

OSDP Project I-082 Bindweed Mite Trail Final Report

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Introduction

This on-farm research project was approved by the Organic Sector Development Program in July 2007. The total project cost was \$2,500, of which half (\$1,250) was to be contributed by the OSDP and half (\$1,250) was to be contributed by Hartwood North Farm (project applicants). There was no in-kind contribution included in this project.

Upon conditional approval of the OSDP, we worked with the COABC Organic Extension Agent (Rochelle Eisen) to develop a research plan for this small on-farm research project. Please see appendix A, Bindweed Mite Trial Results for details of the Research Plan. We received the mites in June of last year, and conducted the trial according to the research plan.

Financial Report

Income

Details	Projected Income	Actual Income
Hartwood North Farm	\$1,250	\$1,250
OSDP	\$1,250	\$625.00
Totals	\$2,500	\$1,875*

Expenses

Details	Proposed Expenses	Actual Expenses
Mite Galls	\$2,000	\$2,100
Wages to weed plots	\$0	\$367.41
Fencing & markers	\$300	\$32.59
Totals	\$2,500	\$2,500

*We are still owed \$625 from the OSDP; due on acceptance of this report.

Variances

We needed to spend some funds for weeding the plots (which we had not planned for), and spent much less on fencing than we anticipated. In the end, the final cost of the project was unchanged.

Conclusion

Though the results were (at this point) inconclusive, we are happy that we invested time and money into this project and we feel that the knowledge gained from the experiment represents good value for the OSDP. We hope that the results of our project (published in the BC Organic Grower) will encourage other farmers to develop on-farm research projects.

THE BINDWEED MONOLOGUES

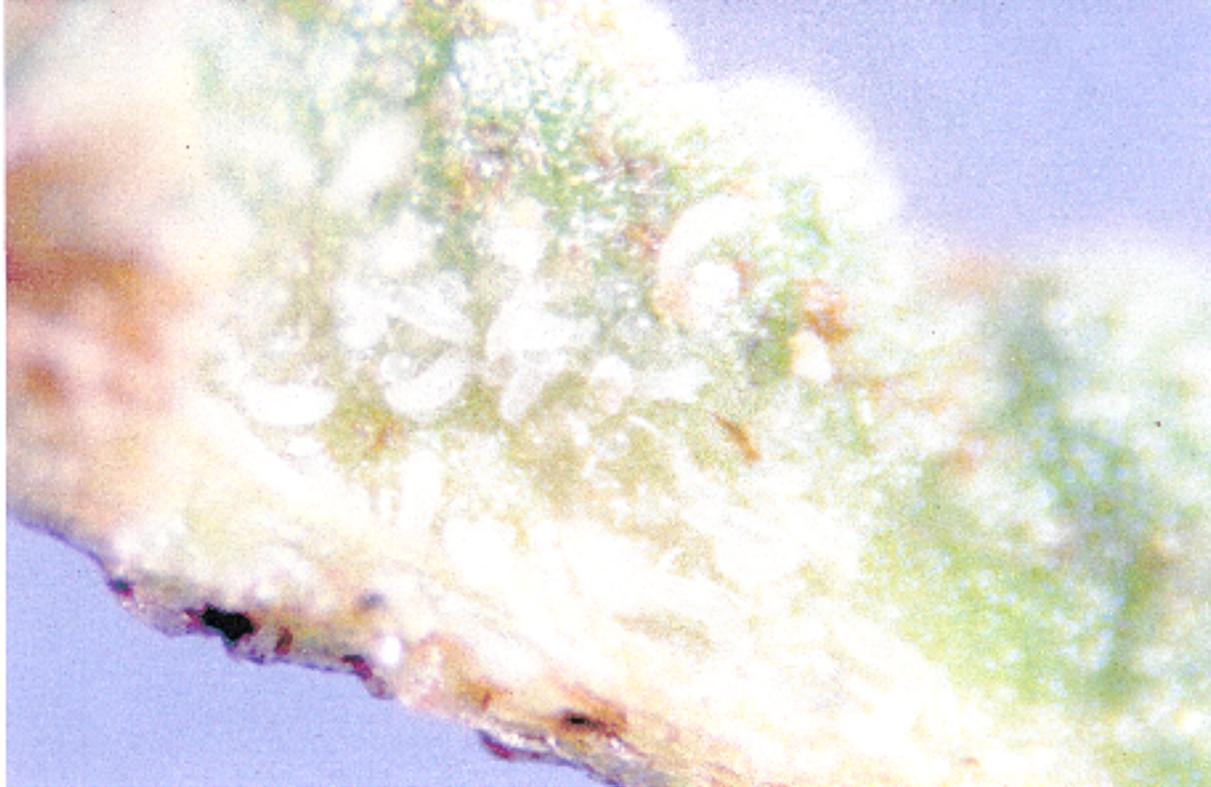
I never thought I'd see the day that I would be weeding out everything but Field Bindweed from a planting bed.

