REACTIONS OF PEA EPICOTYLS TO VARIOUS AUXINS AND NON-ACTIVE AUXIN ANALOGS

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Morphogenetic reactions of plant tissues to the application of certain types of phytohormone were shown to depend on (a) the plant's genetic background and (b) the amount of free active hormone in the cells. In the case of auxin effects in pea, we demonstrated that the ability of intact pea seedlngs to reduce the auxin concentration by oxidation (IAA) or conjugation (NAA) led to negligible morphogenetic damages, while 2,4-D applied to the roots caused severe damage of the seedlings because this growth regulator is metabolized to a much lesser extent (1). On the other hand, we were able to demonstrate that the fasciated mutant 489 C was able to form roots from auxin-induced callus, while its initial line was not (2).

In a recent experiment, we tested the ability of a number of auxins and so-called "non-active'' analogs on callus induction in epicotyl segments of the initial line (2 x 10 replications with 10^{-4} M of the hormone, grown on Murashige/Skoog medium). The results, shown in Table 1, were scored after 4 weeks in culture and are grouped in accordance with the frequency of the parameter "%-callus induction".

Table 1. Effects of various auxins and "inactive" analogs on callus induction from epicotyl segments of 'Dippes Gelbe Viktoria'.

Compound	Callus	Swelling	No reaction
2,4-D	62.5	12.5	25
MCPA	57.0	21.5	21.5
3,5-D	25.0	16.7	58.3
indole-3-butyric acid	21.4	28.6	50.0
NAA	14.3	35.7	50.0
IAA	12.5	25.0	62.5
indole-3-acrylic acid	12.5	25.0	62.5
benzoic acid	10.0	20.0	70.0
indole-acetonitrile	8.3	8.3	83.4
2-(2,4-dichlorophenoxy)-proprionic acid	0.0	0.0	100.0

Obviously, the phenoxy compounds 2,4-D, MCPA, and, surprisingly, 3,5-D were most effective in callus induction, while the other auxins IBA, NAA, and IAA were less effective in this system at the applied concentration. Compounds like 3,5-D, indole-3-acrylic acid, benzoic acid, or indole-acetonitrile generally are referred to as "inactive" auxins, where a behavioral pattern like that observed with 2-(2,4-dichlorophenoxy)-proprionic acid would be expected. The effects on callus induction or swelling of some of the explants were probably due to interactions of these compounds with the reactions of the segments on wounding. In any case, from the results of the present experiments no clear or definitive statement about the biological activity of an auxin-analog could be made.

1. Ingensiep, H. W., M. Herlt, and H.-J. Jacobsen. 1981. Morphogenetic response, translocation and metabolism of root-applied auxin in pea seedlings. PNL 13:21-23.
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CHANGES OF ELECTROPHORETIC ALBUMIN PATTERNS IN GERMINATING SEED OF FIVE DIVERSE PISUM LINES[1]

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An electrophoretic analysis of seed albumins of lines within the genus *Pisum* revealed five distinct protein patterns which differed in number and in electrophoretic mobility of the major bands (1). Preliminary genetic studies showed that two of these patterns were controlled by two alleles of one locus (2). The albumins corresponding to the characteristic electrophoretic variants seemed to have a molecular weight (MW) of approximately 40,000 and to consist of two subunits of MW approximately 23,000 (3).

Recently, Murray reported that the subunits of MW 23,000 did not disappear during germination of J?, *sativum* seeds and suggested that these polypeptides could function as structural components (4).

The possible physiological role of the specific albumins was investigated by examining changes in electrophoretic albumin patterns during seed germination of five *Pisum* lines, each with a distinct banding pattern. Seeds of the following lines from the Weibullsholm collection were investigated: WL 110 (P. *sativum*): WL 936 (P. *humile*): WL 1490 (P. *cinereum*); WL 808 (P. *abyssinicum*; and WL 1256 (P. *fulvum*). Seeds were germinated in darkness on moist filter paper. Albumins were extracted from cotyledons at five-day intervals until the 20th day, with 0.15 M acetate buffer, pH 4.6 or with 5% K_2SO_4 in 0.1 M Na-phosphate, pH 7.0 according to Murray (4). Native proteins were submitted to disc-electrophoresis, dissociated proteins to SDS-electrophoresis, as described elsewhere (3).

Extracts obtained both in pH 4.6 and in pH 7.0 gave generally similar electrophoretic spectra. The electrophoretic patterns of the albumins from germinating seeds of the five lines are shown in Fig. 1. In general, the characteristic patterns persisted until the 20th day. Some alterations were observed only in P. *abyssinicum* and P. *cinereum*. In P. *abyssinicum* the characteristic band "f" split into two about the 10th day; in P. *cinereum* the bands "b" and "d" became faint approximately after the 15th day. The latter observation should be interpreted with caution, because the relative intensities of the bands "c" and "d" in P. *cinereum* were known to vary depending on uncontrolled

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