*, and three eggs each were transferred on either controls or non-target species.

Bagous puncticollis with feeding marks on *Hydrocharis morsus-ranae* leaf

2.3 *Bagous puncticollis* (Col., Curculionidae)

End of May, we collected thirteen *Bagous puncticollis* weevils from European frogbit in Slovenia (1), Hungary (11) and Slovakia (1). In addition, a mating pair was collected in Sweden. We are currently trying to understand the biology and oviposition requirements of this weevil in order to rear the adults and initiate testing. Although the weevils will readily feed on European frogbit in the last three months, we were not able to obtain eggs or larvae.

Philip Weyl searching for *Bagous puncticollis* in Italy.

3 Parrot’s feather (*Myriophyllum aquaticum*)

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3.1 *Lysathia cilliersae* (Col., Chrysomelidae)

The host-range testing was completed with a few additional no-choice larval development. In total, we have tested 18 non-target species, 12 in the Haloragaceae, one in the Penthoraceae, one in the Crassulaceae, two in the Onagraceae, one in the Polygonaceae and one in the Hydrocharitaceae families. The additional plant species tested in no-choice larval development, *Persicaria senegalensis, Ludwigia glandulosa, Hydrocharis laevigata* and *Penthorum sedoides*, none of which could support full development of *Lysathia cilliersae*. Overall, *L. cilliersae* does appear to be specific enough for North America with little risk to non-targets, however, some final tests with multiple generations with emergent *Myriophyllum* species native to North America are still required.

Good progress has been made in understanding the thermal physiology of *L. cilliersae* with a focus on sub-freezing mortality. *Lysathia cilliersae* individuals were exposed to temperatures ranging from -8.5°C to 2°C and held at these temperatures for different durations between 6 and 96 hours. Survival was recorded both one hour and 24 hours after exposure. These tests allow us to model and predict winter survival in potential new climates. Initial predictions suggest that winter survival is possible in western North America, especially on the coastal regions, following quite closely the distribution of parrot’s feather.

Cold plate arenas where insects are cooled down to reach a specific temperature, prior to thermophysiology tests.

Phytobius vestitus female prepped for thermal testing on a parrot’s feather stem.

3.2 *Phytobius vestitus* (Col., Curculionidae)

The rearing of *Phytobius vestitus* always slows down during winter, which means that the beginning of the year is dedicated to increasing the colony. This year, we completed no-choice oviposition tests with two species, *L. glandulosa* and *Pen. sedoides*. Both species received very little oviposition in one or two replicates, thus we included them in dual-choice oviposition tests. Thus, dual-choice oviposition tests were set with three non-target species: *Myriophyllum rubricaule*, *Pen. sedoides* and *L. glandulosa. Myriophyllum rubricaule* received eggs in all replicates, however *P. sedoides* and *L. glandulosa* were completely ignored. This gives a total of 17 non-target species tested, 12 in the Haloragaceae, one in the Penthoraceae, one in the Crassulaceae, two in the Onagraceae and one in the Hydrocharitaceae families.

We are currently completing the thermal profile of *P. vestitus* with temperature-dependent development tests to find the temperature development threshold and the degree-days to complete development of the weevil.

Lauréline Humair, Matija Milković PhD student from Novi Sad University in Serbia and summer student Pedro Roismann collecting parrot’s feather.

4 Flowering rush (*Butomus umbellatus*)

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Summer student Afiqah Sundusin checking a flowering rush plant for weevils.

4.1 *Bagous nodulosus* (Col., Curculionidae)

Between 9 April and 14 May 2025, we were able to collect over 115 weevils from our pond rearing, of which 58 were sent to Sidney, Montana, for rearing in quarantine and for setting up a nursery pool. On a field trip to Slovakia end of April, 225 additional weevils were collected. In early May, 50 of these weevils were sent to Canada for further rearing and field releases.

In May, we set up an impact experiment releasing 12 pairs of *Bagous nodulosus* into four pools each, similar to the preliminary experiment carried out in 2024. Four additional pools were set up as controls, and each pool contained six frames (60x60 cm) filled with potting soil with three different plant densities (1, 4 and 9 plants of flowering rush). We plan to take down one replicate and measure above and below ground biomass of the plants in September. The remaining three replicates will be analyzed in September 2026 after two full growing seasons.

Setup for one replicate of the combined impact experiment with the weevil *Bagous nodulosus* and the fly *Phytoliriomyza ornata*.

4.2 *Phytoliriomyza ornata* (Dipt., Agromyzidae)

We have completed host-specificity tests in 2025 using flies of the first and the second generation of *Phytoliriomyza ornata*. No development was found on any of the 40 species tested, confirming the narrow host range of *P. ornata*. We started working on a petition for field release of *P. ornata* and we plan to be ready to submit it at the end of the year.