My husband Malcolm and I bought a wonderful 67 acre farm 5 years ago after many years of dreaming of escaping our city life. With a lot of stored up energy and enthusiasm we embarked upon what turned out to be far too many projects at once. Somewhere between the renovation of our 100 year old house, raising a young family and settling in to our new community, we planted vegetables, cut flowers and fruit trees, went to farmers' markets, raised sheep and chickens, started a vineyard, managed a grain field, obtained certified organic status and worked several part-time jobs.

During our first summer we noticed a couple of unfamiliar weeds in the vegetable garden, one of which became our nemesis. European Field Bindweed or *Convolvulus arvensis*, considered to be one of the most problematic weeds of agriculture in British Columbia and being considered for inclusion into the Invasive Plant - Biocontrol agent program, flourishes on our farm and shows very few signs of being knocked back by our many attempts at control. It is particularly awkward in cutflower beds as it twines up long stems and into shrubs such as Lavender, which involves regular complete weeding before harvests. Vegetables such as potatoes are smothered, and seedbeds are quickly covered up. Just a few days after hoeing, the intensive root systems which can be several meters deep push their way up to the soil's surface again.

We became quite depressed about this weed a couple of years ago and after considering altogether giving up vegetable/flower production, which we love, we decided to explore all possible organic control options. COABC extension agent Rochelle Eisen, seeing that we were slowly burning out, researched possible biocontrol measures and encouraged us to obtain funding from the organization to trial the European Gall Mite (*Aceria malherbae*). This microscopic mite originated in Thessalonika, Greece, and has been trialed in parts of the world showing some promise, however none that were conclusive in British Columbia. We opted to apply for the funding from COABC'S OSDP program and to trial the mites in a small area on our farm.

These microscopic worm-like mites lay round translucent eggs into the galls created by their feeding every 10 days between May and November. Adults and nymphs feed on upper leaf surfaces, and development occurs within the galls, thereby stressing the plants.

