Two Simple Insect Sampling Devices[1]

T. NISHIDA AND JOHN TAKARA

COLLEGE OF TROPICAL AGRICULTURE
UNIVERSITY OF HAWAII, HONOLULU, HAWAII

Simple and inexpensive devices for insect and other arthropod sampling are useful in pest management, especially in the area of surveillance where one must determine levels of abundance as well as spatial distribution of pests. Two such devices, which can be made easily out of discarded material, are described in this paper. They are extracting devices that separate insects sampled from plant material so that they can be readily counted. There are a number of similar devices reported in the literature (Gray and Schuh, 1941; Newell, 1947; Taylor and Smith, 1955; and Southwood, 1966). Many of these are modifications made to meet the specific needs of a particular problem. The two devices described here are referred to below as the dry shaking device and the wet shaking device, figures 1 and 2, respectively.

DRY SHAKING DEVICE

The dry shaking device, shown in figure 1, separates insects from plant sample and other debris without using a washing agent. The plant sample with insects is placed in the sample container which has a lid on top and collection vial at the bottom. After placing the lid, the entire device is shaken briskly 10-15 times up and down by holding it vertically. This causes the insects to drop into the vial at the bottom while the plant debris remains in the sample container. The vial is removed and a small amount of a killing agent or preservative placed in it. The vial is then capped and labelled. To take the next sample, a new vial is placed at the bottom of the dry shaking device. By this procedure many samples can be taken rapidly in the field. Ethyl acetate was found to be a suitable killing agent when glass vials were used. However, as most plastics are soluble in this chemical, 70% alcohol was used in place of the ethyl acetate when plastic vials were used.

The construction of this device is simple. As shown in figure 1, the major parts are the sample container, which may be any type of can with a lid, and a funnel with a vertical lip. The diameter of the funnel should be a little larger than that of the sample container so that the latter fits into the funnel. Before attaching the can to the funnel the bottom of the can is removed and a 0.6 cm mesh hardware cloth soldered in its place. The other parts of the equipment are as shown in figure 1.

WET SHAKING DEVICE

The wet shaking device, shown in figure 2, utilizes a washing agent in separating insects from plant samples. The sampled plant material is placed in the sample container at the top. With the valve closed, about 800 cc of a washing agent such as a 30 percent ethyl alcohol is poured into the sample container. The lid of the sample container is put in place and then the entire device is shaken up and down 10 to 15

[1]Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Journal Series No. 2206.

times while holding it in a vertical position. The valve is then opened and the liquid flows through the nylon organdy sieve at the bottom where a container catches the washing agent. After complete drainage the cloth sieve, which contains the insects, is removed by pulling out the holding ring. The cloth is placed in a vial and labelled. Another cloth is then placed over the opening of the plastic tube and the holding ring is pushed up the plastic tube to hold the cloth in place. The device is then ready to be used for another sample.

This device can be made by following the details given in figure 2. The major parts are a sample container, funnel, and aluminum U-beam. The sample container is an empty can with a lid. The bottom of the can is removed and a 0.6 cm mesh hardware cloth soldered in its place. The funnel is one with a vertical lip with a diameter slightly larger than that of the sample container. The sample container is inserted into the funnel and they are held together by four screws and nuts. The aluminum U-beam, figure 2 left, is used to give rigidity to the device and to hold the valve which is screwed onto it. To control the downward flow of the washing agent a valve is needed. Various kinds may be used; however, we found that the cheapest and most efficient one was a wide paper clip, such as Easterbrook clip no. 40.

Discussion

The two devices described here have been useful in only certain situations. The dry shaking device was useful for non-clinging insects and for use on dry days. It does not work well when plant samples are wet. Under such conditions the wet shaker is more useful. One disadvantage of the wet shaker is that the washing agent must be carried into the field. To reduce the amount of the washing agent used, we re-used the washing agent by collecting it after it had passed through the sieve.

We found that these two devices worked well in sampling insects associated with the corn silk such as nitidulids, small *Heliothis* larvae, thrips, *Orius, Cyrtorhinus,* and *Tytthus*. On other plants they can be used to sample such insects as leafhoppers, aphids, and thrips. The dry shaker also is useful in sampling insects and other arthropods in relatively dry forest litter. We have found that the wet shaker works well in sampling spider mites on papaya leaves and thrips on corn. One good feature of the devices is that pests as well as predators are sampled together in the same sample unit.

The two devices described here are designs which could be modified variously to suit other similar sampling circumstances. For example, the sample container can be reduced or increased in size, depending upon the size of the plant sample. The washing agent can also be changed to meet the needs of the investigator. Our trials with a few detergents showed that a number of these can be used; however, those that foam were not satisfactory because small insects can very easily be lost in the foam.

Summary

Two simple sampling devices, the dry shaking and wet shaking, are described. Diagrams are presented to aid in constructing these inexpensive devices from discarded materials. They have been useful in sampling various plants for small insects and mites and in determining the spatial distribution of such arthropods in crop areas.