Between 20 and 22 April, we set up a combined impact experiment with the weevil *B. nodulosus* and the agromyzid fly *P. ornata*. We used 24 flowering rush plants grown from standardized rhizomes (20 g) in 15 liter pots in March 2025. Each plant was covered with a gauze and received either one pair of weevils, or two pairs of flies, or both, or kept free of insects as a control. We started to take down and dissect three replicates in mid-July to record the number of larvae developing on the plants. Depending on the results, we plan to dissect and record plant biomass of the remaining three replicates in September.

Summer students Rachel Wong and Pedro Roisman releasing *Bagous nodulosus* on pools for an impact experiment on flowering rush.

4.3 *Doassansia niesslii* (Fungi, Doassansiaceae)

During 2024, good progress with the testing of the Romanian isolate of the smut against the North American *B. umbellatus* populations was made. All populations belonging to genotype 1 (South Dakota, Montana, Wisconsin), genotype 2 (Bouchie Lake, Canada) and genotype 4 (New York, Ohio and Maine) were susceptible to the smut, however, genotype 5 (Minnesota) was resistant. Host-range testing of non-target species is now also underway. *Echinodorus cordifolius* and *Iris virginica* were found to be resistant. Further plants from the host test list will be sourced in 2025 for ongoing host range testing.

5 Oxeye daisy (*Leucanthemum vulgare*)

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5.1 *Dichrorampha aeratana* (Lep., Tortricidae)

In May, we provided 1000 eggs to Dr Jeffrey Littlefield (Montana State University in Bozeman) and 1500 eggs to Dr Andrew McConnachie (New South Wales Department of Primary Industries and Regional Development in Orange) to supplement their rearing colonies. We are also continuing to maintain a rearing colony of *D. aeratana* at CABI to facilitate future shipments to North America and Australia.

First releases of the rhizome-feeding tortricid moth, *Dichrorampha aeratana*, took place at field sites in British Columbia and Alberta in June 2023 and a new generation of moths has been observed at one site in spring 2024. Releases of the moths in Canada continued in 2024 and 2025. In the US, the USDA-APHIS Technical Advisory Group (TAG) recommended release of *D. aeratana* in 2022, but a release permit has yet to be issued.

Rhizome-galling tephritid fly *Oxyna nebulosa*.

5.2 *Dichrorampha consortana* (Lep., Tortricidae)

In spring 2025, we continued to work with the shoot-feeding moth *Dichrorampha consortana*. In May and June, we set up no-choice larval development tests with a total of 26 non-target species. In addition, we set up an open-field test with three Shasta daisy cultivars that had supported larval development in previous no-choice tests. All plants will be dissected for larvae in August and September.

Mating pair of the shoot-feeding tortricid moth *Dichrorampha consortana*.

5.3 *Oxyna nebulosa* (Dipt., Tephritidae)

Testing with the rhizome-galling tephritid fly *Oxyna nebulosa* was completed in 2024, and we started preparing the petition for field release by summarizing all collected data on its host specificity, biology and impact. We also continue to maintain a rearing colony for potential shipments to North America.

5.4 *Cyphocleonus trisulcatus* (Col., Curculionidae)

Testing with the root-feeding weevil *Cyphocleonus trisulcatus* for Australia at CABI was completed in 2021, but we continue to maintain a rearing colony at CABI for shipments to Australia. In May 2025, together with Dr Andrew McConnachie, we revisited the oxeye daisy sites in France from which *C. trisulcatus* was initially collected. We were able to collect a total of three females and four males as well as several oxeye daisy plants with eggs and larvae. All adults will be incorporated into our rearing colony. In June 2025, we also provided approximately 150 weevils from our rearing colony to Dr Andrew McConnachie to supplement his rearing colony in the quarantine facility in Orange, NSW.

Sonja Stutz collecting *Cyphocleonus trisulcatus* in southern France.

6 Common tansy (*Tanacetum vulgare*)

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Larva of the stem-mining moth *Gillmeria ochrodactyla.*

6.1 *Microplontus millefolii* (Col., Curculionidae)

Host-specificity testing with the stem-mining weevil *Microplontus millefolii* was completed in 2023 and in April 2025, a petition for field release of this species was submitted to the Canadian and US regulatory authorities by Dr Rosemarie De Clerck-Floate and Dr Jeffrey Littlefield, respectively.

6.2 *Gillmeria ochrodactyla* (syn.: *Platyptilia ochrodactyla*) (Lep., Pterophoridae)

Adult of the stem-mining moth *Gillmeria ochrodactyla*

In April and May, we conducted no-choice larval transfer tests with the flower-head and stem-mining moth *G. ochrodactyla* using 30 non-target species and T. vulgare as a control. These tests were conducted with first-instar larvae originating from T. vulgare flower heads that had been collected in western Germany in October 2024 and overwintered at CABI. Some larval feeding was observed on approximately half of the exposed non-target species, but adults only emerged from one of them, i.e. the ornamental species Ismelia carinata.

