



Sampling for Sorghum Headworms in Oklahoma Using the Headworm Decision Support System

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The Sorghum Headworm Decision Support System <http://entoplp.okstate.edu/shwweb/index.htm> is a tool for sorghum producers, crop consultants and others involved in sorghum insect pest management. The system was designed by the USDA Agricultural Research Service, Oklahoma State University, West Texas A&M University and Kansas State University. The system can help identify sorghum pests and learn more about their biology. Most importantly, it can assist in determining an economic threshold for headworms in sorghum fields. Headworm is a general name for two caterpillars that infest the whorls and grain heads of sorghum plants.

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: <http://osufacts.okstate.edu>

- Common Names:** Corn earworm (above right)
Fall armyworm (below right)
- Damaging Stage:** Larvae
- Plant Part Attacked:** Whorl, Panicle
- Development: Complete:** egg, larva, pupa and adult
- Generations per year:** two to six, depending on species

Nature of Damage: In the whorl, small caterpillars feed and cause "windowpaning," and as they grow larger, they cause shotholes. Although this may look dramatic, leaf damage usually does not reduce yields greatly, and control of larvae during the whorl stage is seldom economically justified. In panicles, they feed and damage developing seed. One headworm can consume about 0.01 pounds of grain during its life.

When to Scout: Scout every three days to five days from full panicle emergence until hard dough stage. (See Example of Quick Count Sample Plan on next page):

Photos courtesy Phil Sloderbeck, Kansas State University



Photo courtesy of University of Nebraska



Windowpaning

Photo courtesy Phil Sloderbeck, Kansas State University



Shotholes

Photo courtesy Phil Sloderbeck, Kansas State University



Panicle Feeding

Sorghum Headworm Quick Count Sampling Plan

The Sorghum Headworm Decision Support System can help identify sorghum pests, learn more about their biology and determine the economic threshold for headworms in sorghum fields. You can print out other sequential sampling forms for use in sampling your field.

Go to entopl.okstate.edu/shweb/index.htm for more forms!



Directions for using the Quick Count:

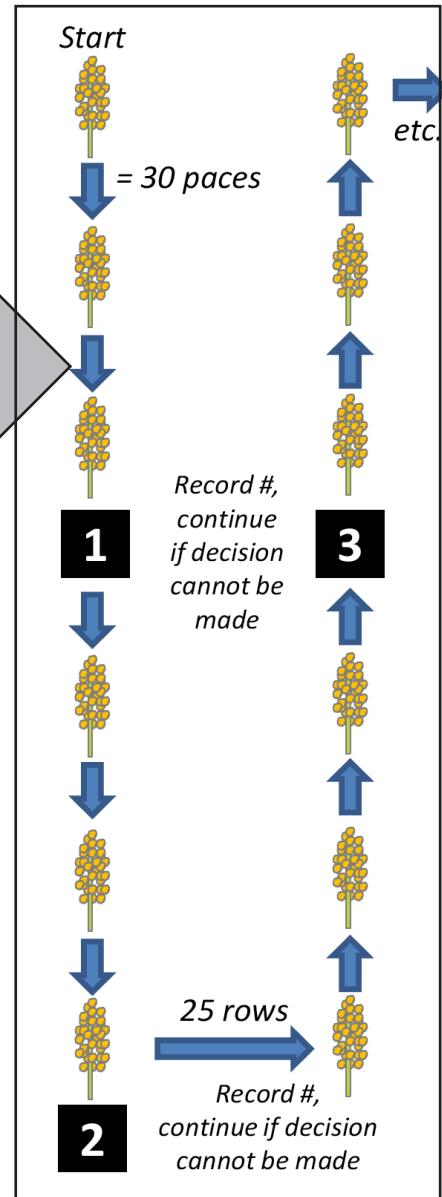
1. Walk at least 15 feet to 20 feet into the sorghum field to begin sampling in one row.
2. Grasp the stalk just below the emerged sorghum head, bend the head into the bucket opening and vigorously beat the head against the side of the bucket. Headworms will fall into the bucket, where they can be seen and counted.
3. Walk 30 paces down the row and sample another head, then walk 30 more paces and sample another head in the same row.
4. After sampling three plants, stop, count and record the total number of medium size (¼- inch to ½-inch long) and large (greater than ½ inch long) headworm caterpillars in the bucket. Ignore all caterpillars less than ¼-inch long. If there are mostly large caterpillars, use the Large Threshold. If there are mostly Medium-sized caterpillars, use the Medium Threshold. If there are about 50 percent of each large and medium, use the Mixed Threshold.
5. Sample three more plants in the same row, add the counts from the previous three plants and add the caterpillar totals.
6. After sampling six plants within a row, move across 25 rows and continue the process for each six heads.
7. Compare counts with numbers in red and green boxes (page 3). If they equal or exceeded the "Treat" box, then treat. If they equal or are lower than the "Don't Treat Box," stop sampling and don't treat. If they fall in the yellow "sample" box, keep sampling until 48 heads have been sampled. If a decision still cannot be decided at Stop #16, return in three days and re-sample the field.