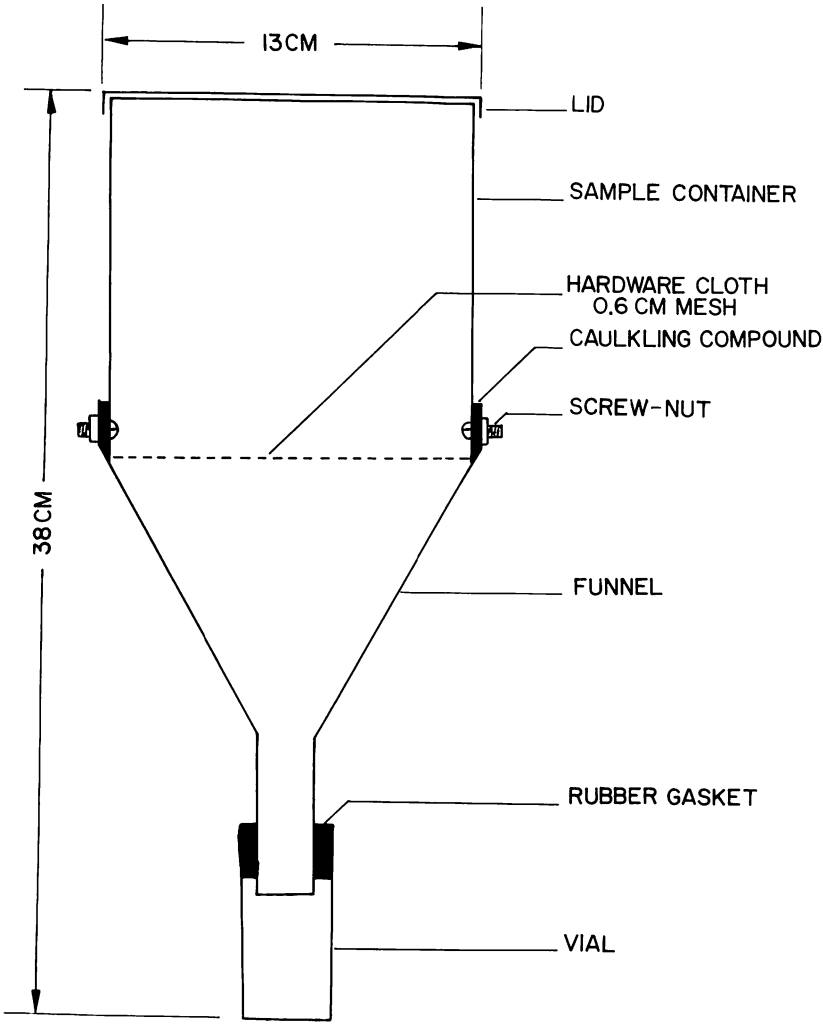

FIG. 1. Diagram of a dry shaking device. Dimensions are approximate.

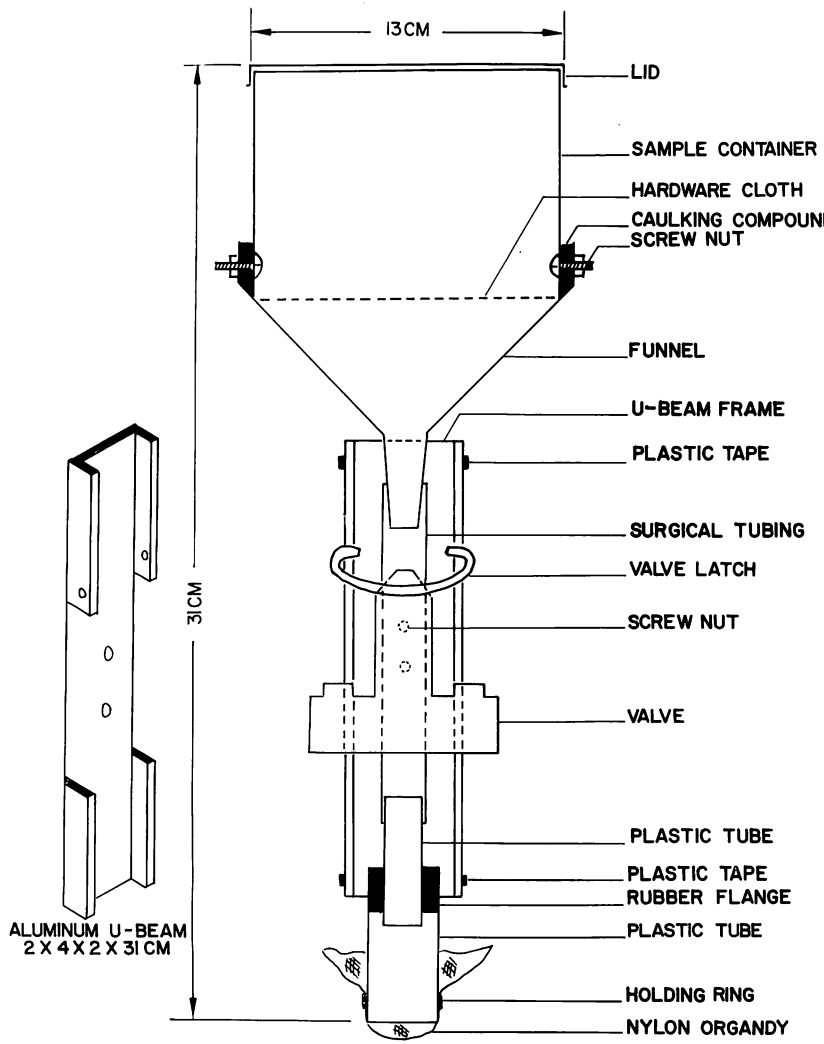

FIG. 2. Diagram of a wet shaking device useful for sampling insects on plants by washing. Relative sizes of the parts are approximate.

References

Gray, K.W. and J. Schuh. 1941. A method and contrivance for sampling pea aphid populations. Journ. Econ. Entomolo. 34(3):411-415.

Newell, I.M. 1947. Quantative methods in biological and control studies of orchard mites. Journ. Econ. Entomol. 40:683-689.

Southwood, T.R.E. 1966. Ecological methods with particular reference to the study of insect populations. Methuen and Company Ltd., London. 391 pp.

Taylor, E. A. and Floyd F. Smith. 1955. Three methods for extracting thrips and other insects from rose flowers. Journ. Econ. Entomol. 48(6):767-768.