Genetic Mapping of Apples and Pears for Disease Resistance and Chilling Requirements

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The breeding of pome fruits in South Africa has historically been based on the selection of phenotypically identified quality traits. However, with the development of molecular markers and genetic maps for apple and pear, it is now possible to implement the use of marker-assisted selection (MAS) for both durable resistance and quality trait selection. Already molecular markers have been used to identify apple cultivars carrying the Vf gene, which controls scab resistance. Other markers linked closely to other traits will provide additional selection criteria.

The main focus of our research program has been on the implementation of microsatellite (SSR) markers. Previously identified, as well as newly generated microsatellite markers, are being tested and mapped across eight mapping populations of apple and one of pear, in order to generate genetic maps consisting of mainly SSR markers. The development, optimisation, multiplexing and mapping of the complete set of markers is ongoing for apple and pear, and the current status of the program will be described. Applications of molecular markers to cultivar identification, the localisation of resistance genes for the major diseases, and for chilling requirement will be presented.