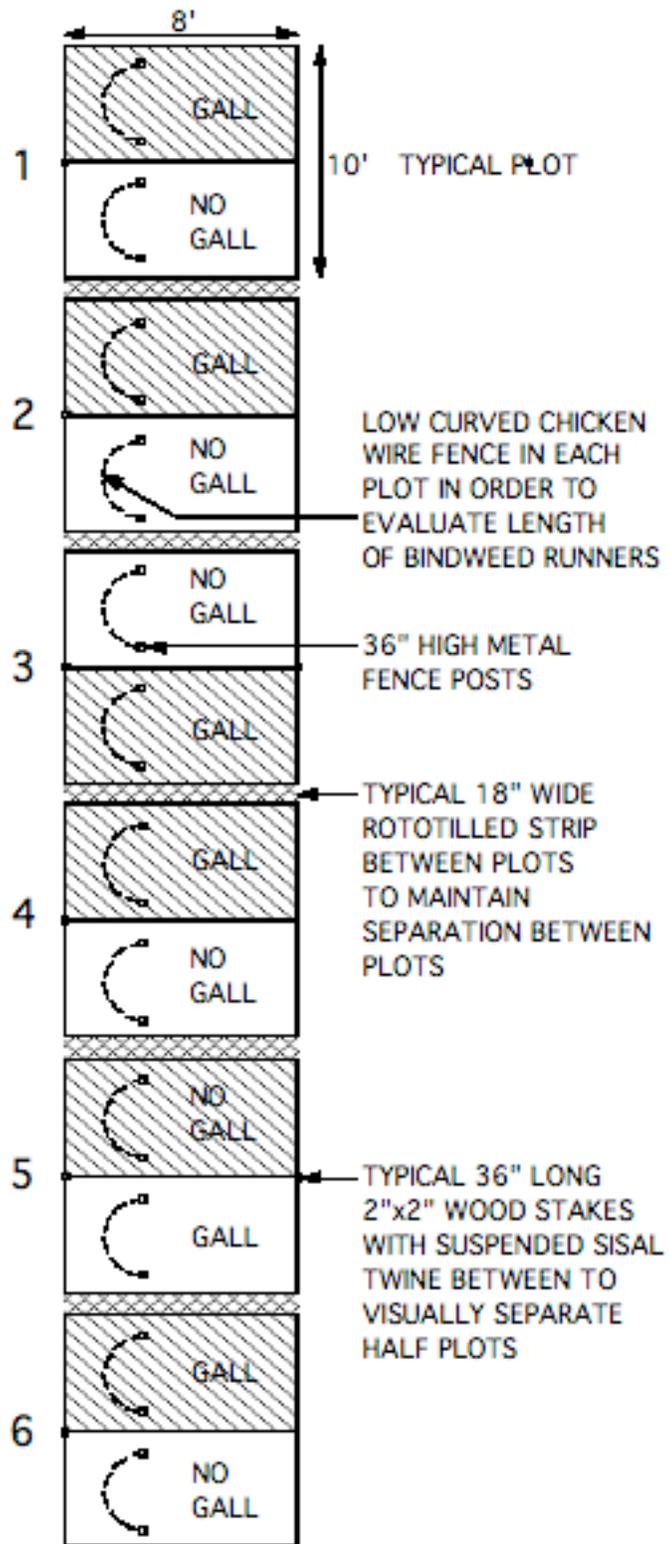


CLOSEUP OF MITES
(photo credit Alec McClay)

The mites were ordered in the fall of 2007 and delivered in early June 2008 by Alec McClay of McClay EcoScience. Alec collected the mites from a site of heavy infestation in Medicine Hat, Alberta, shipped infested leaves to us in containers with ice packs, and we scattered them carefully over our plots. The plots had been prepared ahead according to the drawing below, using a paired comparison design. Each of the 6 plots was about 8'x10', with 2 halves randomly selected to have either mites or no mites. A short, curved chicken wire fence was constructed into each half-plot, in order to evaluate the length of the bindweed runners as the trial progressed.

Not an hour after the mites were scattered a heavy rainstorm tore through the valley and we raced to cover the plots with plastic in order to prevent the mites from being washed off. The next morning the sun shone again, we removed the plastic, observed and waited. And waited. And tried to be patient and waited.

PAIRED
COMPARISON
DESIGN





TYPICAL NUMBERED 8'X10' PLOT SHOWING CHICKEN WIRE SUPPORTS AND ROTOTILLED SEPARATIONS, READY TO RECEIVE THE EUROPEAN GALL MITES



SCATTERING MITES INTO THE PLOTS IN MAY 2008

In accordance with the recommendations of McClay EcoScience we regularly watered the plots via overhead sprinkler, as mites apparently slow down during hot, dry weather. Several times throughout the summer we weeded out Pigweed, Lamb's Quarters, Thistle and Green Foxtail. We checked for any signs of possible Gall Mite establishment in the half-plots such as reduced vine length, thickened fuzzy-textured, distorted or yellow leaves, or reduced flowering. Rochelle Eisen and Sandy Cesselli, Provincial Field Biocontrol Technician from the Ministry of Forests and Range, Biocontrol Development Program, Kamloops, inspected the plots twice throughout the summer, after which we concluded that there appeared to be very little or no establishment evident. Bindweed in two of the plots appeared to have thicker, more leathery leaves and we can only hope that this is more apparent next season, as supposedly it is one of the key indicators of establishment. We had also scattered mites onto several other small specific control areas on the farm and see no signs (yet). We have decided to be optimistic that the mites need time to 'settle in' and will maintain the plots at least until the end of the 2009 growing season. Half of the plots (gall side only) are now

covered with straw to ensure at least partial overwintering in a more protected environment.



