

TOWARDS USER-FRIENDLY EARLY DETECTION ACOUSTIC DEVICES FOR RPW MANAGEMENT

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Early detection of hidden RPW infestations in field environments is a difficult but important component of RPW management. Unfortunately there are few externally visible signs of early infestation, and scouts trying to survey and target them must carefully inspect the bases or crowns of palm trees to discover adult entry holes in individual trees. Larvae can be detected by acoustic methods, but with current technology, skilled persons must identify where to insert acoustic probes, and they must use complicated signal analyses to help distinguish RPW sounds from other insects and background noise. Each field location has somewhat different background noise, and it is best to measure general background noise spectral profiles, i.e., “background sound fingerprints,” in advance to optimize RPW identification. In addition, inspections must be done when it is quietest, usually early in the day, to optimize detectability. With the adoption of such measurement procedures, current technology has been successful in detecting RPW infestations in field tests in the Caribbean, Spain, Saudi Arabia, and Israel. Experience gained from these studies is being applied towards development of user-friendly, low-cost detection devices.

Recent increases in the computing power and decreases in the costs of microcontroller systems has generated considerable interest in their use for insect communication and mating disruption. In this report, we present examples of how combinations of microcontrollers with inexpensive microphone systems, or somewhat more expensive piezoelectric devices that are extremely sensitive to insect movement and feeding vibrations, can be used for auralization, storage, and digital signal processing of insect sounds in trees in field environments. Progress also is occurring in the development of Matlab and other software to automate and optimize the discrimination of insect sounds from background noise on microcontroller platforms. Further development of these hardware and software tools has potential to expand the applicability of early detection technology so that it not just useful for research tool but becomes a widely used tool for RPW pest management.