On 20 and 21 May, about 900 shoots attacked by *G. ochrodactyla* were collected in western Germany. From these, about 220 females and 110 males emerged in June, which were used to set up no-choice oviposition tests with flowering non-target species that had supported partial or complete larval development in previous larval transfer tests. These tests will be evaluated later this summer.

Summer student Jane Sylvestre exposing *T. vulgare* and non-target species to females of *Gillmeria ochrodactyla* under no-choice conditions.

7 Hawkweeds (*Pilosella* spp.)

Ghislaine Cortat and **Ona Corberó Forn**

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7.1 *Aulacidea pilosellae* (Hym., Cynipidae)

Two biotypes of this gall wasp are being investigated. We completed testing a population from Poland of biotype 1, *Aulacidea. pilosellae* ex *Pilosella* spp. from the northern range (eastern Germany, Poland and the Czech Republic). Biotype 2 is *A. pilosellae* ex *Pilosella officinarum* of which we have been testing a population pooled from wasps collected in the southern range (Switzerland and southern Germany). Studies conducted at Agriculture and Agri-Food Canada (AAFC) in Lethbridge showed that biotype 2 carries Wolbachia, which is thought to be responsible for the biotype differentiation. We started to prepare a joint petition for the release of this bioptype in North America in collaboration with Drs Rosemarie DeClerck-Floate (AAFC, Lethbridge), Chandra Moffat (AAFC Summerland) and Dr Jeffrey Littlefield (Montana State University, Bozeman). Batches of galls harvested from lab infested plants in 2024 were taken out of cold storage in June 2025. Adults emerging from these were used to maintain the rearing colony.

Of the 84 test plant species, subspecies and populations tested with *A. pilosellae* ex *P. officinarum*, and 74 with *A. pilosellae* ex *Pilosella* spp., galls were only found on the genera *Pilosella* and *Hieracium*. *Hieracium argutum* was the only test plant attacked when exposed to *A. pilosellae* ex *P. officinarum* in choice tests exposing a test plant together with the natural host (control).

Freshly caught females of *Cheilosia urbana* placed in tubes for egg harvest.

Female *Aulacidea pilosellae*.

7.2 *Cheilosia urbana* (Dipt., Syrphidae)

In late April and early May, 31 *C. urbana* females were collected in the CABI garden. About 600 eggs were harvested and shipped together with nine live females to AAFC, Summerland on 6 May. The shipment was successful, and the eggs arrived in good shape. Upon arrival, eggs and larvae emerging from these eggs were transferred onto potted plants for field releases in spring the following year.

Summer student Ona Corberó Forn field collecting *Cheilosia urbana* in the CABI garden in Switzerland.

8 Swallow-worts (*Vincetoxicum* spp.)

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One *Chrysochus asclepiadeus* larva found nine months after infestation of *Asclepias incarnata* and kept at moderate temperature overwinter.

Chrysochus asclepiadeus on *Vincetoxicum hirundinaria* in the field in France.

8.1 *Chrysochus asclepiadeus* (Col., Chrysomelidae)

The root-mining beetle *Chrysochus asclepiadeus* can develop and emerge as an adult over 1-3 years. Adults in Franche Comté, France, are active between the end of June and the end of July. After collection or emergence from rearing plants, these are stored in containers with cut shoots of swallow-worts and eggs are regularly collected to conduct no-choice larval transfer tests with freshly hatched larvae. The infested plants are kept over winter in an unheated greenhouse (above freezing temperatures). The roots and soil are checked for larvae the following year in April–May. Plants with larvae are kept for up to three years for adult emergence.

In spring 2025, we found larvae in 67% of the control plants (*V. hirundinaria* and *V. nigrum* (overall four larvae per plant) from tests set up in 2024. While a total of five L3–4 larvae were found in two Asclepias incarnata plants that were kept in an incubator at 15/10°C, 12h light over winter, this species was not attacked when exposed in an open-field test in 2018. No adults have emerged from plant species outside the *Vincetoxicum* genus exposed in larval transfer tests. So far, a total of 16 adults emerged from *V. hirundinaria* and *V. nigrum* set up in 2022, 2023 and 2024. More than 2000 eggs have already been harvested from these adults and neonate larvae will be used in no-choice larval transfer tests.

In tests conducted between 2019 and 2023, no adults emerged from larvae found on *Asclepias incarnata, A. rubra, A. syriaca* and *A. tuberosa*. Larval survival after about eight months on these test plants was 1.5% vs. about 18% on the controls. None of the 18 other exposed test plants (12 native to North America) were attacked. These are encouraging results, similar to previous tests with the Ukrainian population of the beetle.

Summer student Ona Corberó Forn counting *Chrysochus asclepiadeus* larvae nine months after infestation of a control plant.