ROCHELLE EISEN AND SANDY CESSELLI INSPECT PLOTS FOR EVIDENCE OF MITES IN SEPTEMBER 2008

In the meantime, we are using several other control methods including black plastic mulch (so far the most effective, with the exception of the cut holes), wood chip mulch, regular wheel-hoeing, solarizing (this looked promising for a full season until the Bindweed grew back) and smother crops such as Clover and Rye Grass.

In late September we were fortunate enough to host Timothy Miller, Weed Extension scientist from the Washington Department of Agriculture at our farm on one of NOAA's regular summer farm visits. After a visit to the farm of Robert and Kathryn Hettler, a well-established vegetable/small fruit farm in Spallumcheen, over 25 NOAA and PACS members continued the informal seminar/tour which focused on organic weed control measures. Timothy, and other seasoned farmers, discussed the pros and cons of several control methods. The Washington State Dept. of Agriculture is exploring the merits of using clove

oil and acetic acid which are sprayed directly onto weeds, Oilseed Radish as a green manure and Mustard Seed meal as a mulch.

Malcolm and I have decided to use our mixed farm operation to its full advantage during the upcoming season, and to do more rotations with our sheep. We've already cultivated a section of pasture which appears to be Bindweed-free, and this will be planted with potatoes, squash and ornamental Sunflowers in the spring as a trial. We plan to graze the sheep on now-fallow vegetable plots, which will provide fertilizer as well as (hopefully) control the Bindweed, which they seem to love eating as much as regular grass or hay.

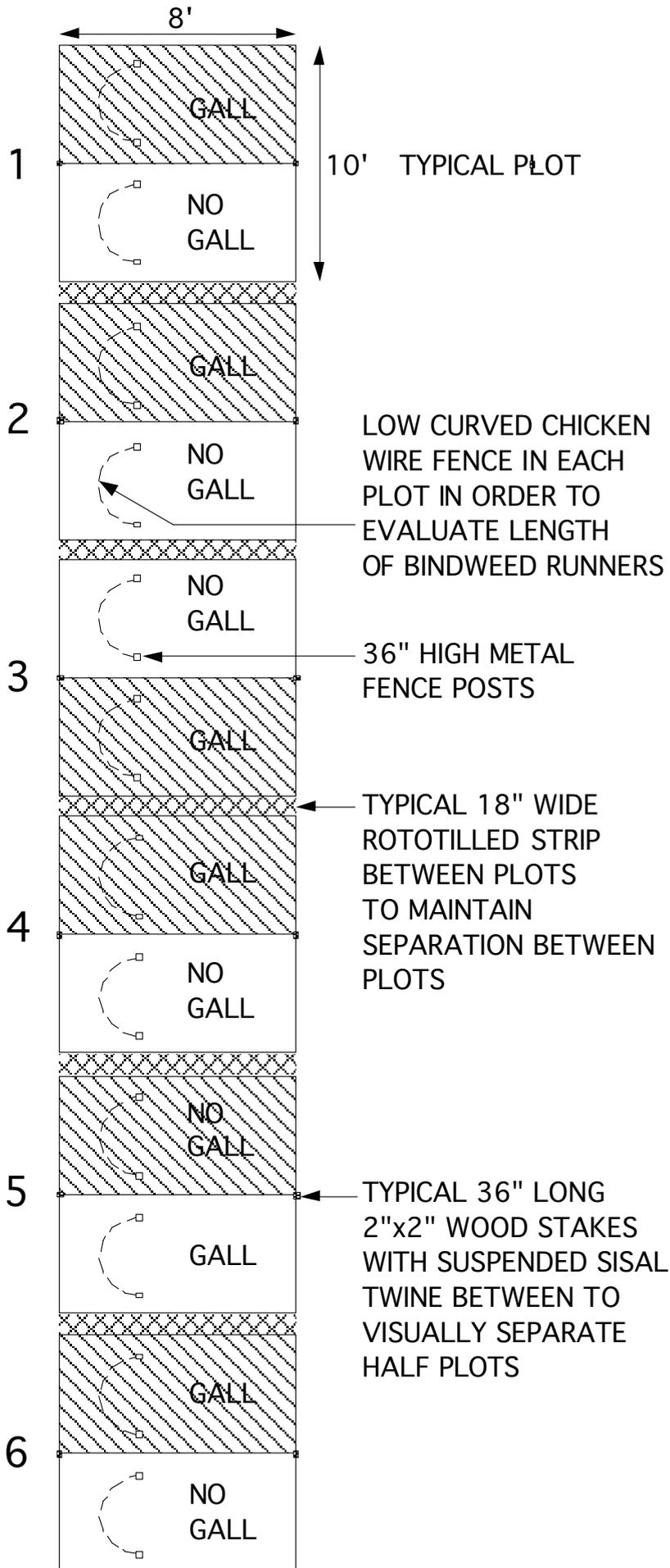
This research project appears to be a long-term commitment for us. In the past, information sources indicate *A. malherbae* requires manual redistribution and, therefore, can be quite labour intensive to disperse, however, recent reports show the mites are dispersing by wind. Studies in the USA have shown the mite to be well established in Arizona and Texas. There are also reports that it may prefer to be in habitats similar to where diffuse knapweed grows. This newly acquired information is welcomed and will be used in further *A. malherbae* development studies and treatments. Cesselli indicated that this biocontrol treatment has been applied and maintained in such a manner that it offers some hope. She mentioned that bioagents often initially establish at very low populations, which can be difficult to detect in a field environment. Once the population reaches a higher level they may then be found with less intense efforts. It is possible that the mite collection site (Alberta) was several weeks behind the new host plant site (B.C. Interior), therefore their development was out of sync, possibly reducing the success of this transfer.

