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Sampling Tutorial

Sampling in IPM provides a fast estimate of the population densities of pests, potential pests, and beneficials. Any feature of a crop field and its inhabitants can be sampled. By using a proper sampling technique, your estimates will be reliable, comparable, and statistically valid

If you are already familiar with the methods and statistics of sampling, then simply read through this page to see how it can be applied to IPM. For a more thorough review of how sampling works and how to do it, work through the remaining pages in this tutorial.

Sampling in IPM includes four main activities

1. Pre-determining the sampling pattern.
2. Locating the sample units in the field.
3. Trapping, capturing, counting, and recording the numbers of organisms in the sample plot.
4. Extrapolating these numbers to arrive at an estimate for the whole field.

Pre-determining the sampling pattern.

Sampling pattern should be predetermined in order to prevent bias in the sample. By selecting which sampling units will be sampled before going to the field, an accurate estimate of the pest population can be made.

The sampling pattern should avoid non-representative areas of the sampled field. If a pest is known to congregate at field edges, then some samples should be taken at the field edge. Otherwise, try to avoid sampling near the edge of the field, as this area is non-representative of the field as a whole. Several sampling patterns are illustrated below.
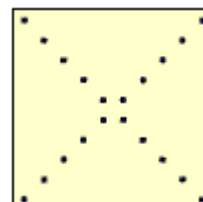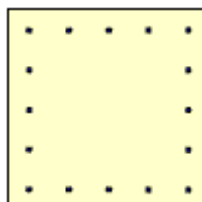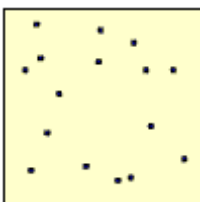
RANDOM PATTERN   EDGE PATTERN   'ZIG-ZAG'   'X' PATTERN
                                          PATTERN

You can try these different sampling patterns using the sampling simulator on the last page of the sampling tutorial. Notice how different sampling patterns interact with different types of distributions.

Locating the sampling units in the field.

Drawing a good map of the field is a good way to accurately locate sampling units in the field. Include field edges, landmarks, and anything else that would help locate sampling units in the field.

Sampling units can be located by their distance from the field edge and other landmarks. A long string with a knot at every meter is a good tool for measuring distances. If you are using quadrants (a square sampling unit), make a quadrant marker from three pieces of metal or bamboo. In many cases, IPM workers simply estimate their location in the field. This is fine as long as the information isn't being used to make a map of pest densities.

Trapping, capturing, counting, and recording the numbers of organisms in the sample plot.

Traps can be used to sample particular pests. All the traps in a sampling scheme should be set at the same time and checked on a regular basis. Because traps capture pests over a period of time, the relationship between population density and trapping success must be known to make accurate population density estimates.

Direct capture methods include sweeping with a net, hand-picking, and fogging. Direct capture methods give a more accurate estimate of pest populations than trapping, because the number of pests captured represents the number of pests in a particular area at an instance in time.

Pests should be accurately identified, counted, and recorded. A counter with a click button is useful for larger numbers. Record the data in a systematic way.
You may also want to note the growth stage and condition of the counted pests.

Extrapolating numbers and determining pest density.

Simply multiply the mean sampling unit density by the number of units in the field. For a more detailed explanation, please consult the rest of the pages this sampling tutorial.

Examples of crop-specific sampling guidelines include,

- The University of Delaware has sampling guidelines for various field and vegetable crops.