

SOME BACTERIAL, INSECT, AND BIRD PROBLEMS OF CACTUS IN MEXICO

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Abstract

Cactus (*Opuntia* sp) are plants native to Mexico and U.S.A. that have been cultivated for a long time in arid and semiarid zones for vegetable and fruit consumption. Because of its economic importance in Mexico, various problems have been studied in the State of Mexico. The cladodes are colonized by the insect families *Syrphidae*, *Otitidae*, *Ephydriidae*, *Gelechiidae*, and *Noctuidae*, which permits the distribution of pathogenic bacteria of the erwinia group. The insect larvae distribute the bacteria internally and the bacteria cause soft rot and cladode abscission. The incidence of this disease has been estimated to be 10%. In the case of tunas, damage is done by five species of birds, later by insects, and, finally, by bacteria. If damage by birds is unchecked, the incidence may reach 80%.

Introduction

Many cactus (*Opuntia*) species are native to Mexico and southern parts of United States. Some of these species have been cultivated for a long time, mainly for food, by the native population in arid and semiarid zones. Lately, cactus as vegetable and fruit has been used extensively by the population and in manufactured products such as ice cream, lotions, wine, and "sweet cheese." Ornamental craft objects have been offered to the public on a growing, but still limited scale. Because of these important uses, it has been necessary to study certain problems related to plant pathology or entomology or certain combinations of factors. Soft rot of cladodes was estimated to be 10% or more, depending on location, and fruit damage incidence by birds up to 80%.

Materials and Methods

In the northern part of the State of Mexico in the San Pablo nursery, a black rot of the cladodes was noted. From this location and from a commercial plantation near Atlacomulco samples were taken during the winter season to be analyzed in the laboratory. Other samples of edible tunas were also taken from a plantation near Tenancingo, State of Mexico, in August and September. These tunas were perforated and many were rotten. Birds and microorganisms were obviously implicated. The birds were captured for identification. Also, insects that visited the tunas frequently were collected. In all cases, only bacteria were isolated from cladodes and fruits. The bacteria were purified and Koch's postulates were carried out. Characterization was done in triplicate using Schaad's manual (Schaad, 1988). In the rotted cladodes, larvae and pupae were

located internally. These cladodes were maintained in a closed cage for various numbers of weeks in order to collect adult insects for identification.

Results and Discussion

Bacteria from cladodes in the San Pablo nursery and a plantation near Atlacomulco rotted cladodes and caused abscission. Bacteria in rotted potatoes, were peritrichous, gram-negative, utilized glucose oxidatively and fermentatively, did not form endospores, did not produce hypersensitive reaction in tobacco, were oxidase and levan negative. Some isolates produced acid from lactose, maltose, and alpha-methylglucoside, but others did not. Some were phosphatase positive, but others were not. Some produced reducing substances from sucrose, but others did not. This indicated that the bacteria belong to the soft-rot erwinia group, subsp. *atroseptica* and *carotovora* and *chrysanthemi* species. Insects obtained from the San Pablo nursery were dipterous insects which belong to the family Syrphidae, genus *Compostelum*, families Otitidae and Ephydriidae. The *Compostelum* individuals were large flies, with high frequency; their larvae were very active and distribute bacteria internally with great efficiency. Insects from the plantation near Atlacomulco were also the large dipterous flies (*Compostelum*) in high frequency, but also moths of the families Gelechiidae (high frequency) and Noctuidae.

With respect to the tunas, birds visit preferentially slightly yellow fruits early in the morning and later in the day, feeding on the sweet pulp. This activity coincides with the fruit maturation and a change of color is probably a good indication of a nutritious source. The damage to tunas is done on an apical part with the beak; also, claws can penetrate the fruit. The birds most frequently found and causing damage were: Curve-billed thrasher (*Toxostoma curvirostre* Swaison), Gray-breasted woodpecker (*Melanerpes hypopolius* Wagler), Tropical kingbird (*Tyrannus melancholicus* Vieillot), Scott's oriole (*Icterus parisorum* Bonaparte) and Black-headed grosbeak (*Pheucticus melanocephalus* Swaison). Insects visiting the tunas were beetles of the families Melolonthinae, Cerambycidae, flies (*Musca domestica*), bees (*Apis mellifera*) and wasps (*Vespidae*). The soft rot produced on these damaged fruits is by a bacteria from the Enterobacteriaceae family but does not belong to the soft-rot erwinia group because of the absence of flagella, slow growth, and other outstanding characteristics. However, this finding is not so important since the original damage is done by birds, followed by insects. In many cases, the fruit falls off before it rots from bacterial action. No fungi are involved. Birds and insects may act as introducers of the bacteria into the fruits.

These are the two cases that I wanted to present as examples of bacterial and bird problems. Bacteria must enter cladodes through damage done to the tough cladode surface by the insects.

Literature Cited

Schaad, N.W. (Ed) 1988. Laboratory guide for identification of plant pathogenic bacteria APS Press, American Phytopathological Society. St. Paul, Minnesota, U.S.A. 164 p. (2nd edition).

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