Effect of Absciscic Acid in the *Avena* Curvature Test

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Abstract

d-Absciscic acid (ABA) does not affect the indole-3-acetic acid (IAA)-induced curvature in the standard *Avena* coleoptile test at a dosage level of IAA which gives a linear doseresponse curve, while ABA is inhibitory in the neighborhood of the saturation dosage of IAA. Consequently the need to remove ABA from samples to be subjected to this test for the estimation of auxins is eliminated.

d-Absciscic acid (ABA) is known to inhibit effectively the straight growth of *Avena* coleoptile sections induced by indole-3-acetic acid (IAA)^{1,2)}. However, its effect on the *Avena* curvature test has not been investigated.

ABA occurs widely in plants³⁻⁷⁾ and has been shown to be transported basipetally through stem or petiole sections⁸⁾. Therefore, it is probable that acidic ether extract from plant tissues, and diffusates^{9,10)} collected in agar blocks from the cut surfaces of stems or petioles may contain ABA in addition to auxins. Thus, it may make questionable the validity of the *Avena* curvature method to estimate auxins in plant tissues. In this connection the present paper deals with the effect of ABA on the *Avena* curvature test.

Avena curvature test was performed with *Avena sativa*, cv. Victory according to Went's standard method⁹⁾. Agar blocks, 2×2×2 mm, contained IAA, ABA or both in varied concentrations. The ABA concentrations applied here are high enough to inhibit completely the elongation of *Avena* coleoptile sections induced by 0.1 and 1 µg/ml of IAA. Curvature was measured 90 min after the placing of agar blocks.

ABA at concentrations up to 10⁻⁵ M did not affect the curvature induced by 2.9×10⁻⁷ M of IAA, while it caused suppression at concentrations from 2×10⁻⁶ to

Table 1. Effect of absciscic acid on indoleacetic acid-induced curvature in the standard *Avena* test

d-ABA	IAA	
	2.9×10 ⁻⁷ M	5.7×10 ⁻⁷ M
0 M	20.5±1.3	26.5±1.8
1×10 ⁻⁷ M	19.5±1.8	25.0±2.1
1×10 ⁻⁶ M	20.3±2.4	27.0±1.9
2×10 ⁻⁶ M	19.5±1.4	19.0±2.3
1×10 ⁻⁵ M	20.5±1.2	18.5±1.4

± denotes standard error. Ten seedlings were used for each treatment.

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Fig. 1. Effect of abscisic acid on indoleacetic acid-induced curvature in the standard *Avena* test. +ABA, 10^{-5} M d-abscisic acid; -ABA, no addition of ABA. Bars on the curves show $\pm$ standard errors.

10^{-5} M when 5.7×10^{-7} M of IAA was used (Table 1). Without the addition of IAA the inhibitor showed no effect. Similar results were obtained three times. Next the inhibitory action of ABA (10^{-5} M) in relation to IAA concentrations was examined. As illustrated in Fig. 1 ABA was ineffective at concentrations up to 3×10^{-7} M of IAA where *Avena* coleoptiles give a linear dose-response curve, but exerts inhibition from 5.7×10^{-7} to 1.1×10^{-6} M of IAA, which is nearly the saturation concentration for the curvature.

These results indicate that in the *Avena* curvature test it is unnecessary to remove ABA from defusates or acidic ether extracts from plant tissues, and data thus far obtained by the test method without purification of samples are valid, provided that the curvature stays within the linear part of a dose-response curve.

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