



Mowing Combined with Biological Control for Field Bindweed Management

G. J. Michels, Jr.
Texas AgriLife Research
2301 Experiment Station Road
Bushland, Texas
79012



Aceria malherbae, the “bindweed mite”

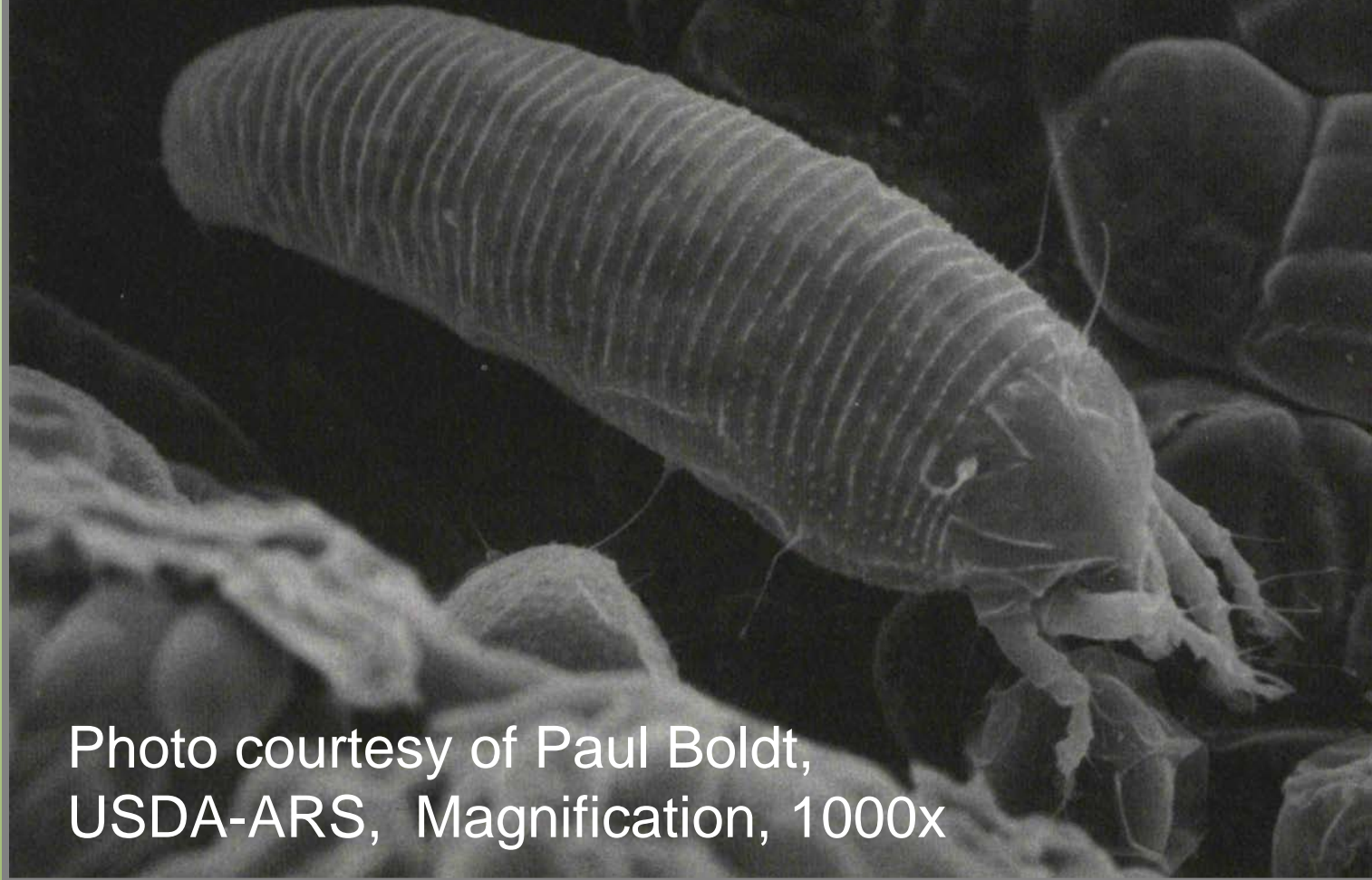


Photo courtesy of Paul Boldt,
USDA-ARS, Magnification, 1000x

Damage Symptoms and Life History

- The mite galls the plants, causes leaf distortion, reduces flowering and seed set
- The mites overwinter on the rhizomes, and move to new growth in the spring
- It is unknown if the mites are wind-blown as with other Eriophyidae, or if travel is exclusively plant-to-plant

