

# A PERSPEX BOX FOR MICROSCOPIC OBSERVATION OF LIVING ROOTS<sup>1</sup>

*Een perspex-bakje voor het microscopisch bekijken van levende wortels*

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In rhizosphere studies it may be important to observe living roots at different stages of development. LINFORD (1942) described a root observation box for this purpose. He also described how to overcome the difficulties of using incident light for observation. DEN OUDEN (1958, 1960) worked with roots in flat plastic bags with agar, which enabled him to observe with transmitted light. Both methods have a disadvantage, the first because of the use of incident light, the second because of the use of an agar-medium for rooting. Therefore a root observation box was constructed which is suitable for observation with transmitted light and in which plants can root in soil. The idea is not unlike that described by DONCASTER (1964), but the box is simpler in construction and therefore cheaper. The production cost is about f 15.— each.

From 20 mm thick perspex a piece  $50 \times 60 \text{ mm}^2$  is taken. In this piece a cavity is milled in such a way that a flat box remains, open at the top and at one of the longer sides, and having a block saved in its centre (Fig. 1). The back side, B, of the box is 3 mm thick, the other margins and the bottom are 6 mm. The front side of the block measures  $17 \times 25 \text{ mm}^2$ . The front of the box is closed with a  $50 \times 60 \text{ mm}^2$  piece of 1 mm thick perspex, having a hole  $21 \times 29 \text{ mm}^2$  in its centre. The central hole can be covered with a  $24 \times 32 \text{ mm}^2$  coverslip which can be fixed with "sellotape" (Fig. 1b). For higher magnifications it might be advisable to use a thin polyethylene sheet instead of the glass coverslip. This allows observation at lower levels.

The O-shaped hole around the block can be filled with soil. Care should be taken to avoid soil entering the 1 mm wide space between block and coverslip. By sowing seeds carefully a sufficient number of roots will grow into the space between coverslip and block. By putting the box on side B under the microscope the roots can be observed by transmitted light and under high magnifications. As the thickness of the hole in which the roots grow is 1 mm, a  $40 \times$  objective cannot be used for observation of the lowest parts.

The cavity is not a fully natural environment for the roots, but it may be compared with a rather big hole in natural soil.

To prevent roots from growing in the light the root observation boxes are kept in a wooden container. Watering can be done on a constant weight base. The size of the unit can be adapted to the object.

The boxes are in use for observation of *Ophiobolus graminis* Sacc., rhizosphere fungi and bacteria on the roots of wheat. Compared with incident light the contrast is good as may be seen from Fig. 2, showing hyphae of *O. graminis* growing along root hairs of wheat. In the boxes the wheat-plants can be kept for longer than one month.

<sup>1</sup> Accepted for publication 22 April, 1966.

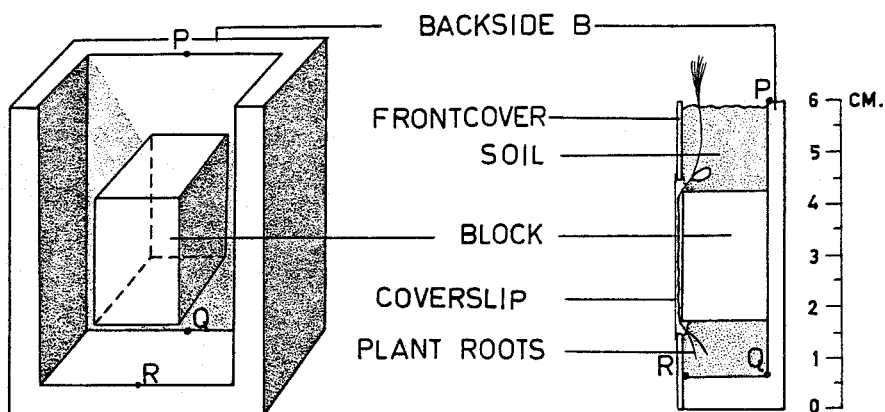


FIG. 1a

FIG. 1b

FIG. 1. The perspex box. / *Het perspex-bakje.*

a. The box without front cover ( $\times 5/8$ ).

*Het bakje, van voren nog niet afgesloten ( $5/8 \times$ ).*

b. Section of the box in the plane PQR, with front cover and coverslip ( $\times 5/8$ ).

*Doorsnede van het bakje volgens vlak PQR, met voorwand en dekglas ( $5/8 \times$ ).*

#### SAMENVATTING

Een beschrijving wordt gegeven van een perspex-bakje, waarin men wortels van levende planten onder de microscoop met doervallend licht kan observeren, terwijl de planten in grond wortelen.

#### REFERENCES

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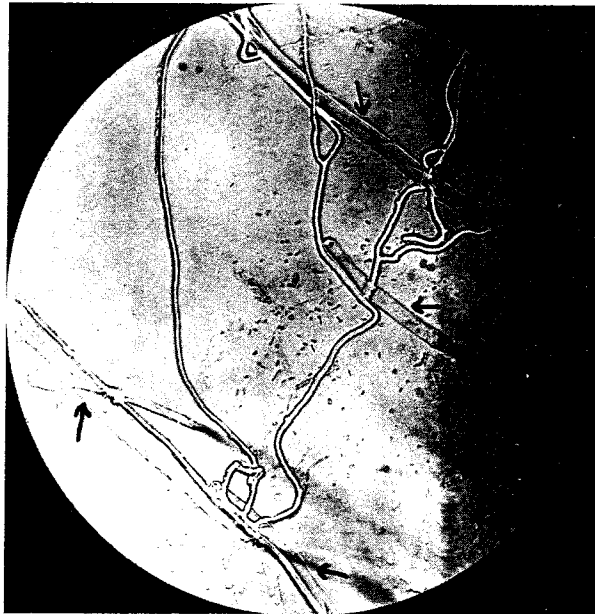


FIG. 2. Root hairs of wheat (arrowed) with hyphae of *Ophiobolus graminis* growing along them. The small dots are groups of bacteria. Microphotograph,  $\times 300$ .

*Wortelharen van tarwe (pijl) met hyfen van Ophiobolus graminis die er langs groeien. De stippen zijn groepen bacteriën. Microfoto, 300  $\times$ .*