

IMPACT OF BIOAVAILABLE PHOSPHORUS ON PLANT AND SOIL MICROBIAL COMMUNITIES IN GRASSLAND UNDER RESTORATION MANAGEMENT

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Introduction

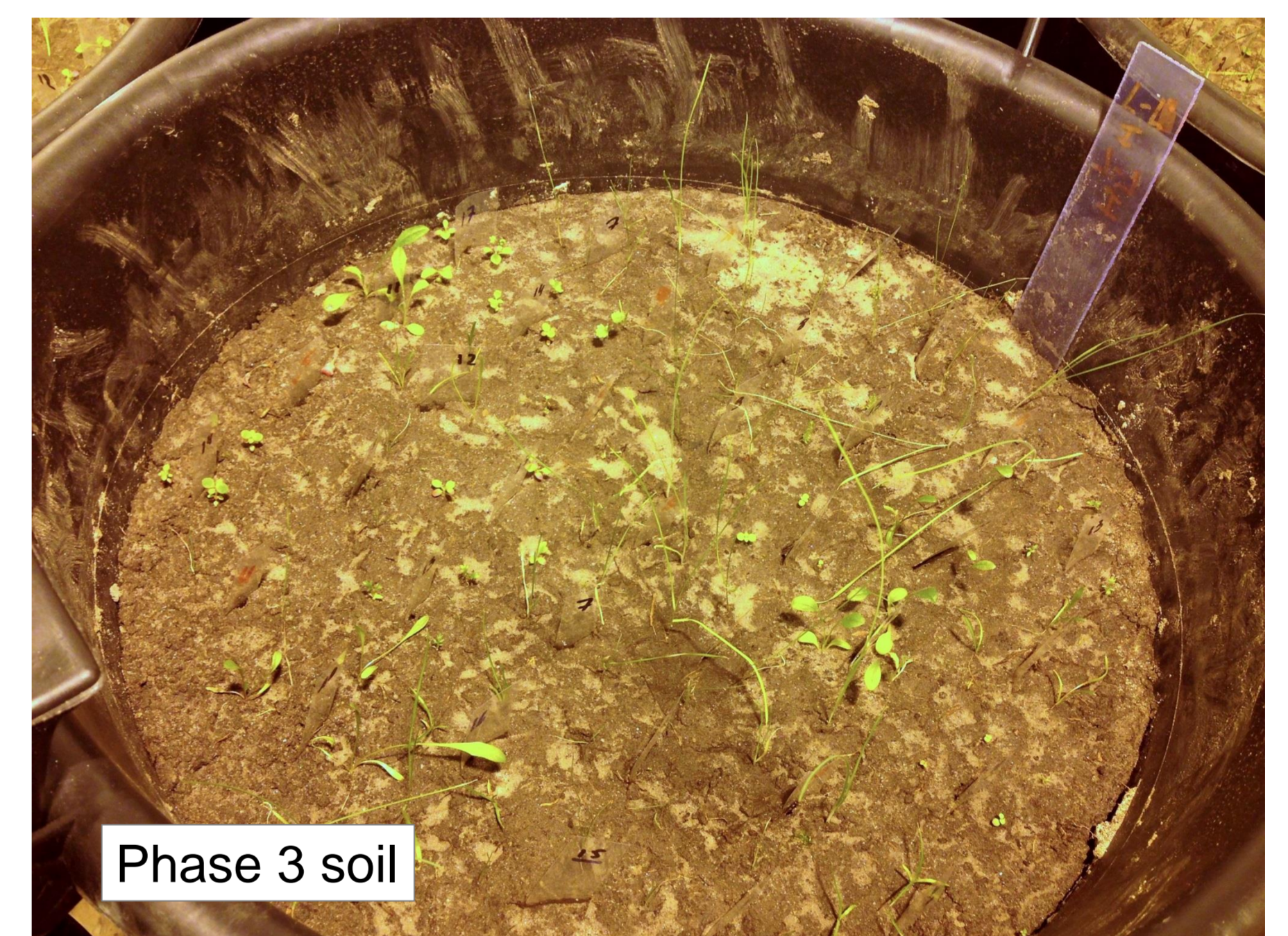
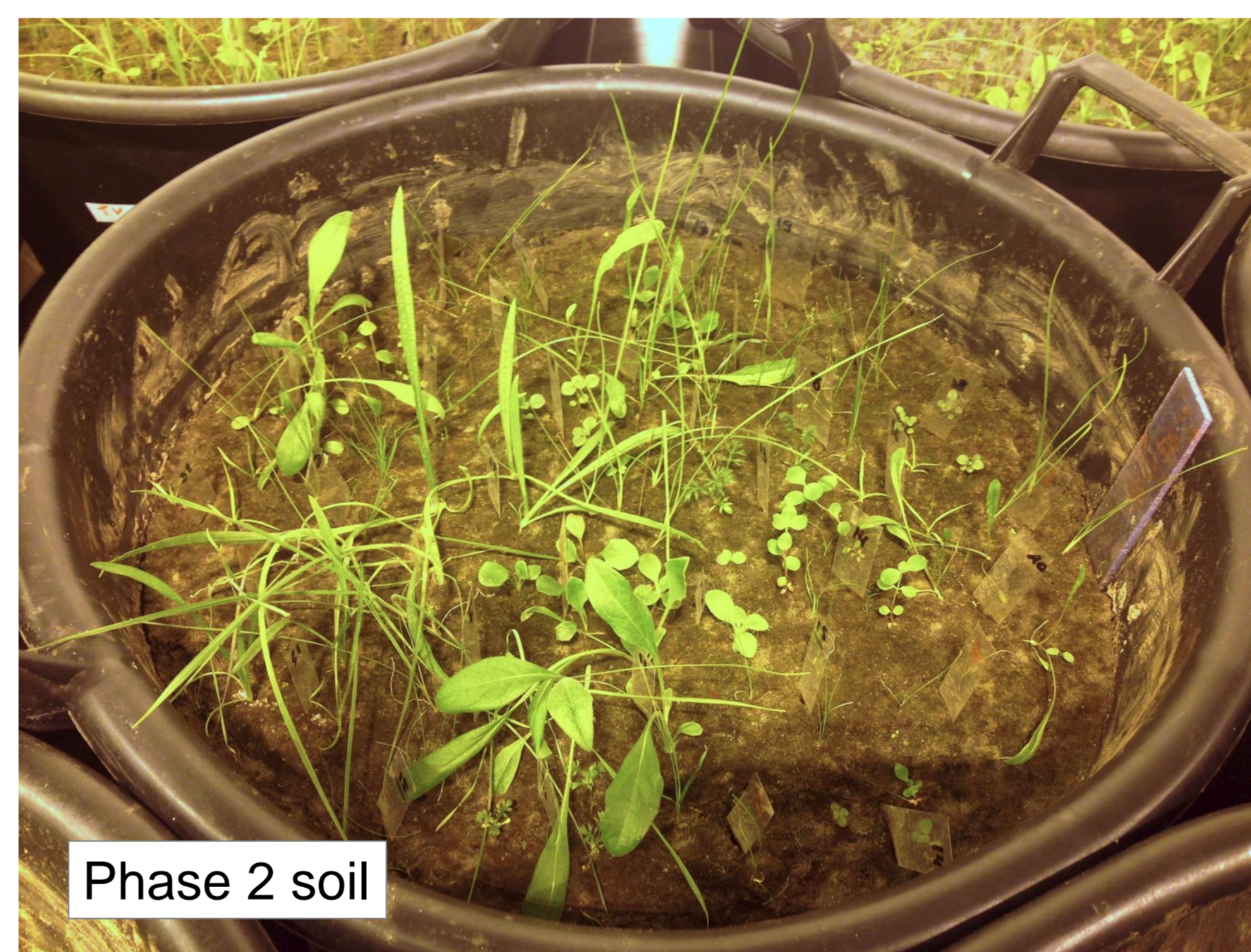
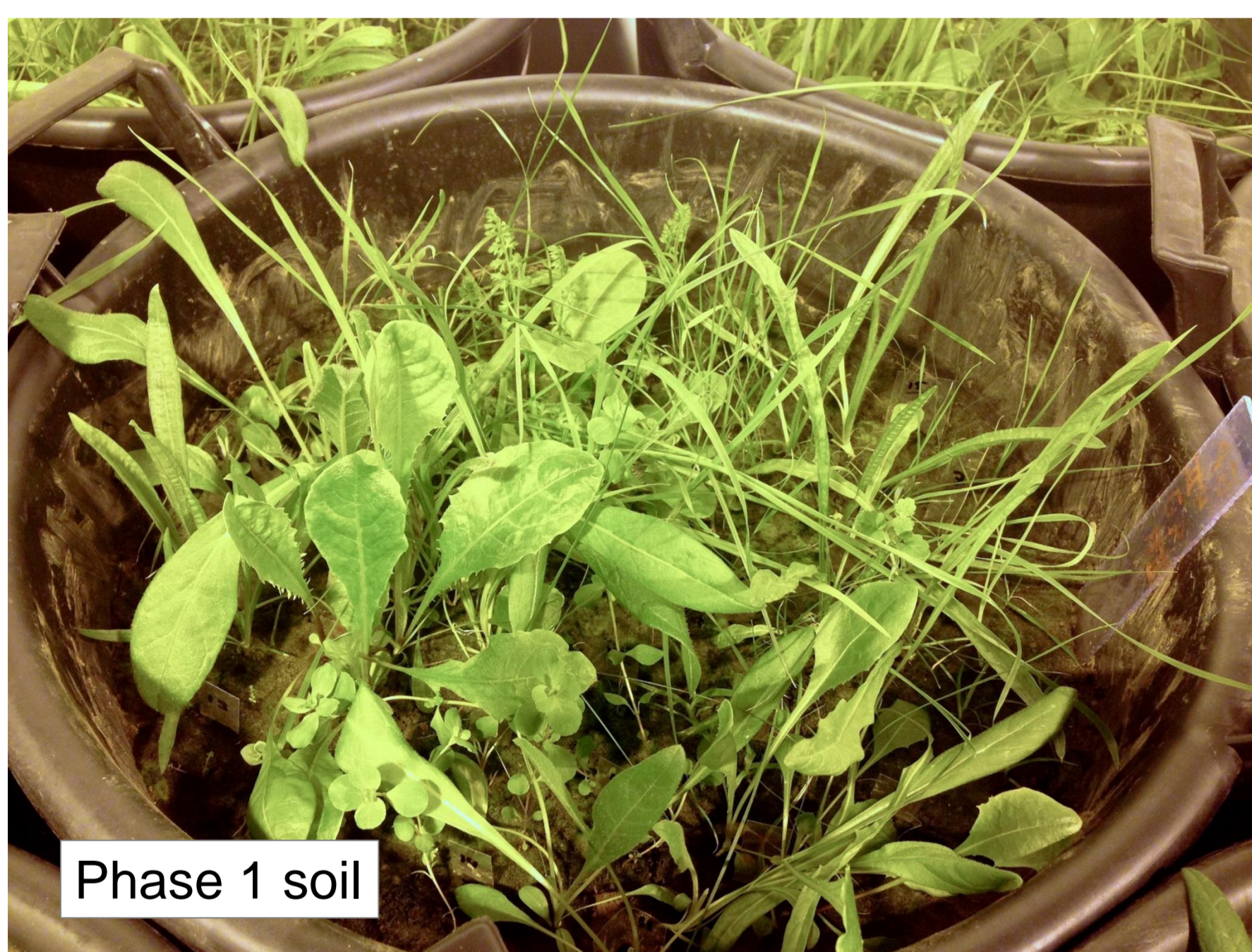
