Anthracnose in mangos report

The Big Picture:
When it comes to mango production, anthracnose (a fungal infection) is the most prominent disease that mango producers must combat. In the field, anthracnose can cause a direct loss of fruit and, if left untreated in harvested fruit, the blemishes it produces can make mangos hard to market.

Moisture promotes anthracnose, and since the fruit is often grown in tropical areas with high humidity, management of the disease is key. With this in mind, the National Mango Board commissioned a literature review to determine how anthracnose is currently being treated in mangos and what measures can be taken control the disease.

Professor Randy Ploetz of the University of Florida, Homestead, Fla., has taken his findings and outlined various management options for the disease. An integrated approach that combines chemical, biological and cultural initiatives would be the most effective, he says, however each method has its challenges.

Fungicidal treatments are necessary in nearly all cases. Treating the trees before and during flowering, as well as at harvest is helpful.

In addition to fungicidal treatments, post-harvest measures that inhibit ripening and heat treatment can also help to reduce anthracnose.

Ploetz outlines the following findings with regard to anthracnose in mangos:

- **In humid environments, pre-harvest management of anthracnose relies heavily on chemical control, namely fungicides.** Although some mango cultivars imported into the U.S. are moderately resistant to anthracnose (Keitt and Tommy Atkins), chemical treatments are necessary where significant rainfall occurs.
    - Pre-harvest anthracnose control focuses on protecting flowers and early fruit development, as well as treating fruit that is approaching harvest, Ploetz says. Treatment entails one or two fungicide applications as the trees flower and again before harvest. While several fungicides are available, only a handful are approved in the U.S. Products like ferbam and chlorothalonil are available, but the latter is phototoxic to fruit and should only be used in the early bloom and early fruit set stages.
    - Resistance to some of these chemicals is always a risk. Benzimidazole and strobilurins should be used with limited applications per season to help prevent resistance.
    - Biological methods for controlling anthracnose, like induced resistance techniques, have been researched but results have been variable.
    - The Kent mango is classified as “highly susceptible” to anthracnose, and the “Haden” variety is “susceptible” to the disease, so these cultivars are primarily grown strictly in arid regions to discourage the development of anthracnose and other diseases.

- **Applying fungicides post-harvest at the packinghouse can help to delay the development of anthracnose.** Thiabendazole (TBZ) is one of the most effective fungicides allowed in the U.S., and it also is effective in managing stem-end rot. Other chemicals have been deemed effective in mangos in other countries, but they are not allowed by the United States.

- **Post-harvest development of anthracnose can also be managed indirectly by delaying the onset of ripening and by reducing the rate of ripening, researchers found.** As is the case with many fruits, ethylene levels increase as mangos ripen, which in turn encourages disease development. Keeping the fruit in its non-ripe state can help control anthracnose.

    - Refrigeration reduces the rate of ripening, but producers need to avoid chilling injury. Most varieties should be stored no colder than 50-55˚F (10-13˚C) to avoid chilling injury.

    - Hypobaric (low pressure) storage can extend the non-ripe, post-harvest life of mangos and has been shown to suppress the post-harvest development of anthracnose of papayas, researchers found. However, previous attempts to use the technology have not accounted for the drying effect (low pressure tends to suck water out of produce). Hypobaric chambers are also expensive.

    - Modified atmosphere storage also inhibits ripening, but in this case it does not work for treating anthracnose in mangos. Mango flavor is affected if the fruit is treated with the required levels of carbon dioxide and oxygen needed to control plant pathogens.

- **Heat treatment (hot water, vapor or forced hot air treatments) after harvest can be effective in reducing the occurrence of anthracnose in mangos.** Such heat treatments are already widely used for treating fruit flies. Because mango varieties differ in heat tolerance, mango producers using these techniques need to be aware of the tolerances of a given cultivar.

- **To date, no biological control measure for anthracnose has been as effective as the most effective fungicide, Ploetz says.** Relatively little research has been done on biological controls for anthracnose. Of those studies done, the primary one uses a Gram-positive bacterium that resists drying and is foodsafe.

Looking ahead:

Fungicides remain the most popular and most economical way to treat mangos for anthracnose. Treating mango trees before fruit develops and prior to fruit harvest is key to keeping the disease in check, and follow-up treatments after harvest further delay the onset of the disease. Delaying post-harvest ripening can also help manage anthracnose in mangos.

The current practices of keeping mangos refrigerated and using hot water to treat fruit flies helps to manage anthracnose; however, packers need to observe prescribed temperature limits to avoid chill and heat injury. Reducing the occurrence of anthracnose will help to create more high-quality, marketable fruit, which, in turn, should help boost consumer demand for mangos. Although production situations may be generally similar, significant differences could be present in the different production countries. The relative importance of the different phytosanitary problems need to be assessed in each area in order to develop a rational and effective approach to manage these problems**.**