

Induction of defense mechanisms on harvested mangoes by UV-C irradiation

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Abstract

Raw mango fruit at 60-70% maturity are widely consumed as a fresh product or as an ingredient of some meals in Thailand and several countries in South East Asia. Anthracnose disease caused by *Colletotrichum gloeosporioides* is the major problem of harvested raw mango for domestic markets and for export, since the pathogen infects young fruit growing in orchards and is dormant as the appressoria form under the fruit peel. This research aimed to induce plant defense mechanisms of raw mango fruit using UV-C irradiation. Four popular cultivars of Thai raw mango fruit ('Keaw-Sawaey', 'Fah-Lan', 'Tawai-Duan-Kaow', and 'Chok-Anan') were harvested from orchards at the commercial stage of development. The fruit were washed with a solution of 100 ppm sodium hypochlorite and air-dried before irradiating with UV-C at 6.16 KJ/m², and then kept at 13 or 25°C. Non-irradiated fruit kept at 13 or 25°C served as the controls. The activities of the enzymes associated with plant disease resistance, i.e., phenylalanine ammonia lyase (PAL), chitinase (Chi), β -1,3-glucanase (Glu), and peroxidase (POD), and total phenolic contents (TPCs) in peel and pulp of raw mango fruit were analyzed at one-day intervals after irradiation. UV-C irradiation induced the activities of all these enzymes, and the accumulation of TPCs in both peel and pulp of mango fruit throughout the storage period, and higher enzymatic activities and TPCs were found in the fruit kept at 13°C than in the fruit kept at 25°C. Disease resistance of all raw mango cultivars was compared based on these enzymatic activities and TPCs. 'Chok-Anan' mango treated with UV-C showed the highest enzymatic activities and TPCs in both peel and pulp, followed by 'Tawai-Duan-Kaow', while 'Keaw-Sawaey' and 'Fah-Lan' showed low enzymatic activities and TPCs. This result was correlated with the degrees of disease incidence and disease development. Disease incidence and disease severity were the lowest in 'Chok-Anan' mango followed by 'Tawai-Duan-Kaow', 'Keaw-Sawaey', and 'Fah-Lan'. These results demonstrated that UV-C irradiation may be used as a tool for delaying anthracnose disease development in raw mango fruit for both domestic markets and for export by enhancing plant defense mechanisms.