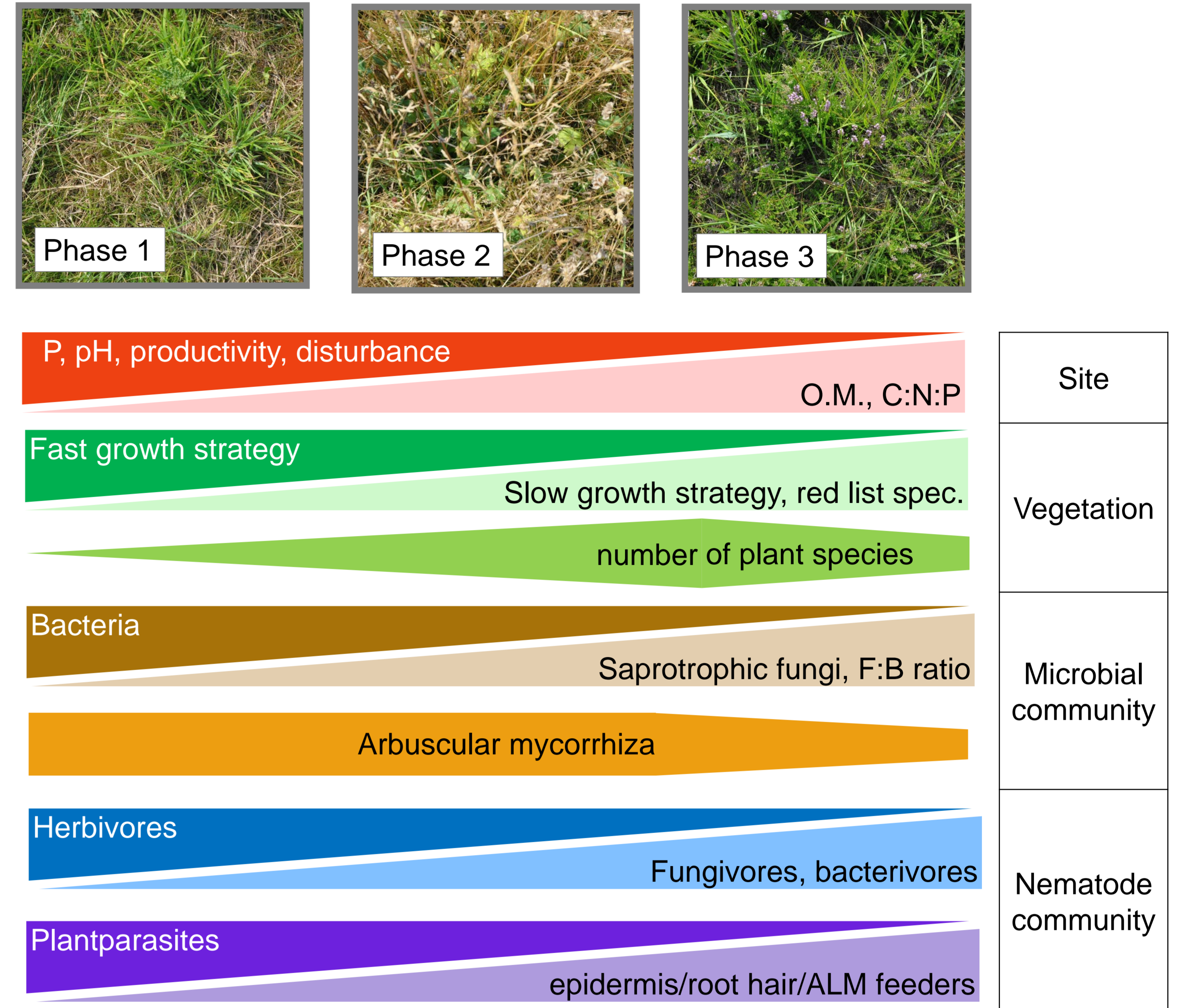
Semi-natural grasslands are often hotspots of biodiversity, but their extent decreases steadily in Western Europe. The European Habitats Directive therefore aims at their protection and restoration. Several western European countries seek to restore semi-natural grasslands through conversion of agricultural land. However, development of species-rich grassland communities on abandoned agricultural land faces several major bottlenecks. Besides the potential unavailability of seeds of target plant species, the high nutrient levels and disturbed soil organism communities may further hamper restoration.

