Sustainable Agriculture Research and Education Program
Farmer/Grower Grant Final Report Format

Please follow the format below in your final report.

1. Restate the goals of your project.

The goal of the project was to learn about Tarnished Plant Bug and evaluate organic management and control of it.

2. Update the information on your farm since you received a farmer/grower grant. Include acres farmed, crops/livestock.

We are a diverse farm that raises a mixture of crops and meat. With free range poultry we raise, process and direct-market 800 broiler chickens and 50 turkeys. We also raise 250 layers (for eggs) on pasture. We pasture pigs for meat and aiding in our production of high quality compost for field and greenhouse use. In addition we also raise a small number of young beef cattle. We intensively cultivate about an acre of vegetable, herbs, and flowers. These are sold fresh, dried, and as valued added products on farm, at a local farmers market, and at select seasonal festivals. All fieldwork is done by hand and our team of draft horses and ponies. Karma is on the farm full time and I additionally work in Agricultural Research and Extension at Cornell University. We own 100 acres of open land, pasture, and woods. This includes approximately 20 acres of pasture, an acre of cultivated land, and 75+ acres of managed woodland.

3. Who were your cooperators and what were their roles in the project?

Brian Caldwell, local vegetable extension specialist provided us with information and helped us plan and carry out the project. Michael Hoffman, researcher and professor at Cornell University provided us with information concerning the lifecycle of TPB and proper design of our experiments.

4. Tell us what you actually did in your project and how it was done.

Our first approach involved using commercially available and homemade preparations. Historically Sabadilla has been the most common organic control but we had heard conflicting reports on its effectiveness and availability. From researching what was available and what had been used we came up with four different sprays: Beauveria bassiana (Naturalis L), Neem (Neemix 4.5), Nettle Tea (homemade), and Sabadilla

(Necessary Organics Sabadilla Dust). In a plot of potatoes we sprayed each spray four times on one-week intervals. We began before flowering when we started noticing TPB and finished three weeks following flowering. We did insect counts just prior to spraying and the following day.

Our second approach was through habitat modification. We monitored TPB (with traps, visual counts, and sweep nets) over the season to learn how the population changed in response to mowing of headlands, mowing of cover crops, cultivation of weeds and cultivation of cover crops. We monitored populations in the crop and in the modified areas. We attempted to see if habitat modification could have a significant effect on controlling TPB. We were interested in whether disturbing TPB would depress the population or just cause it to move to the crop and thus be a worse problem. It was our hypothesis that we could manage headlands and weeds so as to provide a "sink" for TPB rather than a source. We didn't want to actively breed TPB but at the same time we needed to provide an alternative place (other than our crop) for TPB to go.

5. **What were your findings and accomplishments? Did you have unexpected results? If so what were they?**

Results from one year were very mixed. Some week's one spray seemed to depress populations while the next it would not. None of the sprays appeared to be effective at controlling TPB. But as in all research this left us with new questions and ways that we could potentially use and evaluate the sprays better. Each spray has a different mode of action and it wasn't until we were well into the experiment that we fully understood how each one works. Beauveria bassiana is an insect specific fungus. It is important to apply it well in advance of the presence or at least outbreak of the pest. It would best be applied two weeks prior to flowering. Neem is an insect growth regulator and repellent. It is not designed to kill the insect but rather restrict its growth and repel it. This also needs to used before an outbreak. Nettle tea, as we also found out latter is mainly a deterrent but its whole mode of action is not known. Spraying weekly starting very early has anecdotally found to effective with lettuce. Sabadilla is the only pesticide we used that is designed to actually kill TPB. But as we found it is not always very effective. Its effectiveness is also limited because TPB is highly mobile and your crop can be recolonized in a matter of days by other TPB. Sabadilla is also no longer or legally registered.

After a thorough examination of a seasons worth of data we came to several conclusions.

- Diverse unmanaged areas had high populations of TPB but also the most diverse community of insects including beneficial.

articles written about your project.

I spoke at the NOFA-NY wnter conference in Syracuse, NY and at the regional NOFA summer conference in Amherst, MA in August. Included is an article published in the local cooperative extension vegetable newsletter.

12. Complete the enclosed Final Financial Report Form

Enclosed.

- Plant species were more important than the height in mowed areas. Areas of clover had high TPB populations while the population was low in pure grass stands.
- TPB counts were highest in crops during and just following flowering.

Mowing appears to reduce TPB but to have an effect on the crop it is suspected that a very large area (300'+ to the crop) would have to be mowed because TPB is so mobile

6. **Is there any specific site information relevant to your project or the results?**

We are very isolated from other farms.

7. **What were your economic findings (if relevant to your project).**

We did not do specific economic analysis of our findings. But it was clear that simple techniques like sucession planting and mowing of old crops had very litlle cost and a high return (a marketable crop).

8. **Have the results from your project generated new ideas about what is needed to solve the problem you were working on? What would be the next step?**

Concerning the sprays, we plan to try the sprays again but by themselves, on larger areas, and timed to correspond with their particular mode of action. Because Sabadilla is no longer produced and very broad spectrum we are discontinuing its use. We encourage other growers to experiment with commercial and homemade sprays defining how to use them and what crops they are effective on. Concerning habitat modification we will focus on not providing unnecessary hosts or habitats. This past year we tried to keep in field weed hosts to a minimum. We also used more succession planting and mowed down plantings before they went to flower. This worked well for dill and cilantro- both crops we had had severe damage with in previous years. Despite very high population this past year we were able to have weekly harvests through the season.

9. **Will you continue to use the practice you investigated? Why or why not?**

Yes (see number 8).

