T. Pl.ziekten 64 (1958): 333–334

KORTE MEDEDELINGEN

SOME REMARKS ON THE VAN RAALTE TEST FOR THE TRANSLOCATION OF FUNGICIDES THROUGH PLANT TISSUES [1])

Met een samenvatting: Enkele opmerkingen over de VAN RAALTE-proef aangaande het transport van fungiciden in planteweefsels

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In 1952 VAN RAALTE developed a method for studying the translocation of fungicides through plant tissues in a research program for systemic fungicides (VAN RAALTE, 1952, 1955). The fungicide was contained in a disc of wet filter paper on top of a 5 mm section from a potato petiole. The petiole section was placed with one end on a nutrient agar plate in a petri dish previously inoculated with conidia of *Penicillium italicum*.

2,4,6-Trichloro-phenoxyacetic acid and tetramethylthiuram monosulfide (TMTM) could apparently be translocated through the tissue of the petiole and diffuse through the agar where they caused a clear inhibition zone around the base of the petiole after three to four days.

Ethylene bisdithiocarbamate, dimethyl-dithiocarbamate (as sodium salts) and TMTD did not give an inhibition zone. The phenoxyacetic acid derivative gave inconsistent results. VAN RAALTE proved that TMTM is transported passively through the parenchyma of the petiole. He pointed out that no correlation between (water) solubility and "systemic" activity seems to exist, for the two dithiocarbamates were not translocated, while they are a hundred times more (water) soluble than TMTM which is always translocated.

The present author believes that this method gives only translocation with more or less lipoid-soluble fungicides. The walls of the parenchyma cells of the potato leaf stalk contain very probably a fair amount of lipoids (suberin, cutin) which cause lipoid-soluble substances (fungicides, fluorochromes etc.) that are introduced to spread rapidly, possibly by capillary forces, via the interphases of the intercellular spaces of the phloem parenchyma (ARISZ, 1953; VAN DEN HONERT, 1932; RICE & ROHRBACH 1953, 1955; SCHUMACHER, 1947; SCHUMACHER & HÜLSBRUCH, 1955; STRUGGER, 1949).

The two substances found translocatable in the VAN RAALTE test are lipoid-soluble and not very water-soluble. TMTD, a lipoid-soluble substance, is easily reduced to N-dimethyldithiocarbamate, a water-soluble fungicide. This may explain the fact that the fungicidal property of the chemically more stable TMTM is translocated in the VAN RAALTE test and not that of TMTD. The on a weight base much more important waterphase(s) in the potato petiole apparently form a considerable obstacle. After passing the probably continuous

[1]) Accepted for publication 18 July 1958.

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lipoid phase of the petiole, fungicide molecules must pass a "water barrier", the nutrient agar, on their way to the conidia in the test. They must hence possess a certain minimum solubility in water besides a good lipoid solubility for the rapid transport through the petiole and a high activity to be discovered in the final high dilution at the agar surface.

That the potato petiole section in the above mentioned test has lost several vital functions, such as mass flow through the vascular system, respiration and protoplasmic streaming as a result of the cutting and subsequent depletion of substances like auxins and metabolic substrates may be considered as an advantage. This prevents fungicides being actively translocated or transported by mass flow through the petiole. The test may prove of value in the study of details of the translocation phenomenon, especially if more sensitive detection methods are applied.

SUMMARY

The suitability of the VAN RAALTE test for the study of the translocation of fungicides through the parenchym for mainly lipoid-soluble substances is discussed.

SAMENVATTING

De geschiktheid van de VAN RAALTE-proef voor de bestudering van het transport door het parenschym van fungiciden wordt besproken. Er wordt op gewezen, dat deze proef slechts resultaat oplevert wanneer de betrokken fungiciden goed in lipoïden en enigermate in water oplosbaar zijn. Men dient in het oog te houden, dat in de stukjes aardappelbladsteel, die in de proef worden gebruikt, vitale functies te loor gaan. Zo is er geen beweging van vloeistof in de vaatbundels, die verantwoordelijk kan worden gesteld voor transport van fungiciden door het stukje bladsteel.

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