A sampling plan for two-spotted spider mites in mint

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The two-spotted spider mite, *Tetranychus urticae* Koch, is a major pest of peppermint and spearmint in Oregon, Washington, and Idaho, east of the Cascade Mountains—and in southwestern Oregon, where hot, dry weather contributes to mite outbreaks.

The mite is also an occasional pest in Oregon's Willamette Valley.

Spider mites feed on the contents of leaf cells, slowing down photosynthesis and increasing water stress.

Early signs of mite injury appear as small silver or yellow spots on the upper surface of the mint leaf. Damage caused by high densities of mites resembles water stress. Leaves turn brown and eventually drop.

Spider mite populations are highly clumped. Population buildup occurs in localized areas called *hotspots*. As the mite population increases, the hotspots enlarge.

Mite populations may severely damage one or more areas of a field—and leave other areas of the same field uninfested.

Sampling method

Begin casual inspection for mites when plants emerge in the spring. Choose areas of your field that have a history of mite problems, as well as the drier and dustier areas, including field borders.

Later in the season, as the potential for mite outbreaks increases (during late June, July, and August), begin a weekly sampling schedule to determine the need for chemical control.

It is important to inspect as many areas of your field as you can—to detect possible hotspots when you sample for spider mites. Prepare a simple map of the field (figure 1) and keep a record of mite densities in the areas you sample.

Counting individual mites on leaves is tedious and time-consuming. We offer here a method of sampling for two-spotted spider mites in mint, based on the number of mite-infested leaves, that reduces the time and effort you'll need for sampling.

Walking a Z- or M-shaped pattern through the field (figure 1) increases the likelihood that you'll sample widely separated areas. Take a number of leaf samples along the way. We recommend sampling approximately 10 to 14 sites for every 30 acres.

A sample consists of 45 leaves at each site: you select 15 leaves each from the top, middle, and bottom thirds of the mint canopy. Select leaves from an area approximately 10 feet by 10 feet. Determine whether 5 or more mites are present on each leaf by inspecting the underside of each leaf with a 10X hand lens.

Don't count *all* the mites. *It's only necessary to check that the leaf has 5 or more mites.* Don't count eggs.

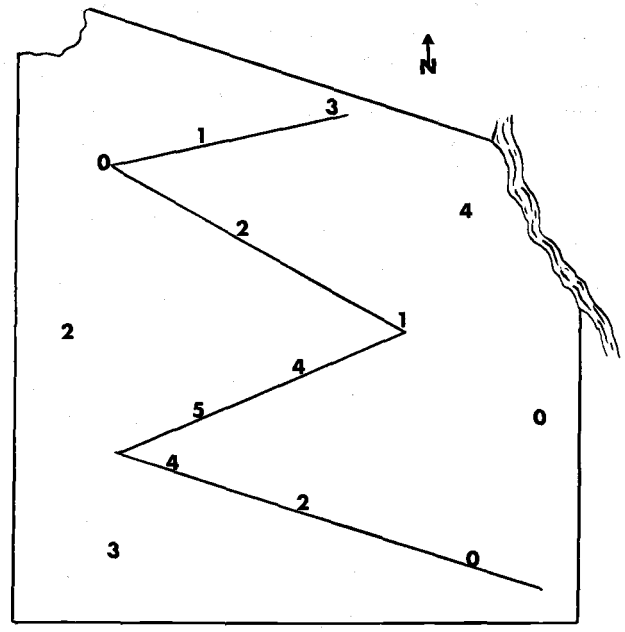

Figure 1—*Example of a field map, showing an M-shaped sampling pattern and mite densities*

Use table 1 to work out your estimate of the per-leaf mite density after you've recorded the number of leaves infested with 5 or more mites. For example, 7 leaves with 5 or more mites from a sample of 45 leaves provides an estimate of 2.5 mites per leaf.

The "90% prediction interval" entry for this estimate tells you that 9 times out of 10, the mite population will be between 0.3 and 4.8 mites per leaf.

So you could be relatively sure that the population has not exceeded 5 mites per leaf if only 7 leaves of a 45-leaf sample had 5 or more mites.

We recommend that, as you walk the sampling pattern and estimate mite densities, you also draw a simple map of the field showing mite densities (figure 1). Comparing maps from successive sampling days will help you identify areas where mite populations are increasing within your field.

You should also observe the numbers of mite eggs and predators. Use your figures as indicators of potential mite buildup or decline.

During hot and dry weather conditions, mite populations can increase rapidly. Sample your field twice each week when the weather is hot and dry.

