

BRIEF COMMUNICATION

Effect of Lunularic Acid on Auxin-Oxidase Activity

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Abstract. Lunularic acid was isolated from fresh thalli of *Targionia hypophylla* L. This acid was found to enhance the destruction of IAA by auxin-oxidase from lentil roots. Such action can explain, at least partially, its inhibitory effect on IAA-induced plant growth.

The presence of lunularic acid in liverworts was first reported by VALIO *et al.* (1969). This acid is an endogenous growth inhibitor (VALIO and SCHWABE 1970) of lower plants (algae and liverworts) but it has not been detected in higher plants (PRYCE 1972). However it inhibited the IAA-induced growth of *Avena* (ARAI *et al.* 1973) and *Triticum* (MATO, unpublished results) coleoptile sections.

The effect of some natural substances on IAA-induced plant growth has often been attributed to their action on IAA-oxidase activity (TOMASZEWSKI and THIMANN 1966). On this basis, we examined the effects of lunularic acid on the activity of auxin-oxidase from lentil roots.

Fresh thalli of *Targionia hypophylla* L. (500 g), collected in December, were extracted as reported by PRYCE (1971). Repeated TLC's on SiO₂ with benzene-ethyl acetate-acetic acid (50 : 5 : 2) (VALIO *et al.* 1969) were carried out to isolate lunularic acid. PC and TLC in different solvents (VALIO and SCHWABE 1970) were performed to purify and identify this acid.

For enzymatic assay, lentil roots were selected and crude homogenates were prepared as previously (PILET and MATO 1967). The reaction mixtures were those used before (MATO 1970) but the final concentration of IAA was $5 \cdot 10^{-4}$ M and that of lunularic acid is shown in Fig. 1.

Lunularic acid was isolated from *Targionia hypophylla* fresh thalli. This acid was located in TLC plates by its blue fluorescence under u.v. light (254 nm) (VALIO *et al.* 1969). Its identity was confirmed by co-chromatography with an authentic sample of lunularic acid in different solvents

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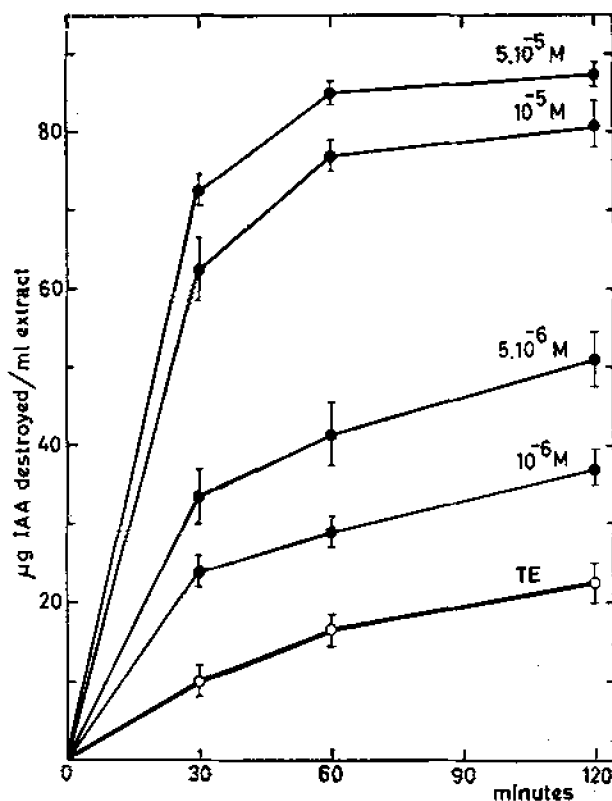


Fig. 1. The activity of IAA oxidase extracted from lentil roots in the presence (●) and absence (○) of AL at different concentrations. Values are the means of 6 replicates $\pm$ standard deviation.

TABLE I

Rf values ($\times 100$) of the substance in extracts of *Targionia hypophylla* L. and of standard lunularic acid (LA)

Compound	Solvents						TLC	
	AA	BAW	PC IAW	TAW	BBPW	BW	BEaA	EaCA
Substance	41	93	77	34	69	64	28	88
LA	41	93	78	32	70	65	30	88
Subst. + LA	41	92	77	32	68	66	27	88

AA: Acetic acid 10%

BAW: Butanol-acetic acid-water (4 : 1 : 5)

IAW: Isopropanol-ammonia-water (10 : 1 : 1)

TAW: Toluene-acetic acid-water (4 : 1 : 5)

BBPW: Butanol-benzene-pyridine-water (10 : 2 : 8 : 3)

BW: Butanol saturated with water

BEaA: Benzene-ethyl acetate-acetic acid (50 : 5 : 2)

EaCA: Ethyl acetate-chloroform-acetic acid (15 : 5 : 1)

PC: paper chromatography. TLC: Thin layer chromatography

(Table 1) and by u.v. analysis. The lunularic acid content was estimated spectrophotometrically using a pure sample as standard.

Lunularic acid increased IAA-oxidation by crude preparations from lentil roots and this effect was correlated with the concentration (Fig. 1). A greater rate of IAA destruction was observed in the presence of lunularic acid (10 and 50 μ mol) than in the control during the first 30 min of the incubation, after which the reaction rate was approximately the same with or without lunularic acid, suggesting a reduction of the IAA-oxidation lag period by this acid. Similar effects were reported (MACHÁČKOVÁ *et al.* 1975) for a natural cofactor of IAA-oxidase in higher plants. It appears from these results that the growth inhibition properties of lunularic acid are related to its promoting influence on IAA destruction rate, although other biological processes can also be involved. This growth inhibitor of lower plants may act in the same way as some higher plant inhibitors (ANDREAE and COLLET 1968).

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