Research Note

Endogenous abscisic acid in juvenile and adult grape (Vitis vinifera L. cv. Pinot noir)

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Introduction: After several subcultures, grapevines growing in vitro show rejuvenation (Mullins et al. 1979). The juvenile characters can be induced by the manipulation of culture conditions. By changing the CO₂ concentration, two distinct morphological patterns were obtained (Fournioux 1995): adult (phyllotaxy 1/2 and presence of tendrils) and juvenile (phyllotaxy 2/5 and lack of tendrils) micropropagated plants.

Some juvenile characteristics may be preserved after acclimatization and transfer into the vineyard: leaves are more jagged, the anthocyanin content is higher and lower fertility is observed in most cultivars (Grenan 1982). As it is difficult to determine the degree of juvenility with morphological characteristics only (Fournioux et al. 1998), the use of biochemical markers should be added.

The abscisic acid (ABA) content of a plant depends on age and varies during ontogenesis. ABA acts as an antagonist of gibberellic acid by maintaining the adult stage in Hedera helix (Rogler and Hackett 1975). It seems to be one of the factors involved in the control of flowering of Xanthium strumarium and as high levels of ABA are supposed to characterize the adult stage, low levels would maintain the juvenile stage (Podolnyi et al. 1989).

We have quantified the ABA content of juvenile and adult plants cultivated in situ (greenhouse) or in vitro, with the aim to investigate the possible relationship between ABA changes and the process of juvenilisation.

Material and Methods: Plant material: Mature cuttings and seeds of Vitis vinifera L. cv. Pinot noir were cultivated in a greenhouse (25 °C day, 22 °C night; 16 h light, 80 mol·m⁻²·s⁻¹). After three months, leaves of seedlings and cuttings were collected from the median part of the shoots. Lateral bud microcuttings produced in vitro and obtained after several subcultures from the initial explant of Pinot noir were inserted in 25 x 250 mm culture tubes containing 15 ml of the Galzy medium (Galzy 1969). Cultures were incubated at 28 °C (day) and 24 °C (night) and 16 h light (125 mol·m⁻²·s⁻¹) at the culture level; fluoro-
helix, demonstrating that high concentrations were characteristic for the adult stage while small amounts were typical for the juvenile.

The in vitro material cultured under 100 mol·mol⁻¹ CO₂ provides a good model to study juvenility because ABA concentration is comparable with that of young greenhouse shoots grown under normal CO₂ atmosphere.

Maturation of Pinot noir, produced in situ and in vitro, is accompanied by an increase in endogenous ABA. However, in the in vitro material the high ABA level seems to be determined not only by its morphological form. The high CO₂ concentration used to obtain this morphology in vitro has probably a promoting effect on the ABA concentration in the leaves as well. This could explain the differences between the two culture conditions.

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