

FINAL REPORT – PROJECT TITLE:

Fava Beans and Kale as Potential Spring Nurseries for Insect Natural Enemies to Move to the Greenhouse

- 2) The goal of this project was to see if lady beetles could be collected in the spring from fava beans and kale plants that have overwintered in the field and transfer those lady beetles to the greenhouse for the control of aphids.
- 3) We farm our own 7 acres and also farm 15 acres next door to us which we lease. We grow vegetables, herbs, flowers and rye for straw. We have a flock of chickens for egg production. We have 3, 10x36 foot hoop houses where we raise all of our seedlings and transplants for our entire farm. Also, our entire farm including the chickens are certified organic.
- 4) My cooperator was Dr Kim Stoner who guided me and taught me what to do, when to do it and how to do it, explaining all the reasons why.
- 5) Most of my work on this project was in the greenhouse. Everyday while performing my own tasks of seeding and transplanting I maintained the cages of plants with lady beetles. These cages required watering, removing egg masses, removing cleaned plants (ones on which the lady beetles ate all of the aphids) and replaced them with other plants that had aphids on them, and replacing the slice of banana each cage had for supplemental food. It was also important during the heat of the day to make sure there was adequate moisture in the cages for the lady beetles. At times the cages were watered 3 to 4 times a day.

In the late winter of Feb 2000 and early spring of Mar/Apr 2000 I scouted the field of kale and fava beans for lady beetles. However the fava beans did not overwinter and what was left of the kale did not have any lady beetles at all. In March of 2000 cages were set up and we used lady beetles Kim collected elsewhere (see Kim's report re: cages). In August, 2000 I hand planted more fava beans in hopes they would overwinter. They sprouted and grew to a height of 8 to 12" but did not last that winter either; neither did the kale. In October, 2000 Kim gave me some lady beetles she had caught and I placed them in my cold cellar and she put hers in the cooler at the Exp. Station. Mine did not last; conditions in the cold cellar were not suitable for the lady beetles; the temperature fluctuated too much. In February of 2001, cages were set up again using Kim's lady beetles; I ordered lady beetles on March 12, 2001 from IPM Labs in New York. They arrived on March 16th and we started to use these beetles the following week in the cages. I again scouted the field in the spring of 2001 for early lady beetles but to no avail. On October 15, 2001 I collected lady beetles from the side of my house and stored them in my non-frost free refrigerator in the barn. They stayed very well and are presently (March 2002) living in cages in the greenhouse producing egg masses.

- 6) I found out, on our farm at least, kale and fava beans do not overwinter nor do lady beetles arrive early enough in the spring to be transferred to my greenhouse. However, lady beetles collected from the side of a building or beetles that are purchased do work perfectly for aphid control in the greenhouse. Seedlings that would be affected with aphids are; peppers, basil and other herbs, hollyhocks, zinnias, to name a few. After using the lady beetles for egg production, then placing the eggs throughout the greenhouse produced hundreds of larvae that ate the aphids. Results were amazing. Almost all of my seedlings had no aphids when I moved them outside.
- 7) The outcome specific to site conditions would be that lady beetles do not appear in this area in early spring and fava beans and kale do not overwinter at our farm.

- 8) The economic findings would be no loss of any seedlings due to aphid infestations in the greenhouse
- 9) I have no new ideas regarding the aphid problem in my greenhouses.
- 10) I will continue to use lady beetles in my greenhouses . This process allows me to solve my aphid problems in the greenhouse very early on in the greenhouse growing season. The other plus is the ability to rid a pest in a strictly natural way.
- 11) Kim has written an article for the NOFA/CT PERIODICAL "Gleanings" which will be forthcoming soon. Kim will include the projects in her talks on pest management to growers and gardeners throughout the year and will present findings at next winter's farmers meetings.

Several farmers have questioned me regarding this project and I have explained how it works. I will be presenting this project to a group of students from Wesleyan University next month. These students are part of a new sustainable agriculture course at Wesleyan and are coming for a farm tour.

I will also present this project in talks and meetings with my various farmer groups throughout the year.

Also, Kim will make a fact sheet to be distributed by the New Haven Agricultural Experiment Station. This fact sheet will also be placed on their website.