Typical Leaf Distortion



Severe Injury



Normal flowering bindweed



Infested flowering bindweed



Bindweed mites on roots



History

- The bindweed mite, *Aceria malherbae*, was collected in Greece in 1988 and 1989, and passed through quarantine at Temple, Texas
- The mite attacks and damages field bindweed, and can be found on morning glory and hedge bindweed, but does not cause damage to the latter two species.
- The mite was introduced to the Texas Panhandle by Paul Boldt (USDA-ARS) in 1989 at Bushland, Texas

History

- Successful establishment was reported in 1993 (Boldt & Sobhian, Environ. Entomol. 22: 234-237).
- Although established, the mite spread very slowly. By 1996, it had moved less than 500 meters from the release site
- However, in 1998, we were contacted by Mason & Hanger Corp. at Pantex (a Dept. of Defense Installation) near Amarillo to try an establishment at their facility

History

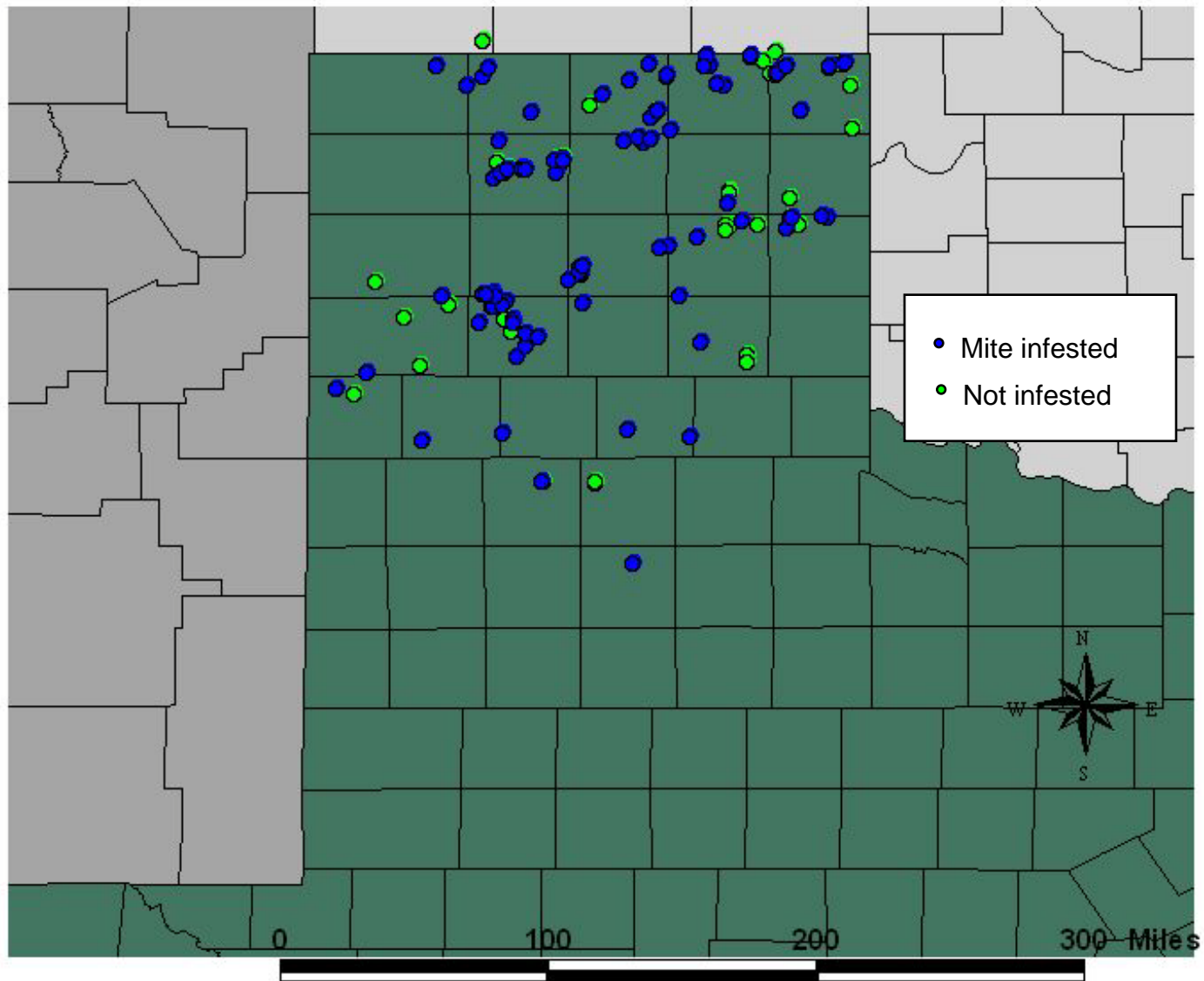
- The mites were released at six sites at Pantex in July of 1998
- Most of the sites were inadvertently mowed 10 days later, and we thought the experiments were ruined
- To our surprise, mowing spread the mites (supposedly on clippings) throughout the release sites

