Abstract

Root system development in the early phases of plant ontogeny

Seed germination and subsequential developement of the root system is a critical stage of life of a newly rising plant. The plant must recognise and suitably and quickly find an answer to the environmental conditions in which it finds itself. However, the way in which the root system develops and its final architecture depends not only on the environmental conditions but also on the plant itself. In addition, responses to different conditions may vary among different plant species.

This work examines the developement of a root system in the first four weeks of a plant's life. It observes the dependence on the amount of available nutrients in the substrate and on the amount of available nutrients the seed is given by the mother plant. It also briefly touches on the relations between seed germination, seed size and the amount of available nutrients.

No differences relating to the amount of available nutrients were found in seed germination. However, differences in germination speeds were found between plant species.

Plant biomass increases with the increasing amount of available nutrients in the substrate. This increase is relatively greater for plant species with a small seed size. Plant species with a big seed size invest relatively more resources in their aboveground biomass than plant species with a small seed size.

The general design of the root system and its developement in time is species specific and is related to the seed size. Surprisingly, both design and development in time are not affected by the amount of nutrients available in the substrate. By contrast, the lengths and numbers of roots are affected by the amount of nutrients available in the substrate and the effect is equal for all observed species.

The initial stage of the plant's growth is affected by the amount of available nutrients in the seed and the amount of available nutrients in the substrate. Nutrients available in the seed influence different parameters than the nutrients available in the substrate.

Key words: root-system development, nutrient availability, seed germination, R/S ratio, Fabaceae