

Zeitschrift:	Berichte der Schweizerischen Botanischen Gesellschaft = Bulletin de la Société Botanique Suisse
Herausgeber:	Schweizerische Botanische Gesellschaft
Band:	80 (1970)
Artikel:	Studies on the metabolic interaction of triiodobenzoic acid during the transport of externally applied indole acetic acid
Autor:	Vardar, Y.
DOI:	https://doi.org/10.5169/seals-56315

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 14.08.2025

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

Studies on the Metabolic Interaction of Triiodobenzoic Acid During the Transport of Externally Applied Indole Acetic Acid

By *Y. Vardar*

(Department of Botany, Ege University, Izmir, Turkey)

Manuscript received March 26, 1970

According to Kuse (1953) 2,3,5-triiodobenzoic acid (TIBA) has a blocking effect on the transport of indole acetic acid (IAA). From earlier experiments (Vardar, 1959) we concluded that TIBA causes a metabolic change of IAA. Several workers (Goldsmith and Thimann, 1962; Christie and Leopold, 1965; Winter, 1967) observed a considerable accumulation of IAA in TIBA treated plant tissues and attributed it to the immobilization effect of TIBA on IAA transport. In the present paper the effect of TIBA during transportation of IAA-C¹⁴ applied externally to young seedlings is studied.

We used *Helianthus annuus* hypocotyls grown and treated with IAA-C¹⁴ according to the procedures in our previous work (Vardar, 1959). The radioactive auxin was provided by the Waltham Tracer Laboratory; its specific activity was 1.1 mc/mM and the concentration 0.11 mg/ml; the amount of auxin applied was 2.2 mg and the activity applied 100 × 13 CpM. The extractions obtained from hypocotyl sections according to Nitsch and Nitsch (1955) were subjected to paper and thin layer chromatography and the radioactive counting of these was done with a Nuclear Chicago M-5 Gas Flow Counter. Paper chromatograms were run on Whatman No. 2 paper in isopropanol-ammonia-water. For thin layer chromatography the Desaga-apparatus and Kalde-wey's technique (1964) were used. Rf values, UV absorption traces, colour spots obtained with Salkowski reagent and autoradiographic results were compared and from them the amounts of radioactivity in various spots determined.

The results from the Salkowski colour evaluation test and the autoradiographic determinations on the chromatograms (fig. 1) show that the externally applied IAA-C¹⁴ is at least partially transported as IAA in hypocotyls. It passes even under the TIBA paste ring proving thereby that TIBA does not block its transport. These results support our earlier view (Vardar, 1959) and show that IAA-C¹⁴ is at least partly responsible for the radioactivity observed in the hypocotyl tissue under the TIBA paste ring. At the same time a comparison of the radioactivity evaluations in thin layer chromatograms (table 1) shows that in the various spots the activity was generally higher in TIBA treated hypocotyl tissues than in the controls. This supports the view that the TIBA treatment enhances the rate of accumulation of externally applied IAA-C¹⁴ within the hypocotyls as pointed out by various workers (Goldsmith and Thimann, 1962; Christie and Leopold, 1965; Vardar, 1959; Winter, 1967).

To explain the physiological phenomena occurring during growth in length (induced by IAA) it is necessary to identify the substances derived from IAA. Several investigations (Andreae and Good, 1955; Klambt, 1960; Rausendorff-Bargen, 1962) show that IAA applied externally to the coleoptile is transformed into various substances depending on the concentration and the length of time of application. Klambt (1960) found 3-indole aspartic acid, 3-indole carboxylic acid and

3-indole acetic acid as the characteristic substances. Our studies confirmed these results, three spots on the chromatograms corresponding to 3-indole aspartic acid (0.07), 3-indole carboxylic acid (0.25) and 3-indole acetic acid (0.35); in addition to these we found a fourth radioactive derivate, the Rf value of which (0.45) corresponds roughly to 3-indole propionic acid or 3-indole butyric acid (Audus, 1959). With UV we noticed a derivate which approximately corresponds to 3-indole acetamide (Rf 0.80) which was also mentioned by Klambt; it did not show any radioactivity in our experiments.

In conclusion we may say that IAA-C¹⁴, applied externally to young green seedlings of *Helianthus annuus*, is transformed into different metabolic derivatives during the transport and that TIBA accelerates these changes. This might explain the action of TIBA on plant growth but additional biochemical experiments are necessary before drawing definite conclusions.

Table 1
Proportional radioactivity in different zones of chromatograms

Spot Rf		TIBA-treated upper part	lower part	Control upper part	lower part
0.07	3-indole aspartic acid	295	82	180	30
0.25	3-indole carboxylic acid	45	18	28	15
0.35	3-indole acetic acid	54	21	50	12
0.45	3-indole propionic or 3-indole butyric acid	85	15	64	7

Zusammenfassung

C¹⁴-markierte Indolylessigsäure (IAA, Keimlingen von *Helianthus annuus* äusserlich verabreicht) wird während des Transports in verschiedene verwandte Verbindungen (Tab. 1) umgewandelt. Trijodbenzoësäure (TIBA) bewirkt eine Anreicherung im Hypokotyl und intensiviert die Umwandlungsreaktionen.

This work was supported by the Turkish Atomic Energy Commission.

References

- Andreae W.A. and M.E. Good. 1955. The formation of indole acetic acid in plant seedlings. *Plant Physiol.* **30**, 380-382.
- Audus L.J. 1959. Plant growth substances. Leonard Mall Ltd.
- Christie A.E. and A. Leopold. 1965. On the manner of triiodobenzoic acid inhibition of auxin transport. *Plant and Cell Physiol.* **6**, 337-345.
- Goldsmith M.H.M. and K.V. Thimann. 1962. Some characteristics of movement of indole acetic acid in immobilization and distribution of IAA during basipetal translocation. *Plant Physiol.* **37**, 492-505.
- Kaldewey H. 1964. Papier- und dünnsschichtchromatographische Trennung, Farbreaktionen und biologischer Test einiger Wachstumsregulatoren aus Fruchtstielen von *Fritillaria meleagris* L. *Coll. Int. CNRS Paris.* Nr. **123**, 412-443.
- Klambt H.D. 1960. Wachstumsinduktion und Wuchsstoffmetabolismus in Weizenkoleoptilzylindern. *Planta* **56**, 309-320.
- 1968. Cytokine aus *Helianthus annuus*. *Ibid.* **82**, 170-178.
- Kuse G. 1953. Effect of 2,3,5-triiodobenzoic acid on the growth of lateral bud and on tropism of petiole. *Mem. College of Sci. Kyoto Univ., Series B/20*, 207-215.
- Nitsch J.P. and C. Nitsch. 1955. The separation of natural plant growth substances by paper chromatography. *Beitr. Biol. Pfl.* **31**, 387-391.
- Rausendorff-Bargen G.V. 1962. Indole derivate in apple. *Planta* **58**, 471-476.
- Vardar Y. 1959. Some confirmatory experiments performed with IAA-C¹⁴ concerning the effect of TIBA upon auxin transport. *Rev. Fac. Univ. Istanbul. Ser. B. XXIV, Fasc. 1-2*, 133-250.
- Winter A. 1967. The promotion of the immobilization of auxin in *Avena* coleoptiles by triiodobenzoic acid. *Physiol. Plant.* **20**, 330-336.