9 Field bindweed (*Convolvulus arvensis*)

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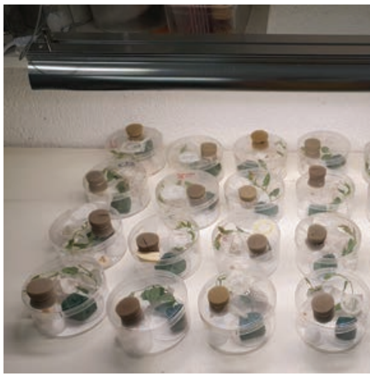
9.1 *Melanagromyza albocilia* (Dipt., Agromyzidae)

The shoot- and root-mining fly *Melanagromyza albocilia* shows promise as a potential biological control agent for field bindweed. However, our attempts at conducting host range tests under confined and semi-natural conditions yielded low success. We are therefore conducting tests under field conditions at a site where the fly occurs naturally. Open-field tests have been conducted each year in southern Germany since 2017. On 13 June 2025, six North American native test plant species, one crop and *Convolvulus arvensis* as the control, were embedded into the ground at the edge of a maize field. The plants were recollected on 15 July. Dissections are ongoing and results will be presented in the annual report.

For the no-choice tests in the lab, about 470 pupae were field collected in 2024, of which 72 flies and 177 parasitoids emerged in 2025. Due to male and female synchronization problems and low longevity, only five tests could be established. In order to obtain adults to conduct additional testing in the lab in 2025, additional infested *C. arvensis* plants will be collected in southern Germany and dissected for puparia later this summer.



Melanagromyza albocilia oviposition tests on field bindweed.

Melanagromyza albocilia mating pair during oviposition tests.

9.2 *Microsphecia brosiformis* (Lep., Sesiidae)

This root-mining sesiid moth is difficult to collect owing to its low densities in the field. This year with temperatures above 40°C from mid-June to mid-July, no *Microsphecia brosiformis* have been spotted yet in the field. In addition, field trips in eastern Serbia and southern Banat have been postponed.

An open-field test was set up with three potted North American bindweed species which supported larval development under no-choice conditions: *Convolvulus equitans, Calystegia occidentalis* and *Calystegia macrostegia. Convolvulus arvensis* plants present within the plot will be used as controls. A “drop-by-drop” irrigation system was installed to mitigate the effect of the high temperatures and drought. The plants will be dissected in November, and results will be presented in the annual report.

Summer student Ona Corberó Forn and visiting student Matija Milković setting up an open-field test with *Melanagromyza albocilia* in southern Germany.

10 Russian knapweed (*Rhaponticum repens*)

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Adult male *Pseudorchestes sericeus* from the quarantine culture maintained at CABI.

10.1 *Pseudorchestes sericeus* (Col., Curculionidae)

The host range testing with the leaf-mining weevil, *Pseudorchestes sericeus* has largely been successfully completed with a total of 74 test plant species and/or varieties screened. In the process of preparing the petition for field release, we continue to maintain the rearing of this weevil. Unfortunately, the culture experienced a collapse over winter 2024/25. Although we are able to maintain the rearing at about 20 adults, we are struggling to increase the numbers. We continue to experiment with different rearing techniques, but due to the bottleneck in the population, fresh genetic material may be the key to restarting the population.

Russian knapweed roots collected in the field in Armenia, July 2025.

10.2 Field surveys

In July we were able to conduct surveys in Armenia in search of a root-feeding moth in the genus *Fulvoclysia* that was collected at one site in July 2023. Unfortunately, despite approximately 70 roots dissected in the field, no larvae were recovered. An additional 40 plants were transported to CABI for detailed dissections and possible rearing of any eggs or small larvae recovered. We believe the site has been massively altered between 2023 and now, with the plant roots averaging less than 1 cm in diameter compared to 3–5 cm diameter in 2023, which suggests a young and immature population of the plants, not suitable for a root feeding moth.

The field site in Armenia, July 2025.

11 Garlic mustard (*Alliaria petiolata*)

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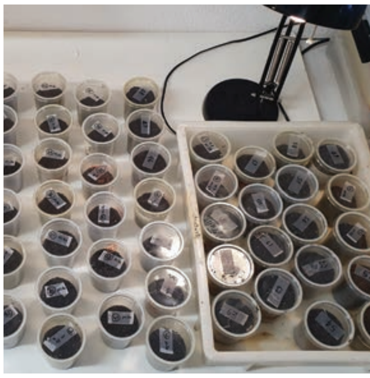
11.1 *Ceutorhynchus constrictus* (Col., Curculionidae)

Adult *Ceutorhynchus constrictus*.

In March, over 1'300 adults of the seed-feeding weevil *Ceutorhynchus constrictus* emerged from our rearing colony established in 2024. Adults were either placed in plastic containers or onto potted garlic mustard plants. With the permission for field release in Canada, we began to explore the best conditions to ship *C. constrictus,* where the plants in Canada are delayed compared to Switzerland. Flowers were only offered one week before the shipment to synchronize weevil oviposition with Canadian garlic mustard seed development. On 6 May, about 400 females and 375 males were shipped to AAFC Ottawa for field releases in Ontario, Alberta and British Columbia. After testing for oviposition, the remaining fertile females were used at CABI for rearing on *A. petiolata* and for some additional host-range tests for the US. The native North American *Leavenworthia stylosa* was exposed in no-choice and single-choice tests. No eggs were found on any *L. stylosa*, while eggs were found on all the controls. Under choice conditions, no feeding was found on *L. stylosa* and in the no-choice tests, only superficial feeding was recorded (no seeds were damaged).



