

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

STSM Report – Fribourg, Switzerland 2016

Defence in native vs. invasive *Ambrosia artemisiifolia*

4th June – 20th June 2016, by Yan SUN

STSM details

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Applicant details

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Host details

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Purpose of the STSM

The purpose of this STSM is using an invasive alien plant, *Ambrosia artemisiifolia*, as the model species, to compare the defence of the plant populations that experienced a very strong top-down regulation in their native range (North America) with invasive plant populations (China) that have not yet been reunified with their natural specialist herbivores. I set up a quarantine experiment using *A. artemisiifolia* from different origins, on which its potential biological control agent, *Ophraella slobodkini*, feed. We used 11 *A. artemisiifolia* populations from the US, the native range, and 10 invasive populations from China that experienced different intensive and history of biological control management. We ask if native American populations are more herbivory defended than invasive Chinese populations, and if the invasive Chinese populations that experienced higher intensity and longer history of biological control management are more defended than the one experienced shorter or no history of biological control management.

Description of the work carried out during the STSM and of the future collaboration

The STSM was hosted at University of Fribourg, Fribourg, Switzerland:

Week 1:

- ✓ Setting up the experiment in quarantine
- ✓ Transplanting *A. artemisiifolia* seedlings to individual pot (1L)

- ✓ Transferring an egg batch of *O. slobodkini* on one leaf of each *A. artemisiifolia* individual.
- ✓ Recording the statues of eggs each day

Week 2&3:

- ✓ Recording the statues of eggs each day

Week 4:

- ✓ Collecting all adults but not yet measuring their biomass
- ✓ Data analysis

Description of the main results obtained:

Due to the limitation of the numbers of egg batches of *O. communa*, we thus only used *O. slobodkini* in this experiment.

We measured the developing time from eggs to all stages (larva, pupa, adult) of *O. slobodkini*. In general, we found no significant different developing time of *O. slobodkini* that fed on the native US *A. artemisiifolia* populations comparing to that fed on the invasive Chinese populations ($F_{1,34} < 4.25$, $P \geq 0.05$; Fig. 1).

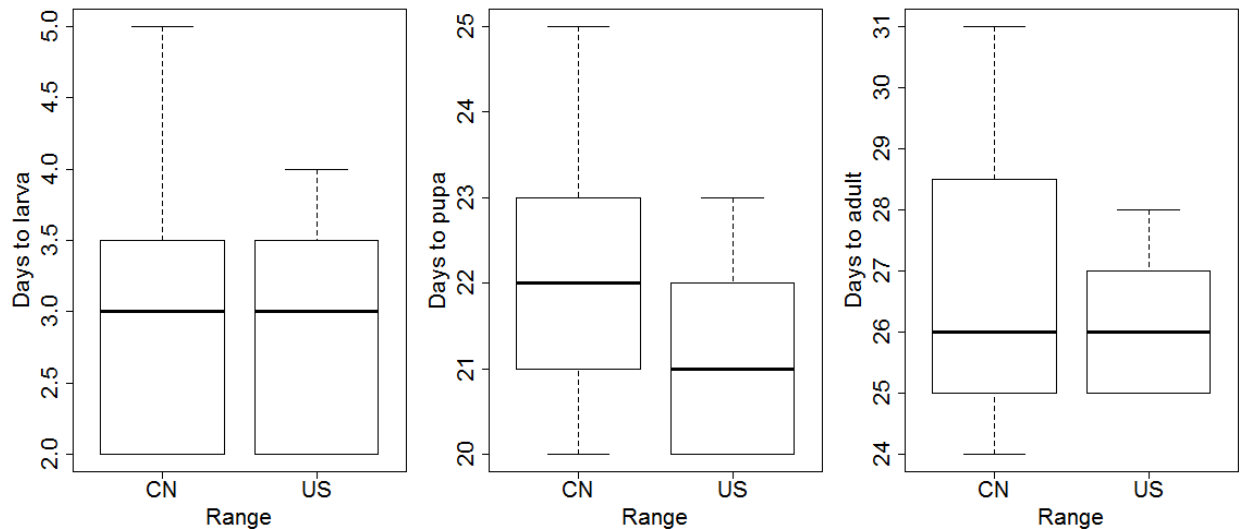


Fig. 1. Developing days of *O. slobodkini* from egg to larva (left), to pupa (middle) and to adult (right), on invasive Chinese *A. artemisiifolia* populations and on the native US populations.

