

BOLL WEEVIL INVESTIGATIONS

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Objective

To determine the biology and ecology of the boll weevil, Anthonomus grandis Boheman, in Arizona and to use this information to improve control and to predict its damage potential in the arid Southwest.

Summary of Progress

Infestations of boll weevils in Arizona in 1969 were very light, and few boll weevils were detected. Apparently, destruction of stalks and plow-under in conjunction with applications of insecticides to control the pink bollworm, Pectinophora gossypiella (Saunders), reduced the populations of boll weevils.

In studies of hibernation and cultural control, boll weevils emerged from buried and unburied bolls throughout the winter. No heat accumulation was necessary to trigger emergence of the adult weevils which were active whenever the temperature exceeded their physiological threshold. Burial of the bolls containing weevils to a depth of 30 cm was necessary to prevent emergence of the weevils from the bolls. A small number of weevils was found during the winter in desert trash adjacent to fields with large infestations the previous growing season. Few overwintering weevils met the criteria for full diapause.

Mortality of immature boll weevils in fallen cotton squares on the soil surface commences when the summation of the index of time (1 hour period) X temperature $>38^{\circ}\text{C}$ reaches 60. Complete mortality occurs when the summation reaches 400. Soil surface temperatures in Arizona cotton fields attain a mean temperature of 38°C when the mean air temperature is 35°C and when air temperatures are lower than 30°C ; they may reach 60°C at maximum air temperatures. Therefore, periods with temperatures $>38^{\circ}\text{C}$ are frequent and prolonged. The excessive soil surface heat imposes a strong bioclimatic control on the boll weevils until late season when shading by maturing cotton plants enables the weevils to survive in squares on the soil surface.

Adult thurberiae weevils, Anthonomus grandis thurberiae Pierce, were longer-lived than weevils from cultivated cotton, and overwintering thurberiae weevils lived longer than the 1st square-reared generation. However, the fecundity of these Arizona boll weevils is highly variable, and the potential is drastically reduced by conditions in the field. The ovipositional pattern of weevils from cultivated cotton was relatively consistent and apparently closely associated with longevity.