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Microclimatic Effects on Premature Fruit Drop of Mango in Northern Vietnam

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Abstract

Mangoes (*Mangifera indica* L.) in northern Viet Nam are predominantly produced by different ethnic minorities for local markets; however, productivity is limited by the occurrence of premature fruit drop. The physiological mechanisms of the process of fruit drop are still ambiguous but are suppose to be related to lack of fertilisation, embryo abortion, competitive source-sink relations, pests and diseases pressure and the occurrence of adverse climatic conditions. It is hypothesised that physiological responses of mango to environmental cues such as excessive temperature, drought and/or high vapour pressure deficit will induce a high degree of fruitlet abscission. This in turn might be linked to relatively hot, dry prevailing winds and the lack of precipitation throughout the months of February and March as well as the common farming practices of non-irrigated orchards. These microclimatic factors might induce specific changes within the abscission zone (e.g. lack of carbohydrate supply, reduced export of indole^{-3}-acetic acid [IAA] out of the fruit; increased fruit ethylene synthesis) which subsequently leads to fruit drop.

Consequently the aim of this study was to investigate the premature fruit drop pattern of irrigated and non-irrigated mango trees (cvs. 'Hoi' and 'Tron'). An automated weather station recorded air temperature, light intensity, wind speed and direction, rainfall and relative humidity within the orchard. In addition, measurements of soil temperature at 10 and 20 cm depths and soil moisture ranging from 10 to 40 cm depth were taken at regular intervals in close proximity of treatment trees. Air temperature and relative humidity within the tree canopy were recorded by micro-loggers. Phenological data such as full bloom, initial fruit set and fruit drop were recorded on selected mango inflorescences on each treatment tree. Throughout the fruit drop window between mid February and end of March 2009, corresponding with the period of hot, dry climatic conditions, fruit- and leaf-diffusates for IAA-export were sampled at weekly intervals. Initial results of hormone analysis indicate a correlation between a reduced IAA export and fruit drop.

Keywords: Abscission zone, auxin, irrigation, mango, Viet Nam

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