Phase 1 recent agricultural meadow with fast-growing grasses like *Lolium perenne*, *Holcus lanatus*, *Agrostis stolonifera*

Phase 2 years to decades of mowing management has depleted soil nutrient concentrations. Co-dominated by many herbs and grass species

Phase 3 Nutrient poor *Nardus* grasslands with slow-growing plants like *Molinea caerulea*, *Calluna vulgaris* and *Erica tetralix*. No history of intensive agricultural use.

Restoration phases



Same plant communities, different soils

Artificial plant communities composed of 19 species (mix of typical plants across restoration phases) were established in pots with 9 soils (3 of each restoration phase). Pictures above depict the situation 1 month after seedlings were planted.

Phase 1 soil fast-growing plants typical for phase 1 grow extremely fast and start to overshadow the others

Phase 2 soil similar response, but far less pronounced

Phase 3 soil very little growth, some fast-growing plants like *Taraxacum officinalis* even start to die

Future research

The preliminary response of plant communities depicted above is the response of co-varying soil characteristics such as bioavailable nutrients, pH, organic matter content and soil biota.

To disentangle the relative importance of soil nutrients and soil biota on vegetation development or 'restoration success', a larger-scale pot experiment will be used. A similar fixed plant community will be established in a sterilized substrate. Treatments will be full factorial combinations of fresh soil inoculation (phase 1-3) and N and P fertilization. Vegetation development will be monitored, and nematode, bacterial and fungal communities will be assessed and reassessed in the inoculum and after two years of vegetation development.