

## MORPHOLOGICAL AND HISTOCHEMICAL FEATURES OF COMPATIBLE AND INCOMPATIBLE STEM UNIONS *in vitro*

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Plant grafting is of considerable importance in the deployment and regional adaptation of elite cultivars, but its range of application is restricted by physiological and biochemical factors that produce incompatible grafts. Localized incompatibility is a general phenomenon in many cultivated fruit species and is a factor that makes rootstock and cultivar selection difficult.

Herbaceous stem unions *in vitro* were examined at early stages of graft union development in order to look into the cellular responses associated with the incompatibility reaction between apricot/plum grafts. The histological observations were carried out as soon as two weeks after grafting from both compatible and incompatible unions.

The first response was the high cell proliferation and active cell division in the contact surface from both stock and scion. The pith cells began to enlarge and divide in response to wounding. Likewise, the existing cambial region, parenchyma cells at pith and radial xylem parenchyma cells of both graft partners were involved in wound callus formation. The graft partners were held together by the callus in both kind of unions and the cell layers closest to the wound surface were the first to divide. The physiological responses were similar whether the partners were compatible or not during the first week. The most striking differences were observed in the second week after grafting. The differentiation of callus parenchyma took place to form new cambial initials, in both stock and scion from the compatible combination. Nevertheless, there was no indication of new cambial differentiation from the callus cells in the incompatible union. Furthermore, more intercellular deposits remained in the callus cells from the incompatible union at this time, which were associated with phenolic compounds. Their accumulation may have marked effects potentially affecting the fate of the graft. These observations lead to the suggestion of an enhanced phenylpropanoid metabolism in the incompatible unions as a consequence of stress situations between both graft partners.

The fact that physiological differences can be detected histologically within two weeks after grafting may facilitate the early detection of graft incompatibility and play a paramount role to make the rootstock breeding programmes more dynamic.