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(Prepared by R. A. Reinert)

Physiological Disorders

Bitter Fruit

Most cucurbit species have bitter compounds called cucurbitacins in their foliage. Cucurbitacins are thought to be toxins produced by these plants as a defense against insects and herbivores. Most cucurbit cultivars have been selected by plant breeders to have a low cucurbitacin content in the fruits. Ornamental gourds are an exception and may have a high cucurbitacin content. Some cucumber cultivars are bitter-free in their foliage as well as their fruit.

Bitter fruits are occasionally produced, in the following ways. In cucumber, standard cultivars produce slightly bitter fruits when the plants are exposed to drought during fruiting. The fruits have an unpleasant taste but are not dangerous to eat. The problem is remedied by irrigating during fruit production or by growing bitter-free cultivars. In squash, bitterness can be introduced by increasing seeds of a cultivar in an isolation block that is too close to other seed production blocks. If there is an ornamental gourd (*Cucurbita pepo*) being grown near squash (*C. pepo*), the dominant gene for bitterness can be introduced by cross-pollination of the squash cultivar. The bitter gene will then be in some of the progeny of the squash cultivar harvested from the isolation block. When the seeds are planted by growers, there will be occasional bitter fruits in the harvest. Bitter squash has an unpleasant taste and can be dangerous to health if eaten in sufficient quantities.

Generally, if cultivars are inbred during development, tested to verify that the fruits are not bitter-tasting, and increased by self-pollination (or sib-pollination in an isolation block), there will be no problem of bitterness. Adequate isolation involves a distance of 2 km (with intervening trees or tall crops) from other plantings of the same species. If beehives are placed within the isolation block, the isolation distance could be shorter, because the bees would not be traveling through adjacent crops.

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(Prepared by T. C. Wehner)

Measles

Smooth-skinned cucurbits periodically develop superficial green brown spots which may be few in number or severe enough to cover the entire fruit surface. This condition, called measles, has been recognized in many cucurbits, including cucumber, pumpkin, melon, and watermelon. Though symptoms can be severe, the disorder causes economic loss only in cucumbers and honeydew melons.

Symptoms

Measles initially appears on fruit surfaces as small, water-soaked areas, 1–3 mm in diameter (Plate 70). As these spots persist over time, the tissue is injured, and a slight overgrowth occurs in their place. The spots then become tan, slightly raised areas, 3–6 mm in diameter. Different areas of the fruit surface may be affected, but symptoms generally occur on the upper surface and often under leaves that are in close proximity to fruit. The spots are superficial and generally do not penetrate beyond the outer epidermal cell layers. Leaves, petioles, and stems also develop symptoms of measles, with spots that are initially water-soaked and 1–3 mm in diameter. Later the centers of these spots become necrotic and take on a tan color.

Measles is an abiotic disorder caused by guttation. Symptoms generally occur during extended periods of high humidity or during the early fall months, when cool nights with high humidity result in extreme guttation.

Research has shown that under greenhouse conditions laminar water-soaking and fruit spotting become prevalent 7–10 days after the initiation of conditions conducive for guttation. Typically, leaf and stem symptoms become evident in 10–14 days, and fruit symptoms in 21–25 days.

Control

Control of measles on honeydew melons has been accomplished by reducing irrigations in the fall-harvested crop. Switching to alternate-row irrigation at fruit-set, or foregoing the last irrigation, reduced both the incidence and the severity of measles with no adverse effects on fruit size or soluble solids content.

(Prepared by W. D. Gubler)

Moisture Stress

Most domesticated cucurbit species are susceptible to water stress induced by high soil moisture tensions (often referred to as drought) and excess water (often referred to as flooding). Both can have significant effects on plant metabolic processes.

Water Deficit

Water deficits have a significant effect on practically all metabolic and physiological plant processes. As soil moisture is depleted, water transport gradually diminishes, thus lowering plant water potential and turgor pressure and increasing vapor pressure deficits between the plant and the surrounding