Emergence of *Ceutorhynchus constrictus* reared at CABI in Delémont

In June and July, about 300 mature larvae of *C. constrictus* larvae were harvested manually from garlic mustard (test controls and rearing plants) and at least the same number of larvae were collected directly in containers with sifted soil for adult emergence in spring 2026.

11.2 *Ceutorhynchus scrobicollis* (Col., Curculionidae)

Between May and July, adult *Ceutorhynchus scrobicollis* emerged from rearing plants infested in 2024. Over 300 live adults were recovered from these plants and are kept on potted garlic mustard rosettes for aestivation. Weevils will either be shipped to AAFC in autumn or kept at CABI to maintain the rearing. plants will be dissected in November, and results will be presented in the annual report.

Single-choice tests in cages and no-choice sleeved plants with *Ceutorhynchus constrictus* in the greenhouse.

Lepidium draba with galls and *Cardamine breweri* with no galls in the survival test 2024–2025.

12 Whitetop or Hoary cress (*Lepidium draba*)

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12.1 *Ceutorhynchus cardariae* (Col., Curculionidae)

The females of the galling weevil, Ceutorhynchus cardariae that were collected from survival tests set up in 2024 with Planodes virginicum and Cardamine breweri were reset on new plants of the same test plant species in summer 2024. Five control plants were set up in parallel. Females from test plant species, did not survive until spring 2025 when they lay eggs, while the surviving females on the controls, produced 664 offspring.

We also continued maintaining a rearing colony of this weevil at CABI. Of the 980 adults that overwintered from 2024, about 79% survived. The reared adults were set up on potted plants and about 3000 C. cardariae emerged in 2025.

12.2 *Ceutorhynchus turbatus* (Col., Curculionidae)

On 20 May, about 450 adults of the seed-feeding weevil *C. turbatus* were collected in southern Switzerland. Between 20 and 23 May, we established no-choice oviposition tests with thirteen plants of four non-targets, *Lepidium fremontii, Physaria lanata, Polanisia trachysperma* and *Lepidium eastwoodiae* and five *Lepidium draba* control plants. No eggs were recovered from either of the test plant species. In addition, we set up development tests with *L. eastwoodiae* and *L. draba* as a control. Apart from the control plants which produced on average 13.5 larvae per plant, we observed only a single seed destroyed on one *L. eastwoodiae* plant, which appears to be from larval development, however, the larva was not recovered and presumed to have died before completing full development.

Summer students Jane Sylvestre and Ona Corberó Forn collecting *Ceutorhynchus turbatus* in southern Switzerland.

13 Perennial pepperweed (*Lepidium latifolium*)

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Adult of *Ceutorhynchus marginellus* on perennial pepperweed.

13.1 *Ceutorhynchus marginellus* (Col., Curculionidae)

We continued our investigation on the host range of the gall-forming weevil *Ceutorhynchus marginellus* in the quarantine facility at CABI. We exposed a total of seven non-target species and perennial pepperweed plants under no-choice conditions. In these tests, three second instar larvae were found in one plant of *Physaria lepidota*. However, all larvae were dead, and no gall was visible. One or two galls were observed on two *Streptanthus glandulosus* ssp. *glandulosus*, but no adults emerged from these plants. Galls, larvae and/or adults were found on all of the exposed perennial pepperweed plants.

We also set up single-choice tests with 16 non-target species that supported adult or gall-development under no-choice conditions in 2025, or in earlier years, to determine whether these would also be accepted for oviposition by *C. marginellus* when simultaneously being offered perennial pepperweed.

Larvae of *Ceutorhynchus marginellus* on perennial pepperweed.

Under these conditions, similar or higher numbers of larvae than on the simultaneously set up *Lepidium latifolium* plant were found on a subset of plants of the native *Lepidium acutidens, L. oxycarpum, L. strictum* and of *Armoracia rusticana* (horse radish) and a few larvae were found on single plants of two additional species. No larvae were found on the remaining ten non-target species. Larvae were found on all of the simultaneously exposed perennial pepperweed plants.

In March, we sent approximately 200 adults of *C. marginellus* to Dr Mark Schwarzländer at the University of Idaho for studies on the host-finding behavior of this weevil.

Set-up of single-choice test with *Lepidium latifolium* (left) and *Armoracia rusticana* (right) setup under quarantine condition.

Summer student Afiquah Sundusin transferring *Coccinellidae* larvae on *Isatis tinctoria* and *Lepidium draba* rearing plants for aphids' biocontrol.