Table 1—*Estimated mean density and 90% prediction interval of two-spotted spider mites in mint*

No. leaves with 5 or more mites	Predicted mean	90% P.I.
0	0.0	0-2.1
1	0.6	0-2.6
2	1.0	0-3.0
3	1.4	0-3.4
4	1.7	0-3.8
5	2.0	0-4.1
6	2.3	0.1-4.5
7	2.5	0.3-4.8
8	2.8	0.5-5.1
9	3.0	0.7-5.4
10	3.3	0.8-5.7
11	3.5	1.0-6.0
12	3.7	1.1-6.3
13	3.9	1.2-6.6
14	4.1	1.3-6.9
15	4.3	1.4-7.2
16	4.5	1.5-7.5
17	4.7	1.6-7.8
18	4.9	1.7-8.1
19	5.1	1.8-8.4
20	5.2	1.8-8.6
21	5.4	1.9-8.9
22	5.6	2.0-9.2
23	5.8	2.0-9.5
24	5.9	2.0-9.8
25	6.1	2.1-10.1
26	6.2	2.1-10.4
27	6.4	2.1-10.7
28	6.6	2.1-11.0
29	6.7	2.1-11.3
30	6.9	2.1-11.7
31	7.0	2.0-12.0
32	7.1	2.0-12.3
33	7.3	2.0-12.6
34	7.4	1.9-12.9
35	7.6	1.9-13.3
36	7.7	1.8-13.6
37	7.9	1.7-14.0
38	8.0	1.7-14.3
39	8.1	1.6-14.7
40	8.3	1.5-15.1
41	8.4	1.4-15.4
42	8.5	1.2-15.5
43	8.7	1.1-16.2
44	8.8	1.0-16.6
45	8.9	0.8-17.0

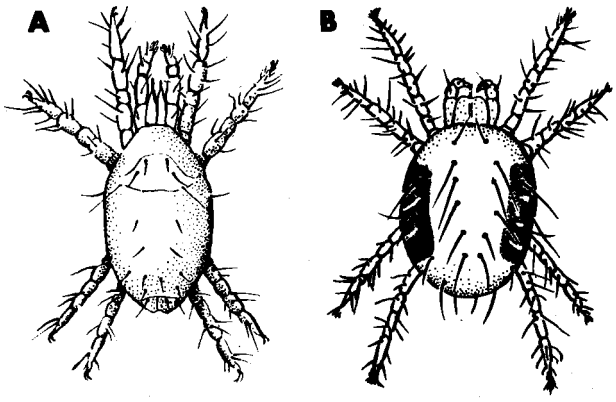

Figure 2—*(A) a typical predator mite; (B) the two-spotted spider mite*

Suppressing the mite population

Native predators aren't common in commercial mint fields, probably because of disruptive agricultural practices such as pesticide application, plowing, and flaming. Predators may be useful to control spider mites, but only if your management practices include conserving predator populations.

Predators include minute pirate bugs, lacewings, lady beetles (often small and black), and predator mites.

You can distinguish predaceous mites (figure 2a) from spider mites (figure 2b) by their light brown color and their active, searching behavior. An average of 0.5 predator per leaf will likely keep the mite population below the treatment level.

Mite populations often build up along field margins and in areas of the field that have not been fall-flamed. Sandy areas of the field and areas that receive inadequate irrigation or have sparse stands are also susceptible to mite outbreaks.

Moisture stress leaves mint more open to attack by spider mites. Sample these areas, which do not necessarily reflect the condition of the entire field, and use them as indicators of the potential for mite outbreaks within a field.

Treatment levels

The estimated treatment level in mint for two-spotted spider mite is an average of 5 mites per leaf after sampling all sites in a field. Research has shown that if spider mites exceed 5 per leaf, populations can build up rapidly, and serious damage could occur before treatment.

Fields that are plowed and/or flamed in the fall generally have lower spider mite populations the following spring. These cultural practices delay mite population development by as much as 30 days during the summer.

In some fields, mite populations will not reach the treatment level of 5 mites per leaf and will not require treatment. In some instances, spot treatment for spider mites will be adequate for season-long control and will reduce the cost of treatment substantially.

If sampling indicates that treatment is necessary, treat infested areas with a registered acaricide. See the *Pacific Northwest Insect Control Handbook*, current edition; single copy, $15.00 plus postage from Bulletin Mailing Room, OSU, Corvallis 97331, *or* Bulletin Dept., Cooperative Extension Service, Cooper Publications Bldg., Washington State University, Pullman, WA 99164-5912.

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