MOVEMENT OF PHOSPHATE IN THE ROOT SYSTEM OF THE BROAD BEAN (*VICIA FABA*)

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Although radio-isotopes have been used frequently in studies of the uptake of nutrient ions by plants, the only work appertaining to the movement of radio phosphorus within the root system appears to be that of KRAMER AND WIEBE[1] with barley.

A study has been made of the movement of ^{32}P within the root system of intact broad bean plants, which were allowed to absorb radio-active phosphate under approximately normal conditions. Plants were grown in full culture solution until the shoot length was 15 to 20 cm, when the root system was well developed. After transfer to culture solution (less phosphate) for 24 hours, the roots were washed and one lateral, or two adjacent ones, immersed in 10^{-4} *M* KH_2PO_4 with added $H_3{}^{32}PO_4$. This solution was contained in a small test tube which was sealed on to the selected laterals with vaseline. The whole root system with attached tube was then immersed either in water or in various non-toxic solutions and observations were made on the path and rate of movement of ^{32}P.

After various periods of time (10, 20, 45, 60, 75 and 90 minutes) the plant, excluding the lateral roots which had actually dipped into the active solution, was cut up into portions which were dried and ground. 30 mg samples were then tested for radioactivity by means of a mica end-window Geiger counter.

The results indicated that in times up to 75 minutes ^{32}P tended to spread within the root system. In the early stages of these experiments ^{32}P accumulated in the laterals below the point of entry; later it also became concentrated in the laterals above this point. After about 75 minutes material from the two basal internodes showed that large-scale migration into the shoot had commenced, although the stem apex still gave negligible counts.

It was concluded from these short-duration experiments that even if movement of phosphate up the plant is controlled eventually by the transpiration stream[2,3,4], ^{32}P administered as phosphate is first translocated throughout the root system and can move against the direction of water flow before entering the shoot. Since the same effect was observed when the root system was immersed in an equimolar solution of KH_2PO_4, it is assumed not to be due to non-availability of external phosphate to other lateral roots, but may form part of a cyclic movement of phosphorus about the plant similar to that observed by BIDDULPH[5] in *Phaseolus*.

The work is continuing and a full description will be published later.

REFERENCES

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