Corn Earworm (*Helicoverpa zea*).



Fall Armyworm (*Spodoptera frugiperda*).



The information in this sampling guide was developed in collaboration by:

Research was funded by:



Example: MIXED, Threshold = 0.80. Decision is to "Do Not Treat" after 27 heads were sampled.

| Stop # | 3 more heads | + | Previous total | New total | Large | | | Medium | | | Mixed | | |
|--|---------------|---|----------------|-----------|---|---------------------|-------------|---|---------------------|-------------|---|---------------------|-------------|
| | | | | | Do Not Treat | Sample 3 More Heads | Treat Field | Do Not Treat | Sample 3 More Heads | Treat Field | Do Not Treat | Sample 3 More Heads | Treat Field |
| 1 | First 3 heads | | 2 | | --- | 0 to 1 | 2 or more | 1 or less | 2 to 4 | 4 or more | --- | 0 to 2 | 3 or more |
| 2 | 1 | + | 2 | = 3 | --- | 0 to 1 | 2 or more | 4 or less | 5 to 7 | 8 or more | 1 or less | 2 to 4 | 5 or more |
| 3 | 2 | + | 3 | = 5 | 0 | 1 to 2 | 3 or more | 7 or less | 8 to 10 | 11 or more | 3 or less | 4 to 5 | 6 or more |
| 4 | 1 | + | 5 | = 6 | 1 or less | 2 to 3 | 4 or more | 11 or less | 12 to 14 | 15 or more | 5 or less | 6 to 7 | 8 or more |
| 5 | 1 | + | 6 | = 7 | 2 or less | 3 | 4 or more | 14 or less | 15 to 17 | 18 or more | 6 or less | 7 to 9 | 10 or more |
| 6 | 2 | + | 7 | = 9 | 2 or less | 3 to 4 | 5 or more | 17 or less | 18 to 20 | 21 or more | 8 or less | 9 to 10 | 11 or more |
| 7 | 2 | + | 9 | = 11 | 3 or less | 4 to 5 | 6 or more | 20 or less | 21 to 23 | 24 or more | 10 or less | 11 to 12 | 13 or more |
| 8 | 1 | + | 11 | = 12 | 3 or less | 4 to 5 | 6 or more | 24 or less | 25 to 27 | 28 or more | 11 or less | 12 to 13 | 14 or more |
| 9 | 1 | + | 12 | = 13 | 4 or less | 5 to 6 | 7 or more | 27 or less | 28 to 30 | 31 or more | 13 or less | 14 to 15 | 16 or more |
| 10 | | + | | = | 5 or less | 6 to 7 | 8 or more | 30 or less | 31 to 33 | 34 or more | 15 or less | 16 to 17 | 18 or more |
| 11 | | + | | = | 5 or less | 6 to 7 | 8 or more | 33 or less | 34 to 36 | 37 or more | 16 or less | 17 to 19 | 20 or more |
| 12 | | + | | = | 6 or less | 7 to 8 | 9 or more | 37 or less | 38 to 40 | 41 or more | 18 or less | 19 to 20 | 21 or more |
| 13 | | + | | = | 7 or less | 8 to 9 | 10 or more | 40 or less | 41 to 43 | 44 or more | 20 or less | 21 to 22 | 23 or more |
| 14 | | + | | = | 7 or less | 8 to 9 | 10 or more | 43 or less | 44 to 46 | 47 or more | 21 or less | 22 to 24 | 25 or more |
| 15 | | + | | = | 8 or less | 9 to 10 | 11 or more | 46 or less | 47 to 49 | 50 or more | 23 or less | 24 to 25 | 26 or more |
| 16 | | + | | = | 9 or less | 10 | 11 or more | 50 or less | 51 to 53 | 54 or more | 25 or less | 26 to 27 | 28 or more |
| <p>If you still can't make a decision at Stop #16, then return in 3 days and resample the field.</p> | | | | | <p>Economic Threshold for LARGE Headworms: THRESHOLD = 0.25/HEAD</p> | | | <p>Economic Threshold for MEDIUM Headworms: THRESHOLD = 1.3/HEAD</p> | | | <p>Economic Threshold for MIXED Headworms: THRESHOLD = 0.80/HEAD</p> | | |

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The Oklahoma Cooperative Extension Service

Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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