

Integral procedure to predict bitter pit in ‘Golden Smoothie’ apples based on calcium content and symptom induction

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Abstract

Bitter pit has been described as one of the most important physiological disorders of apple fruit whose symptoms appear late in the season and during storage and which can cause high economic losses. The negative relationship between bitter pit and mineral contents in fruit led to develop prediction models. However, these models are based on mineral content close to harvest and can only provide valuable information at harvest. Aim of this study was to assess for three years the accuracy of different bitter pit prediction methods along fruit development, based on either Ca content in fruit (at 90 days before harvest and at harvest) or induction of symptoms (Mg infiltration, ethephon dip, passive method) at three levels: the overall accuracy, the accuracy of bitter pit incidence prediction (true positive rate), and the accuracy of non-bitter pit prediction (true negative rate). These three accuracies were considered together to know the real prediction risk of each method. From the results obtained, we proposed and validated, for other two years more, a detailed protocol to predict bitter pit which incorporated fruitlet analysis at 90 DBH, in order to gain prediction time, and the passive method at 40 and 20 DBH, in order to reduce the proportion of negative samples that were incorrectly classified.