PEA LEAF ARCHITECTURE: THE INTERACTION OF af, tl AND tac

Marx, G.A. , NYS Agricultural Experiment Station
Geneva, New York 14456, USA

In a recent review (1) describing the actions and interactions among genes affecting foliar architecture, several recent observations were excluded from the discussion. Some new observations concerning the af tl interaction versus the af tl tac interaction are worth placing on record.

The af tl interaction, giving rise to the pleiofila phenotype, is well known and scarcely needs reiteration here. But the phenotype change occasioned with the addition of tac to this combination does deserve comment. The leaves of af tl plants, like those of af Tl plants, are characterized by a three dimensional configuration, specifically a spherical mass of tendrils or tiny leaflets. This spherical configuration persists throughout the ontogeny of the plant. With the introduction of tac (i.e. af tl tac) three marked alterations occur. Two such modifications that have already been described are the decrease in the number of lamina with a concomitant increase in the size of the lamina on each leaf. There is, however, a striking difference associated with the introduction of tac. Whereas the lower leaves of af tl tac plants, like those of af tl, are essentially three dimensional, the leaves gradually become more or less "two" dimensional and these upper leaves resemble leaves of Af tl plants. They are distinguished from Af tl or from Af tl tac by having more leaflet pairs. The increase in the number of leaflet pairs on the more or less "flat" upper leaves of af tl tac plants over the correspondingly situated leaves of Af tl tac isogenic counterparts presumably is due to the action of af in the former combination.

What is most interesting in these relationships, however, is the fact that the introduction of af into an otherwise wild-type background leads to an alteration from a leaf that is essentially a two dimensional flat plane to a leaf which is essentially a three dimensional sphere. This conformation remains essentially unaltered with the introduction of tl, i.e. af tl. Yet, with the addition of tac to the combination (af tl tac) there is a return to the essentially flat plane, at least in the upper leaves of a given plant. Somehow the tac mutant cancels one characteristic effect of af but it does so only in an af tl background, not in an af Tl/Tl or at Tl/tl background. This is but one more dramatic example that genes do not stand alone!

1. Marx, G.A. 1987. Plant Molecular Biology Reporter 5:311-335.

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