INSECT BIOCLIMATOLOGY

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Objective

To develop bodies of bioclimatological data that may be used to interpret entomological data.

Summary of Progress

Wintertime soil temperatures are important in the development of insects, and are inconvenient to measure. Therefore, a method of estimating these temperatures would be useful in field applications. Heat transfer equations are not suited for predicting soil temperatures at various depths because of the variable thermal diffusivity coefficient of soil in cultivated fields. However, simple linear regression analysis will provide good estimates of mean soil temperatures at depths of 0, 3, 6, 9 and 12 inches if daily mean air temperature is used as the independent variable. Still better estimates can be obtained at greater depths by using soil surface temperature as the independent variable in the linear regression equation.

Temperatures at the surface of cotton leaves may be estimated from air temperatures with regression equations. The equation for the upper side of the leaf is:

$$\hat{Y} = 1.10\ (at) - 3.17$$

and that for the underside of the leaf is:

$$\hat{Y} = 0.98\ (at) - 0.47$$

where:

$\hat{Y}$ = the estimate of the leaf temperature (°C)

at = the air temperature (°C).

Data have also been obtained that will permit us to develop regression equations to estimate temperature and heat flux in the various parts of short-and long-staple cotton plants. These data are currently being analyzed.