KATHRYN CARUSO

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Multicolored Asian Lady Beetles: Turning a Pest into a Resource

Kimberly Stoner, Connecticut Agricultural Experiment Station
Kathy Caruso, certified organic farmer, Upper Forty Farm, Cromwell

Since 1995, the multicolored Asian lady beetle (*Harmonia axyridis*) has been a familiar presence around our houses, congregating on the outside of buildings in mid-October, aggregating inside during the winter, and reappearing as the days get longer and warmer in the spring. For most of us, these beetles are a curiosity or an annoyance, but for a few people who get large aggregations in their homes each year, they are pests.

However, this lady beetle, like many of the other familiar lady beetles, is a voracious feeder on aphids and other plant pests. So, in an agricultural context, both the larvae and the adults are effective biological control agents.

This article is about the methods we used to collect, store, and release lady beetles in the greenhouse for biological control of the aphids which are such a problem at this time of year.

Collecting: We tried many methods of collecting different species of lady beetles, but we had the best results with lady beetles collected in middle to late October as they aggregated on the outside of buildings. Kim collected 120 lady beetles in 1 ½ hours as they landed on the back porch of her condominium. The best sites are light-colored buildings facing south or southwest. Beetles aggregate on sunny afternoons beginning about October 15. The easiest collecting method was to lightly dust the inside of a glass jar with flour, and knock beetles into the jar. The flour sticks to the tarsi (feet) of the beetles and prevents them from being able to walk up the sides of the glass. Very few of them will try to fly out of the jar without walking up the glass first.

Handling: As soon as possible, we transferred the beetles to new, clean jars with clean paper towel to walk on, so that the beetles could clean the flour off themselves. Then, we gave them slices of banana to feed on. They fed vigorously for a few days. The bananas gave them carbohydrates and moisture, which help the beetles survive winter dormancy. (We tried commercial lady beetle food, but it was more expensive and no more effective than bananas. We also tried providing them with aphids, but it was hard to find enough aphids of attractive species – they didn't like cabbage aphids – and this did not improve their survival either.)

Storage: For good survival, it is best to store the lady beetles under cold, humid conditions. Kathy had an old refrigerator that was not self-defrosting, with a constant temperature of 39 degrees F. and 47% humidity. The cold room at the Experiment Station also had a temperature of 39 degrees F. and 54% humidity. We had close to 100% survival of the fall-collected multicolored Asian lady beetles in both places. Survival was not as good in Kathy's basement storage room, where the temperature

fluctuated more. Also, modern frost-free refrigerators might dry out the beetles too much, although we didn't try this.

Use in the greenhouse: In late February, we set up six cages (cubes, 1 ft. on a side) of beetles in the greenhouse. Kathy does not have screens on the vents in her greenhouse, so we set up the lady beetles inside cages so that they would not fly away. We put 10 adult beetles in each cage. (We did not try to distinguish male and female beetles.) Kathy found plants with aphids in her greenhouse, and we put the plants inside the cages. (See Leanne Pundt's article for more information about finding and identifying aphids in the greenhouse, and for other methods of biological control.) The plants were changed as needed, and the egg masses were clipped off the plants and distributed around the greenhouse. It is very important to change the plants frequently and re-distribute the egg masses because lady beetle larvae are highly cannibalistic and adults will also feed on egg masses. Spreading them out gives the lady beetle larvae and adults more opportunity to feed on the pests instead of on smaller stages of their own species. Adding banana slices to the cages increased the numbers of egg masses slightly.

The average number of egg masses per cage per week varied greatly from less than 1 up to 17. Each egg mass also varies in size, but most have over 20 eggs. We continued replenishing the beetles from the supply in cold storage as beetles died or escaped from the cages.

In the second year of the project, Kathy bought lady beetles (convergent lady beetles, *Hippodamia convergens*) from a biological control company in California. We compared these beetles with the multicolored Asian lady beetles we had collected and stored in the fall. She was not able to find a company that would ship the convergent lady beetles when she wanted them (late February). However, she received beetles in mid-March, they were reasonably priced (\$25 for 9,000), and they laid similar numbers of egg masses. Since the minimum number of beetles to order was so large and this species of beetle is much more active and fast-moving, it would have been better to have larger cages with more plants.

Kathy was very happy with the results of this project. Although she still had some aphids, she felt they were better controlled than in previous years, and her plants had vigorous populations of lady beetle larvae by the time she set them out to harden off. One thing she would do differently is to make better cage covers. The cages we bought from BioQuip (phone: 310-324-0620) had nylon covers that disintegrated rapidly in the greenhouse. This past fall she collected more multicolored Asian lady beetles off her own back porch, and she plans to use them in the greenhouse this spring.