POSTHARVEST ALTERNATIVES FOR PROPAGATIVE MATERIALS AND CUT FLOWERS

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Heat treatment and irradiation are alternatives to methyl bromide for postharvest treatment of propagative plant materials and tropical cut flowers. Most insects, including ants, foliar and root aphids, armored scales, soft scales, foliar and root mealybugs and whiteflies are killed at 49° C (120° F) from 5 to 12 minutes. Dose levels of irradiation needed to kill insects is much higher than doses needed to arrest development or reproduction. For example, studies in Israel and Thailand demonstrated that 100 krad (1000 Gy) and 150 krad (1500 Gy) are needed for acute mortality of the the agromyzid leafminer, Liriomyza trifolii, and melon thrips, Thrips palmi, respectively. Other studies in the Netherlands showed that dosages of only 10-20 krad (100-200 Gy) arrest the development and reproduction of the beet armyworm, Spodoptera exigua, green peach aphid, Myzus persicae and a thrips, Frankliniella pallida.

The limiting factor for disinfesting cut flowers and foliage with hot water and irradiation is phytotoxicity. Phytotoxicity of cut flowers is measured by vase life. Cut flowers are more susceptible to heat and radiation injury during the fall and winter seasons rather than the spring and summer seasons. Conditioning flowers in hot air at 39° C (102° F) for 2 h before hot water treatment eliminates seasonal phytotoxicity. Probably, heat shock proteins in flowers and foliage are produced by conditioning in hot air; these induce heat tolerance. Some cut flower species such as anthuriums, dendrobium orchids and pincushion protea are sensitive to both hot water and irradiation.

Hot water treatment holds much promise for disinfesting propagative materials such as plumeria, anthurium, gardenia and Dracaena spp. When cuttings of these species are treated at 49° C for 10 min followed by a basal application of 0.8% IBA (indole-3-butyric acid) rooting and/or shooting of cuttings are significantly enhanced. Unrooted chrysanthemum cuttings survive 49° C for up to 6 min, but root mass is lowered after a 1 to 2 min dip. Most foliar aphids, thrips, spider mites, and Liromyza leafminers (95-99%) infesting chrysanthemum cuttings should be killed after 2 min in 49° C.

The taro root aphid is effectively killed at 49° C for 5 min, and taro planting material can tolerate hot water at 49° C for 10 minutes without negative effects on growth; The root mealybug, Rhizoecus hibisci in potted Rhapis palms

is erradicated when the internal root ball temperature reaches 46° C, with no significant phytotoxic injury to the potted Rhapis.

Hot water could be used as a single nonchemical postharvest treatment to disinfest cut flowers and propagative materials of quarantine pests and enhance the quality of flowers or cuttings prior to export. Irradiation holds promise for cut flowers not tolerable to hot water, but more studies are needed on sublethal effects and tolerance of flowers to irradiation. High cost of irradiation facilities and possible lower consumer acceptance of irradiated products are disadvantages.

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