Within Chinese populations that experienced different biological control history, the developing time from eggs to larva of *O. slobodkini* did not differ among all populations ($F_{2,17} = 0.52$, $P = 0.6$; Fig. 2). The biological control history of *A. artemisiifolia* had significant effects on the developing time from eggs to pupa and to adult of *O. slobodkini* ($F_{2,17} < 37.02$, $P < 0.001$; Fig. 2). The developing time to pupa was longer when *O. slobodkini* fed on populations that had

massive biological control release management (Tukey HSD, $P \leq 0.001$), and no difference when they fed on populations that had no biological control history comparing to when they fed on the populations that had only spread biological control agent suppressing (Tukey HSD, $P = 0.48$). Similarly, we found that the developing time to adult was longer when *O. slobodkini* fed on populations that had massive biological control release management (Tukey HSD, $P \leq 0.001$). Yet, the developing time to adult was also longer when *O. slobodkini* fed on the populations that had only spread biological control agent suppressing comparing to when they fed on populations that had no biological control history (Tukey HSD, $P = 0.02$).

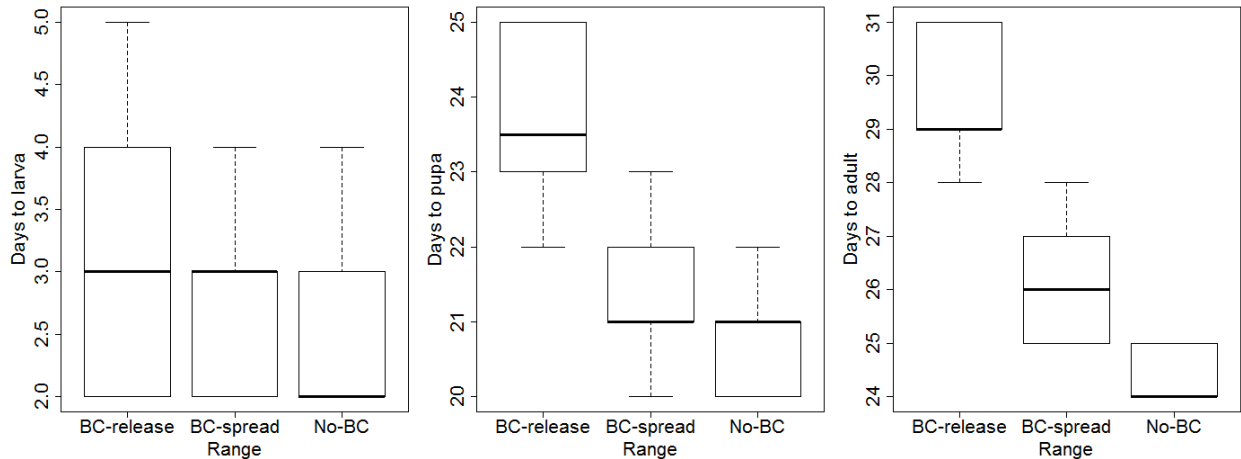


Fig. 2. Developing days of *O. slobodkini* from egg to larva (left), to pupa (middle) and to adult (right), on Chinese *A. artemisiifolia* populations with different biological control history.

Foreseen publications/articles resulting from the STSM

Above results will be combined with a preparing publication with regard to biological control herbivores as drivers of evolutionary change of *A. artemisiifolia* populations in the introduced range.

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

Cf. attached email from Prof. Dr. Heinz Müller-Schärer, University of Fribourg, Fribourg, Switzerland.

I greatly acknowledge the warm-hearted, most helpful and efficient support by my host researcher Prof. Dr. Heinz Müller-Schärer.