BRIEF COMMUNICATION

Differential Stomatal Closure by Abscisic Acid in Epidermal Strips of Green and Pigmented Leaves or Leaf Parts

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Abstract. Response of stomata in epidermal strips from green leaves of Tradescantia sillamontana and anthocyanin-rich purple leaves of T. virginiana and from green and pigmented regions of Pedilanthus tithymaloides leaves, to ABA have been compared. Stomata from anthocyanin-rich leaves or leaf parts appeared to be relatively insensitive to ABA as compared to those from green leaves or leaf parts. Observations indicate the possibility of the involvement of endogenous anthocyanins in antagonising ABA in preventing the stomatal opening.

Abscisic acid (ABA) is known to cause the stomatal closure by affecting the ionic and metabolic states of guard cells and by binding to guard cell membranes (MacRobbie 1981, Zeiger 1983, Hornberg and Weiler 1984). ABA-induced stomatal closure, however, has been demonstrated to be reversed by certain phenolic compounds in Commelina communis (RAI et al., 1986) and Phaseolus vulgaris and Zea mays (Laloraya et al., 1986), suggesting a role of endogenous phenolics in stomatal movements. To check whether the stomata from anthocyanin-rich leaves (leaf parts) respond differently to ABA than those from green leaves (leaf parts), we have compared the stomatal response to ABA in green and pigmented leaves (leaf parts) in certain suitable systems.

Plants of Tradescantia sillamontana (green leaves), T. virginiana (purple leaves) and Pedilanthus tithymaloides (variegated leaves with pinkish peripheral and green central regions) cultivated in field were used for the present studies. Epidermis was peeled off from the abaxial surface of fully expanded youngest leaves and stomatal response to ABA was studied strictly according to the methods described earlier (RAI et al., 1986). In each of the three experiments 30 randomly located stomata from each of two peels were studied. Significance of the data was worked out using student’s t-test.

A comparison of the response of stomata from green leaves of T. sillamontana and purple leaves of T. virginiana to ABA reveals that the stomata from the leaves of the former species are much more sensitive to ABA (75 % closure at 1 mol m−3) than those of the latter species (37 % closure at 1 mol m−3) (Fig. 1A). Likewise, ABA-induced stomatal closure is of greater mag-
nitude in the green region than in pigmented region of the same leaf of *P. tithymaloides* (Fig. 1B).

Present findings suggest that the reluctance of stomata of anthocyanin-rich leaves (leaf parts) to ABA is probably due to latter's antagonism by endogenous anthocyanins. We have earlier demonstrated the reversal of ABA-induced stomatal closure by a number of phenolic compounds (RAI et al. 1986). Ineffectiveness of the abscisic acid in causing stomatal closure in yellow lupin (*Lupinus luteus*), a drought-resistant species, also has been demonstrated (LANCASTER et al. 1977). The authors suggested some specialized physiological adaptations to be the reason for the insensitivity of yellow lupin stomata to ABA. Localization of phenolic compounds in stomatal guard cells has also been demonstrated. WEISSENBOCK et al. (1984) showed that guard cell protoplasts isolated from abaxial leaf epidermis of *Vicia faba* contained 12 different Kaemferol 3,7-O-glycosides which are localized in the vacuoles (SCHNABL et al. 1986). That guard cells are one of the predominant sites of flavonoid accumulation within leaf has also been shown in *Pisum sativum* L., mutant Argenteum (WEISSENBOCK et al. 1986).

Our suggestion that phenolic compounds may be involved in the regulation of stomatal mechanism has been strengthened by present experiments. The level at which phenolics antagonise ABA in causing stomatal closure, however, is yet to be recognized.

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**REFERENCES**