14 Dyer's woad (*Isatis tinctoria*)

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14.1 *Ceutorhynchus peyerimhoffi* (Col., Curculionidae)

The petition for field release of the seed-feeding weevil, *Ceutorhynchus peyerimhoffi* was submitted to TAG in spring and we are awaiting feedback. In the meantime, we continue the rearing and from adults which emerged from our rearing colony this spring, we transferred 850 onto flowering dyer's woad plants for rearing. Over 4800 larvae were collected and are being kept for adult emergence in 2026.

14.2 *Ceutorhynchus rusticus* (Col., Curculionidae)

A total of 19 plants, from three test plant species and the control, were exposed to the root-crown mining weevil *Ceutorhynchus rusticus* in no-choice oviposition and development tests in autumn 2024. These plants were regularly checked and any dying plants were dissected. Adult emergence was successful in 2025, with all control plants kept for adult emergence supporting development with an average of 17 adults per plant. Of the three test plant species exposed, none supported adult development but some *C. rusticus* mining, and some underdeveloped larvae were recorded on *Cakile edentula*.

Due to the dry 2024 summer and collections in the field being a bit more difficult, we kept a small rearing on 21 plants and obtained 627 adults, which are kept for aestivation in a wooden shed. In autumn 2025, we are planning to set up an additional open-field test in southern Germany with plant species that supported adult development in previous tests.

Summer student Jane Sylvestre carrying *Isatis tinctoria* plants for *Ceutorhynchus peyerimhoffi* rearing.

15 Tree of heaven (*Ailanthus altissima*)

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15.1 *Aculus taihangensis* (Acari, Eriophyidae)

Work with the eriophyid mite *Aculus taihangensis* is being done at BBCA in Rome, Italy.

In 2025, host-specificity tests were continued with *Holacantha stewartii* (syn. *Castela stewartii*), a species native to Texas and Mexico and belonging to the tree-of-heaven family (Simaroubaceae). Specifically, one *H. stewartii* plant and one tree-of-heaven plant (used as a control) were exposed to the mite under laboratory conditions. Six weeks after inoculating each plant with 20–30 *A. taihangensis* mites by attaching an infested tree-of-heaven leaf, more than 400 mites were found on the tree-of-heaven plant, while only one live mite was found on the *H. stewartii* plant. Symptoms of the mites (i.e., deformed leaves) were observed only on the tree-of-heaven plant, and not on the *H. stewartii* plant. In June, a total of three *H. stewartii* plants and five tree of heaven plants were inoculated with the mite under open-field conditions. To date, symptoms of the mites (i.e., deformed leaves) have only been observed on the tree-of-heaven plants, and not on the *H. stewartii* ones. All plants will be harvested in August, and the number of live mites will be recorded.

Since host-specificity testing with *A. taihangensis* is close to being completed, we will start preparing the petition for field release by summarizing the collected data on the host specificity, impact and biology of this mite.

Holacantha stewartii inoculated with *Aculus taihangensis* under open-field conditions.

Symptoms of *Aculus taihangensis* on *Ailanthus altissima* 30 days after its inoculation.

Silvia Barlattani (BBCA) setting up host-specificity tests with the eriophyid mite *Aculus taihangensis* under open-field conditions.

16 Dalmatian and Yellow Toadflax (*Linaria* spp.)

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Ivo Toševski monitoring the mass rearing of *Rhinusa pilosa* in the greenhouse.

16.1 *Rhinusa pilosa* ex *Linaria vulgaris* and *R. rara* ex *L. genistifolia* (Col., Curculionidae)

In 2025, we continued rearing *Rhinusa pilosa* genotypes using an improved rearing protocol carried out in a greenhouse to avoid the unpredictable weather conditions in recent years. Applied method yielded good results in 2025 with over 3500 adults. This spring we conducted mass rearing with a total of 131 copulated females, of which 103 females were of 8 known haplotype (i.e. haplotype Rp-A18 = 12 females, Rp-A4 = 12 females, Rp-A13 = 10, Rp-A10 = 10, Rp-A3 = 12, Rp-A7 = 12, Rp-A19 = 25, and Rp-B7 = 10 females). In addition, 10 females of unknown haplotype originating from the laboratory rearing between 2019-2024 and 18 females originating from the field collected in 2024 were used. The rearing results will be known after dissection of galls obtained in rearing cages. Currently, over 1200 *R. pilosa* adults were obtained from partly dissected cages. It is planned to genetically examine the adults obtained from each single female to determine their haplotype affiliation.

This year, we supplemented the rearing colonies of both *R. pilosa* and *R. rara* with adults from field-collected galls. In April 2025, we collected a total of 80 galls of R. pilosa and in May, a total of 350 galls from *R. rara*.

Dr. Jelena Jović collection *Rhinusa pilosa* galls in the field in the vicinity of Ljubičevac, East Serbia.