History

- Within three weeks of the initial release, the mites at one site had moved over 100 meters
- In addition the mites were found infesting bindweed at several other sites around the Pantex installation
- We believe they were distributed by mowing equipment and personnel carrying mites on clippings or on their clothes

History

- Finding that that the mites could be spread by mowing gave us a viable tool with which to manage the mites.
- In 1999 we started making our own releases in the Panhandle
- 2002 we started a distribution program in the Texas Panhandle and with other scientists in Texas, New Mexico and Oklahoma.



Bindweed mite releases and establishment 1999-2003.

Year	New releases	Total sites	Sites examined	Sites infested	Percentage infested
1999	119	119	58	58	100
2000	55	174	167	115	69
2001	1	175	158	115	73
2002	2	177	56	50	89
2003	0	177	175	139	79

Between 1999 and 2003, 177 sites were established in the Panhandle. In 2003 we surveyed all sites and 79 percent were found to be infested. After 2003 we lacked funding to continue yearly surveys.

Distribution Program

- The mites were made available to producers, researchers, and extension agents if they agreed to fill out a survey and allow their release sites to be monitored for establishment



Distribution Program

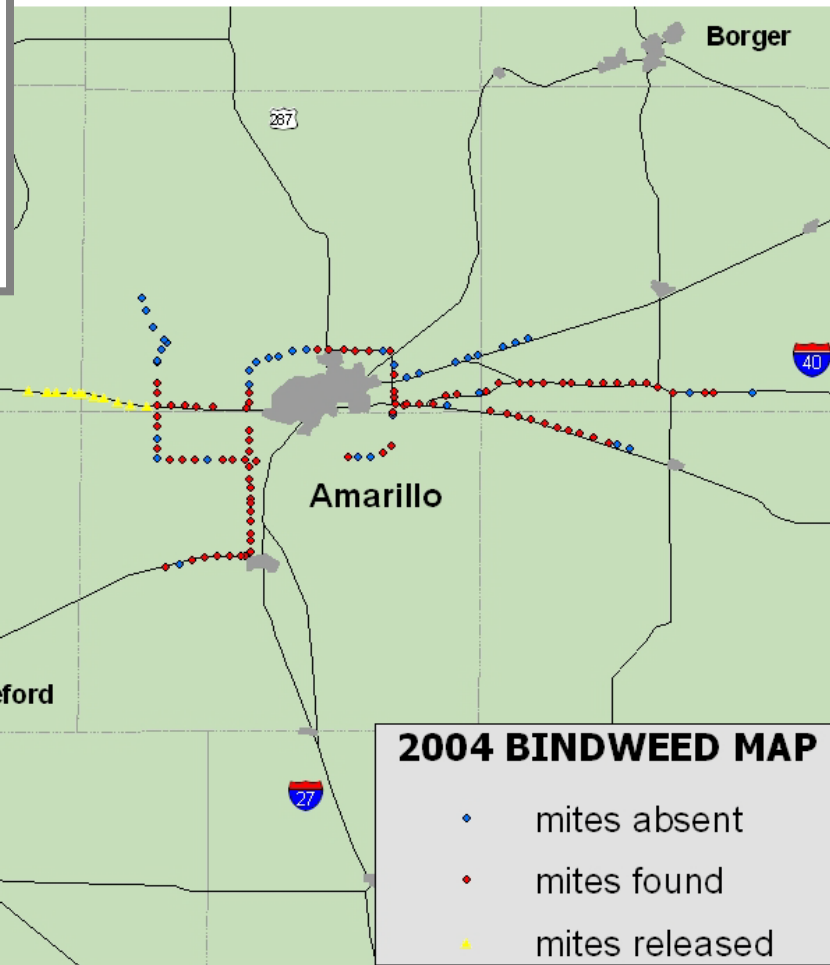
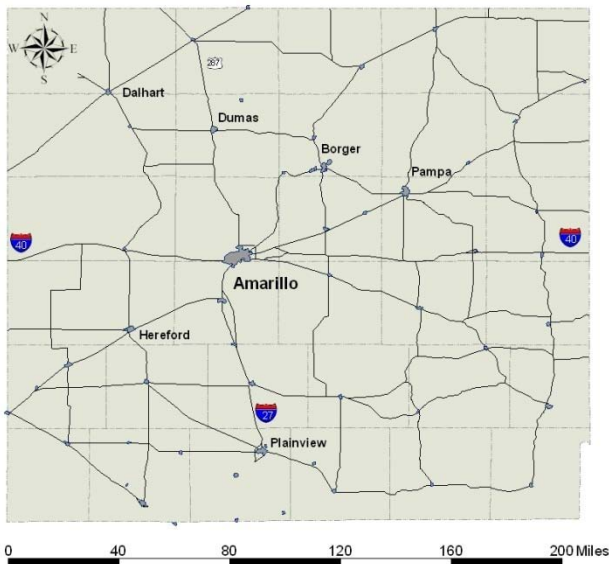
- In 2000 we cooperated with Texas Cooperative Extension to deliver mites to all county agents in the top 23 Panhandle counties to establish nurseries.
- As of the fall of 2001, mites were established in 18 of 21 (86%) counties that reported, and nurseries were available in the spring of 2002 in eight of those counties (about 40%).
- Since 2002, the number of nurseries has varied depending on County Agent interest and demand.

Distribution Program

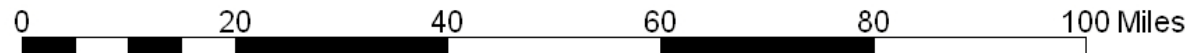
- Over the years we became convinced that mowing, or at least some way of chopping and spreading mite-infested bindweed clippings was the best management practice.
- Using the mites for biological control of bindweed was not a release a forget process in most cases. Periodic mowing dramatically increases the mites' impact.

Land type	Total sites	Total infested	Percentage infested
CRP mown	6	6	100
CRP undisturbed	15	14	93
Cultivated Fields - fallow	14	10	71
Cultivated Fields - plowed	6	3	50
Lawn - mowed	19	19	100
Pasture - grazed	5	2	40
Pasture - ungrazed	11	10	91
Roadside - mown	47	43	91
Roadside - unmown	6	3	50
Totals	129	110	
Average			76

