

2018 Lily Beetle Research Update  
Dr. Ken Fry, Olds College

Lily Beetle Larvae Collections:

The lily plots were randomly sampled beginning May 22, 2018, and sampled once per week for 10 weeks. There were a total of 148 plants in the population being sampled with 30 plants sampled each sampling date (20.27% of the population). The plants selected for sampling each date were randomly determined.

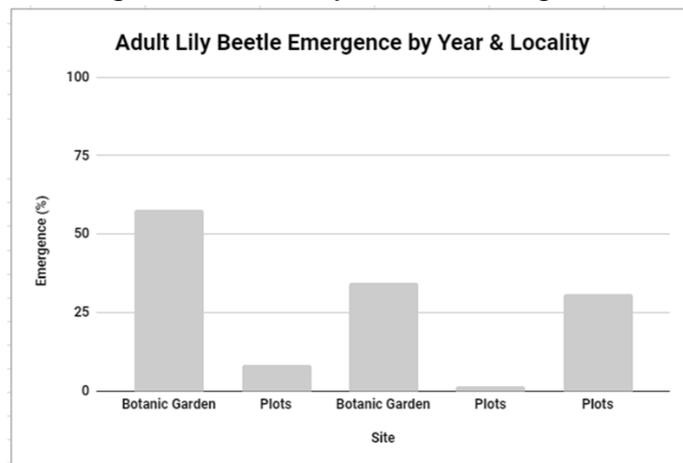
One hundred nineteen (119) lily beetle larvae were collected from the lily plots in 2018. Sixty (60) larvae were fed on excised lily leaves and allowed to pupate in plastic containers filled with vermiculite wetted with tap water. Fifteen (15) adult lily beetles emerged from the pupae, an emergence rate of 25%. The remaining pupal cells were dissected to determine parasitism rates. Six (6) pupae were parasitised with a mean of 11.3 parasitoid larvae per beetle pupa.

The remaining fifty-nine (59) larvae were dissected to determine parasitism rates. There was 100% parasitism of larvae collected in June and July and 0% parasitism of larvae collected in May and August. The mean number of parasitoid larvae per beetle larvae was 6.58.

There were too few beetle pupae arising out of the larval rearing process to allow for overwintering to recover wasps for release in 2019. A separate lily plot will be established in 2019 to allow for a lily beetle population substantial enough to support collections for rearing the parasitoid wasps.

An examination of the lily beetle emergence from 2016-2018 indicates that the parasitoid has been slow to colonise the Botanic Garden from the original releases in the lily plots (Fig. 1).

Figure 1. Adult Lily Beetle Emergence



Lily Beetle Parasitoid Rearing:

In 2017, 826 larvae were collected from the lily plots and reared in plastic chambers containing vermiculite. They were provided with excised lily leaves to complete development to the pupal stage. Three hundred seventy-two adult lily beetles emerged in 2017. The remaining pupae were

stored at 4°C until spring 2018. The pupae were incubated at room temperature to allow the emergence of adult parasitoid wasps.

Two hundred thirty-three (233) adult *Tetrastichus setifer* wasps emerged between June 4 and June 12, 2018. These wasps were released at the Reader Rock Garden in Calgary (50 wasps June 7), a private residence in Airdrie (50 wasps June 4). And Olds College Botanic Garden (40 June 12). The remaining wasps were found dead in the emergence cages.

The low number of emerging adult parasitoid wasps was unexpected. All beetle pupae were then dissected to determine the status of the beetle pupae. Of the 454 pupae remaining, 361 were parasitised for a parasitism rate of 43.7%. There were a total of 3,638 parasitoid larvae, pupae and adults recovered from the beetle pupal cells. Of the parasitised beetle pupae, 891 wasps emerged from the wasp pupa but did not emerge from the beetle pupal cell. Therefore, wasp development did occur in the beetle pupal cells but a substantial number of wasps did not complete development to adult or failed to exit the beetle pupal cell. Different rearing conditions and soil substrates will be tested in 2019.

#### Training:

A summer student was employed to enter all records of lily beetle occurrence in Alberta into the Alberta database managed by Dr. Ken Fry and into the national database managed by Dr. Naomi Cappucino. The student monitored lily beetle populations in the lily plots at Olds College and assisted in rearing larvae for parasitoid monitoring and dissections of lily beetle pupae.

#### Extension:

Invited Presentations with Lily Beetle Research Results content:

- Calgary Horticultural Society Annual Conference, April 14, 2018, Calgary, Alberta
- Mid-Sun Community Garden Club, March 10, 2018, Calgary, Alberta
- Edmonton Horticultural Society, May 28, 2018, Edmonton, Alberta
- Entomological Society of Alberta Annual Meeting, September 27-29, 2018, Edmonton, Alberta
- Entomological Society of America, Canada, and B.C. Joint Annual Meeting, November 11-14, 2018, Vancouver, B.C.
  - I met with Dr. K. Tewksbury of the University of Rhode Island. Dr. Tewksbury participated in the original work to have *T. setifer* introduced into North America. We discussed parasitoid rearing and the possibility of releasing a second species of parasitoid that has outperformed *T. setifer* in the United States.