

TRANSPORT BEHAVIOUR OF 2,4-D IN DECAPITATED SUNFLOWER SEEDLINGS

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Abstract. The transport behaviour of the isotopically labelled synthetic auxin, 2,4-D has been studied in 21 day old sunflower (*Helianthus annuus*) seedlings which were decapitated in the epicotyl (Brown *et al.* 1979). Steam-ringing techniques have been used to differentiate between apoplastic and symplastic movement.

2,4-D was applied in aqueous bicarbonate solution to the cut surface of decapitated seedlings at sub-lethal levels (< 100 nmoles/seedling), and was found to be widely distributed throughout apoplastic stem tissue within 5 to 30 minutes of application. This material was then slowly redistributed, the direction and mode of movement depending on the amount present. Thus, when 2,4-D was applied at low levels (< 2 nmoles/seedling), it moved basipetally in the symplast and accumulated in the root, whereas when applied at higher levels (4 to 20 nmoles/seedling), it moved acropetally in the apoplast and concentrated near the stump surface, where callus growth was observed.

This behaviour suggests that the 2,4-D initially present in the apoplast is transferred in the vicinity of the cut surface to the symplast where it is loaded on to the auxin polar transport system of the plant and is moved to the root. However, when higher levels of 2,4-D are present it is postulated that the transport system becomes overloaded and the auxin spills over into pith tissue where meristematic activity is stimulated and a new auxin sink established. This would be consistent with the observed accumulation of 2,4-D and the growth of callus tissue near the cut surface.

These results indicate that the transport behaviour of sub-lethal rates of 2,4-D is critically dependent upon the concentration present - a twofold change in 2,4-D level being sufficient to completely alter the direction and mode of its movement within the plant.

Brown, B.T., C. Foster, J.N. Phillips and B.M. Rattigan. 1979. *Planta* 146: 475-480.