Water balance of a wheat crop

A team of French researchers evaluated the water consumption of a winter wheat crop in a thick soil to determine the water balance of the soil [1]. The purpose of this work was to quantify the quantities of water that enter, leave or remain in the soil during a given period. In the event of an exceptional drought, these crops develop their root systems deeper, in particular to find water.

1. Device

Monitoring carried out for 4 years in a thick soil under winter wheat. Decadal (every ten days) measurements of humidity by neutron device every 10 cm down to 1.60 m. Measurements of actual evapotranspiration (ETR) and precipitation (P).

2. Key findings of the study

For the dry summer years (1976 and 1979), the real deficit Σ(P – ETR) is greater than the change in soil water stock observed in the 0-170 cm range, reflecting a total upwelling of about 100 mm for both wheat and alfalfa.

Such figures are not negligible. In 1976 (a year of exceptional drought), cereal yields were satisfactory on the plots studied. The water requirements of crops can therefore be met from reserves present in the soil, including in very deep layers (> 170 cm), during periods of severe drought. Samples showed that 80% of the root mass was in the 0-75 cm range.

The authors were unable to determine whether the additional 100 mm used was due to capillary rise or absorption by the roots beyond 170 cm depth.

3. Comments

Under exceptional drought conditions, wheat had to sink its roots to a depth of much more than 75 cm to obtain water. There is no link between "root abundance" and "root efficiency" when needed (during a critical period).

Notes et références

Cover image. Wheat field [Source: Photo Pixabay]

[1] Katerji, N., Daudet, F. & Valancogne, C. (1984). Contribution des réserves profondes du sol au bilan hydrique des cultures. Détermination et importance. *Agronomi*e, 4 (8), pp. 779–787.