10. **What do you tell other producers about your project and the results?**

We summarized our project and results to all interested growers. We told them we have no secret solution but there are may things they should try.

11. **Explain what you did in your outreach program. Please send a copy of any**

Organic Control and Management of Tarnished Plant Bug
-Michael and Karma Glos
Kingbird Farm (Berkshire, NY)

Tarnished Plant Bug (TPB) has been an increasing problem on our farm since we first started growing vegetable, herbs and flowers at our current location. TPB affects many of our crops and in some cases can make the entire crop unmarketable (cut flowers) or severely reduce marketable yield (dill and cilantro). As a certified organic farm with a commitment to organic methods we don't have available the standard options that make TPB less of a problem with conventional growers. Insecticides like Sevin, that are used for other pests, eliminate TPB before a grower even knows they have it.

To help with this problem we started asking other farmers, extension agents, and researchers what we could do to solve this problem. It quickly became clear that there was no known silver bullet and that many other growers had battled with this pest. We thus applied For a USDA Sustainable Agriculture Research and Education (SARE) Farmer/Grower initiated grant. This is a federal grant program that farmers can use to test out new techniques, research pest problems, and even try marketing tactics with the help of a financial grant. We proposed to test two different approaches on our farm. One was to evaluate different sprays on their effectiveness against TPB. The second approach was to look at the habitats that TPB like and modification of those habitats through mowing, weeding, and cultivation.

To begin we tried to develop a thorough knowledge of Tarnished Plant Bug. TPB is a small (.25") true bug. It is greenish brown with reddish brown on the wings. There is a small but distinct yellow-tipped triangle in the center of its back. It overwinters as an adult under leaf litter, stones, and tree bark. At the end of April the adults become active and lays eggs in crops and weed hosts. The overwintering population peaks around mid May in New York State but there are two to four indistinct generations that occur through out the growing season. Development from egg to adult takes 25-40 days. Weed hosts include pigweed and lambquarters and common susceptible crops include strawberries, many tree fruits, flowers, and vegetable crops including lettuce. The insect feeds by piercing and sucking. Catfacing occurs on strawberries while crops like dill become severly wilted with the flowers becoming deformed.

Our first approach involved using commercially available and homemade preparations. Historically Sabadilla has been the most common organic control but we had heard conflicting reports on its effectiveness and availability. From researching what was available and what had been used we came up with four different sprays: Beauveria bassiana (Naturalis L), Neem (Neemix 4.5), Nettle Tea (homemade), and Sabadilla (Necessary Organics Sabadilla Dust). In a plot of potatoes we sprayed each spray four times on one-week intervals. We began before flowering when we started noticing TPB and finished three weeks following flowering. We did insect counts just prior to spraying and the following day

Results from one year were very mixed. Some week's one spray seemed to depress populations while the next it would not. None of the sprays appeared to be effective at controlling TPB. But as in all research this left us with new questions and ways that we could potentially use and evaluate the sprays better. Each spray has a different mode of action and it wasn't until we were well into the experiment that we fully understood how each one works. Beauveria bassiana is an insect specific fungus. It is important to apply it well in advance of the presence or at least outbreak of the pest. It would best be applied two weeks prior to flowering. Neem is an insect growth regulator and repellent. It is not designed to kill the insect but rather restrict its growth and repel it. This also needs to used before an outbreak. Nettle tea, as we also found out latter is mainly a deterrent but its whole mode of action is not known. Spraying weekly starting very early has anecdotally found to effective with lettuce. Sabadilla is the only pesticide we used that is designed to actually kill TPB. But as we found it is not always very effective. Its effectiveness is also limited because TPB is highly mobile and your crop can be recolonized in a matter of days by other TPB. Sabadilla is also no longer or legally registered.

Our second approach was through habitat modification. We monitored TPB (with traps, visual counts, and sweep nets) over the season to learn how the population changed in response to mowing of headlands, mowing of cover crops, cultivation of weeds and cultivation of cover crops. We monitored populations in the crop and in the modified areas. We attempted to see if habitat modification could have a significant effect on controlling TPB. We were interested in whether disturbing TPB would depress the population or just cause it to move to the crop and thus be a worse problem. It was our hypothesis that we could manage headlands and weeds so as to provide a "sink" for TPB rather than a source. We didn't want to actively breed TPB but at the same time we needed to provide an alternative place (other than our crop) for TPB to go.

After a thorough examination of a seasons worth of data we came to several conclusions.

- Diverse unmanaged areas had high populations of TPB but also the most diverse community of insects including beneficial.
- Plant species were more important than the height in mowed areas. Areas of clover had high TPB populations while the population was low in pure grass stands.
- TPB counts were highest in crops during and just following flowering.
- Mowing appears to reduce TPB but to have an effect on the crop it is suspected that a very large area (300'+ to the crop) would have to be mowed because TPB is so mobile.

In conclusion, despite not finding a new silver bullet, we did find out many things that we believe will help others and us in control and management of this difficult pest. Concerning the sprays, we plan to try the sprays again but by themselves, on larger areas, and timed to correspond with their particular mode of action. Because Sabadilla is no longer produced and very broad spectrum we are discontinuing its use. We encourage other growers to experiment with commercial and homemade sprays defining how to use them and what crops they are effective on. Concerning habitat modification we will

focus on not providing unnecessary hosts or habitats. This past year we tried to keep in field weed hosts to a minimum. We also used more succession planting and mowed down plantings before they went to flower. This worked well for dill and cilantro- both crops we had had severe damage with in previous years. Despite very high population this past year we were able to have weekly harvests through the season. We encourage other organic farmers to continue to work and share their knowledge on managing this pest.