16.2 *Mecinus laeviceps* and *M. peterharrisi* (Col., Curculionidae)

During spring and summer 2025, we continued with establishing rearing colonies and to develop mass rearing protocols for *Mecinus laeviceps* and *M. peterharrisi.* The rearing of *M. laeviceps* involved 60 copulated females set up between 17 and 21 April on seedlings of *Linaria dalmatica* of North American origin (population from Ft. Macleod area, Alberta, Canada). For oviposition, we carefully clipped the growth tips of each plant several times to produce young, growing shoots 3–4 cm in length. We exposed two pairs per plant and the plants will be dissected at the end of July. We reared *M. peterharrisi* using the same method as *M. laeviceps*, using 50 females. For the rearing of *M. heydenii,* we used 60 females set up on 21 and 30 April in 30 plastic containers with potted *L. vulgaris*. The number of adults obtained from *M. heydenii* is still not known because the plants will only be dissected in mid-August.

Dr. Oliver Krstić dissecting *Rhinusa pilosa* galls obtained from mass rearing in the greenhouse.

In general, the methods used for rearing *Mecinus* spp. are time-consuming and confirm that the phenostage of the plants exposed to each weevil species plays a crucial role as reported in 2024.

17 Common reed (*Phragmites australis*)

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Lenisa geminipuncta larva mining in rearing stem.

17.1 *Archanara neurica* and *Lenisa (Archanara) geminipuncta* (Lep., Noctuidae)

In 2025, we continued producing as many pupae and eggs of both stem-mining moth species as possible to support further field releases in Canada. Rearing of *Archanara neurica* worked very well this year, where we were able to obtain about 700 pupae. Unfortunately, larval mortality of *Lenisa geminipuncta* was again high in 2025 and only about 300 larvae successfully pupated. In June 2025, two shipments with 300 pupae of *A. neurica* and 50 pupae of *L. geminipuncta* were sent to Ottawa. We are aiming at sending up to 10’000 eggs of *A. neurica* and about 2000 eggs of *L. geminipuncta* in October 2025.

Both species are establishing well at the release sites in Canada and the number of visibly dead stems is increasing. We will probably send the last pupae in 2026 and stop working on this project after 28 years.

Work on oviposition cages for *Archanara neurica*.

Summer students Afiqah Sundusin and Rachel Wong collecting *Phragmites australis* stems for moth rearing.

Mogulones borraginis adult on a flower of *Cynoglossum officinale.*

18 Houndstongue (*Cynoglossum officinale*)

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Current work on houndstongue is focused on the seed-feeding weevil *Mogulones borraginis*. It has proven to be the most specific agent acting on houndstongue thus far. CABI Switzerland is maintaining a rearing of the weevil in view of future field releases since *M. borraginis* is extremely rare in the field in Europe and therefore hard to collect.

From over 1700 *M. borraginis* larvae collected in 2024, about 200 adults emerged in November 2024, and an additional 1000 in March 2025 which were set up on houndstongue rosettes and/or shipped to the USA. At the end of May/beginning of June, about 350 females were retrieved and reset on 95 flowering-seeding houndstongue plants. By mid-July, fruit bearing inflorescences were covered individually with gauze bags and vials attached to the end of each bag to collect mature larvae leaving the fruits. Over 5800 *M. borraginis* larvae emerged and were separated into cups (30 individuals per cup) and placed in an underground insectary for adult emergence in autumn 2025 and spring 2026.

In autumn 2024 and spring 2025, a total of 700 adults of *M. borraginis* were sent to the quarantine facility at the University of Idaho run by Dr Mark Schwarzländer. Currently, work is focused on developing the most effective way to rear *M. borraginis* under quarantine conditions to maximize space and number of adults.

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Summer student Jane Sylvestre and Cornelia Closca covering the *Cynoglossum officinale* seed pods for the larval emergence of *Mogulones borraginis.*

19 Japanese knotweed (*Reynoutria japonica*) work in the UK

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19.1 *Aphalara itadori* (Hemiptera, Psyllidae)

Japanese knotweed (*Reynoutria japonica*), giant knotweed (*R. sachalinensis*) and their hybrid, bohemian knotweed (*R.* x *bohemica*) have become serious invasive weeds in North America. A natural enemy from the native range, the psyllid *Aphalara itadori* has been prioritized as a classical biological control agent following extensive research, both under greenhouse conditions and in the field.

A new line of the psyllid, collected in Murakami, Niigata Prefecture, Japan, in 2019 (Murakami line) was found causing severely curled leaves. The results of the 2022/23 work showed that the development of leaf-curl on *R. japonica* and *R.* x *bohemica* can benefit the knotweed biological control program, both by suppressing plant growth and by improving psyllid survival through the amelioration of abiotic stressors. Based on the results, it is likely that the curling damage on leaves of the knotweed species is induced by the Murakami psyllids; however, the mechanism by which the curling damage is induced by the psyllids has not yet been elucidated. Therefore, bacterial diversity in the psyllids and plant samples using the MinION sequencing platform has commenced to search for any as-yet unidentified potential microorganisms that could be contributing to the leaf curling damage.