Out of 155 samples, 101 (65%) were infested with the mite



Sixteen new releases were made along I-40 west of Amarillo



Storing Mites on Clippings

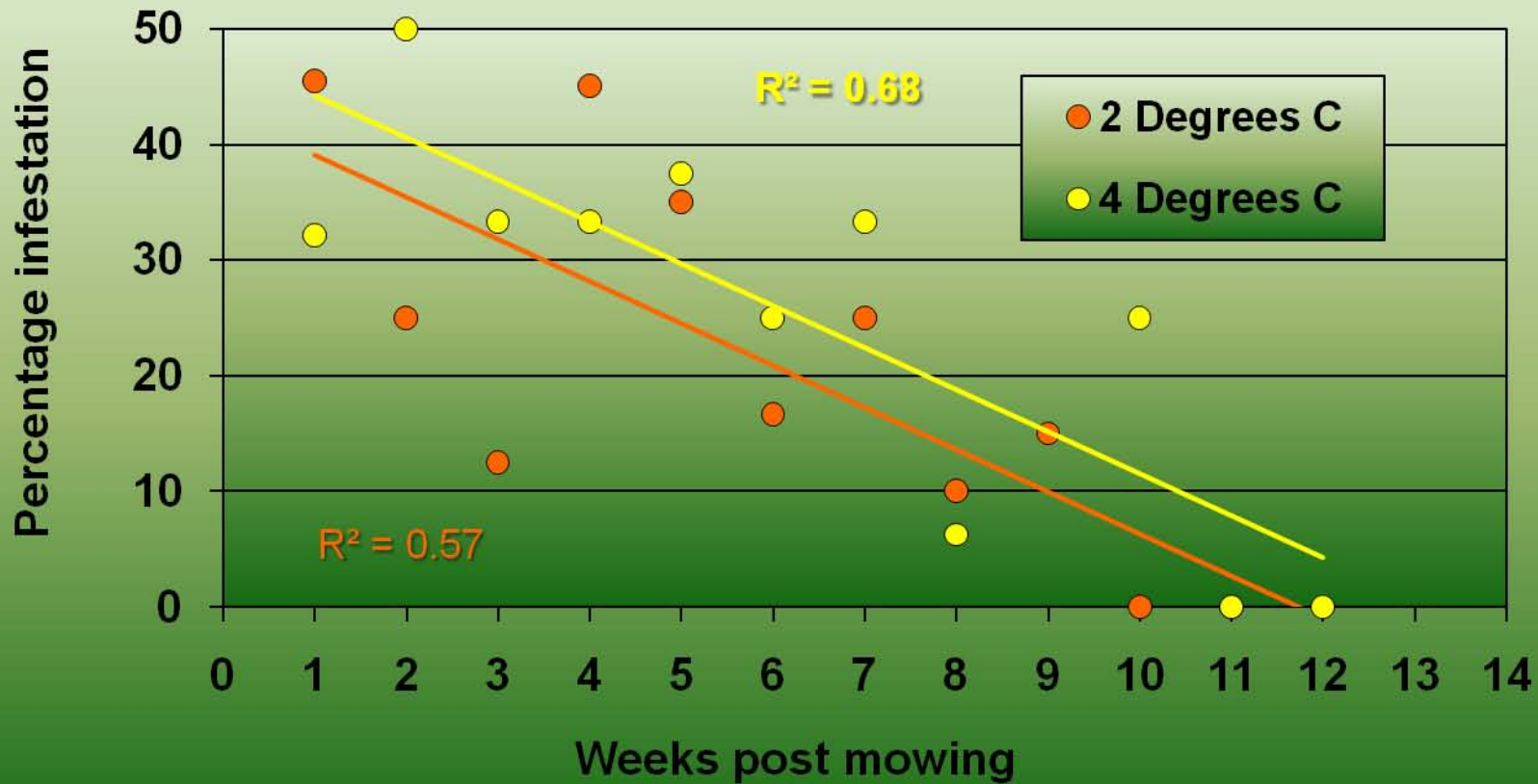
- So, if mowing increases the spread of bindweed mites, it made sense that the mites can live on clippings for some period of time.
- Therefore we looked at how long they could survive on clippings when refrigerated. The idea being that storing the mites on clippings could be a valuable way to collect, store and transport the mites.

Mowing bindweed



Adding clippings to
bindweed

Bindweed Mite Survival on Bindweed Clippings at Two Storage Temperatures



Current Activities

- We continue to make releases as feasible, cooperating with other agencies.
- We have made numerous releases on Federal Installations in Colorado associated with a biological control of weeds program we have there.

Future Directions

- Examine the effect of the bindweed mite on field bindweed starch reserves. Do the mites cause stress other than direct damage?
- Interactions with herbicides. Can herbicides that burn back the plants but not kill them be used in conjunction with the mite?

Conclusions

- The program has been very successful, and the mites are generally well distributed in a number of places in the Texas High Plains.
- Other release sites, and close cooperation with other agencies is sought.
- Basic mite biology and ecology needs to be explored.