Cesselli is pleased that her program has this site to check on a regular basis and will return for inspections in 2009 and beyond if necessary. She would like to visit the site early in the growing season, about the time that the plants are under 10 cm tall, suspecting that early leaves may show the signs of attack easier than the later growth. She believes that the more dense the patch is the better chances are for long-term survival.

Rochelle Eisen is considering generating a survey with the help of Linda Wilson, B. C.'s invasive weed expert sometime during 2009, so that the impact of Field Bindweed on agriculture can be more accurately assessed. This would help to set invasive plant priorities.

Stay tuned . . .

PAIRED COMPARISON DESIGN



Hartwood North Farm, Armstrong, B.C.

Gall Mite Study Research Plan (2008)

Study Area:

- 8'x60' long irrigated area of well-established Field Bindweed at rear of cut flower garden (see site plan attached), on approximately 10% south-facing slope

Materials:

- Gall mites (supplied by McClay Ecoscience, Sherwood Park, Alberta, 780-464-4962)
- 48" long metal fence posts and 36" wide chicken wire
- 36" long 2"x2" wood stakes and sisal string line between

Experimental Design:

- There will be 6 designated randomly placed plots, each 8'x10' within 60' long area, with each plot containing a 'gall' and 'no-gall' side of equal size (see paired comparison design attached). Each half-plot will have a curved section of 36" high chicken wire fencing supported by 2 - 48" long metal fence posts, driven 12" into the ground. This will provide additional means of evaluating Bindweed growth which bears all orientations to light sources. Suspended string lines will be used to visually separate half-plots.
- Individual plots will be labelled accordingly (to be hung on fence behind experimental area).
- Between March and May of 2008 as availability permit, gall mites will be scattered evenly over 'gall' test plots.
- 18" wide strips between plots will be rototilled regularly to maintain separation.
- Plots will be irrigated regularly to ensure survival of mites, and will otherwise be left undisturbed for the duration of the growing season.
- Photographic documentation will be done on a bi-weekly basis once the Bindweed starts to grow. One photograph will be taken of each split plot (total of 6).

Evaluation:

- Plots will be evaluated in October of 2008 on the basis of Bindweed density, general appearance/health, colour, leaf size and flower development. Growth on the chicken wire fencing will provide another means of measuring runner quantity and length. Due to a concern that digging up Bindweed may disturb the mites to the extent that they do not over-winter for the 2009 season, only a visual comparison will be done at this time.