The molecular analysis showed that the bacterial genus *Sodalis* is the most predominant genus in a female Kyushu psyllid line (49.86%) and both male and female Murakami line (23.51% and 35.62%, respectively). A male Kyushu psyllid line is mainly composed of the genus *Klebsiella* (29.30%). The second predominant bacterial genus in the Kyushu psyllid line was *Escherichia* (19.78%) in a male and *Klebsiella* (12.53%) in a female adult, while in the Murakami psyllid line, both sexes held *Wolbachia* (male; 20.02%, female; 32.91%). In the Kyushu psyllid line, only 1.39-1.83% of *Wolbachia* was detected. A higher proportion of *Stenotropomonas* was observed in female Kyushu psyllids (10.31%) than in female Murakami psyllids (1.74%). Upon sequencing plant samples, bacterial communities were similar on all the samples ex healthy leaves of *R. japonica* and *R.* x *bohemica*, *R. japonica* leaves reared with the Kyushu psyllids and curled-damaged leaves of R. x bohemica reared with the Murakami psyllids. It mainly consisted of *Stenotropomonas* on all the samples of the healthy *R. japonica* (42.06%) and *R.* x *bohemica* (30.36%), *R. japonica* with the Kyushu psyllids (35.72%) and *R.* x *bohemica* with the Murakami psyllids (35.57%). Less than 1% of *Wolbachia* was detected on all the plant samples.

UK field site of bohemian knotweed population released with the psyllid *Aphalara itadori.*

A nymph of the Murakami line of *Aphalara itadori* found in the field in July 2024.

Yuen Ting Yeap conducting the MinION sequencing on the psyllid and Bohemian knotweed samples.

20 Himalayan balsam (*Impatiens glandulifera*) work in the UK

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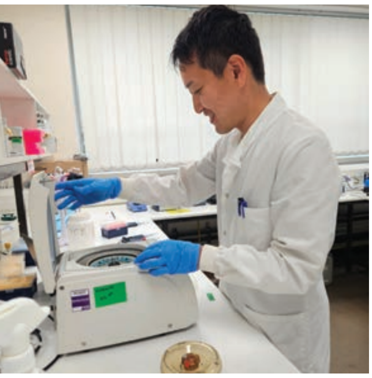
Dense stand of flowering Himalayan balsam in the UK

20.1 *Puccinia komarovii* var. *glanduliferae* (Fungi, Pucciniaceae)

Himalayan balsam is an invasive alien weed in both Europe and North America and can cause serious impacts on biodiversity, river networks, and infrastructure. In 2006, CABI UK initiated a biological control program for this weed and in 2014, the highly specific rust fungus, *Puccinia komarovii* var. *glanduliferae*, was approved for release. Since then, two strains of the rust, one from India and one from Pakistan have been released at sites across England, Wales and Scotland, where susceptible biotypes of the weed exist. On fully susceptible plants, the rust is performing well, adapting to local climatic conditions and spreading from the initial area of release. Good leaf infection is frequently observed in the summer, and the rust is able to survive the winter and establish in stands of Himalayan balsam in the following year.

Impatiens glandulifera leaf ex Harmondsworth Moor, UK, infected with the strain of the rust *Puccinia komarovii* var. *glanduliferae* ex. Dhundi, India

In parallel to the UK work, the rust is also under evaluation for control of *I. glandulifera* in Canada, where the weed occurs in eight provinces. Results of a molecular study indicated that the two haplotypes of Himalayan balsam present in Canada are identical to the two most common ones in the UK, supporting the suggestion that the plant was introduced into Canada from the UK. Assessment of an additional 47 species of specific importance to North America confirmed that the rust is highly host-specific, with no non-target impacts observed. Assessment of six Canadian populations of the weed found many to be resistant to the rust strain from Pakistan and for the Indian strain, levels of infection were much lower than those observed on the positive control plants from the UK.



Daisuke Kurose performing the molecular AFLP analysis on Himalayan balsam samples

During 2020-2023 native range surveys in both India and Pakistan collected additional rust strains. Unfortunately, a strain obtained in 2020 from Karchon, India (IMI 398717) also failed to infect the Canadian Himalayan balsam populations. The infectivity and virulence of a second strain collected in Pakistan in 2022, from Das Kharram, Astore (IMI 507233), was found not to be significantly different from the two strains currently approved for release in the UK. Therefore, a decision was made to put the assessment of this strain on a hiatus whilst other strains were evaluated. A strain of the rust ex Dhundi (IMI 403543) India collected during the original surveys in 2010 was retrieved from liquid nitrogen and is currently under evaluation against Canadian populations of the weed. In addition, a study is underway to determine whether the molecular technique Amplified Fragment Length Polymorphism (AFLP) can be utilised to predict rust susceptibility.

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