

## Aims

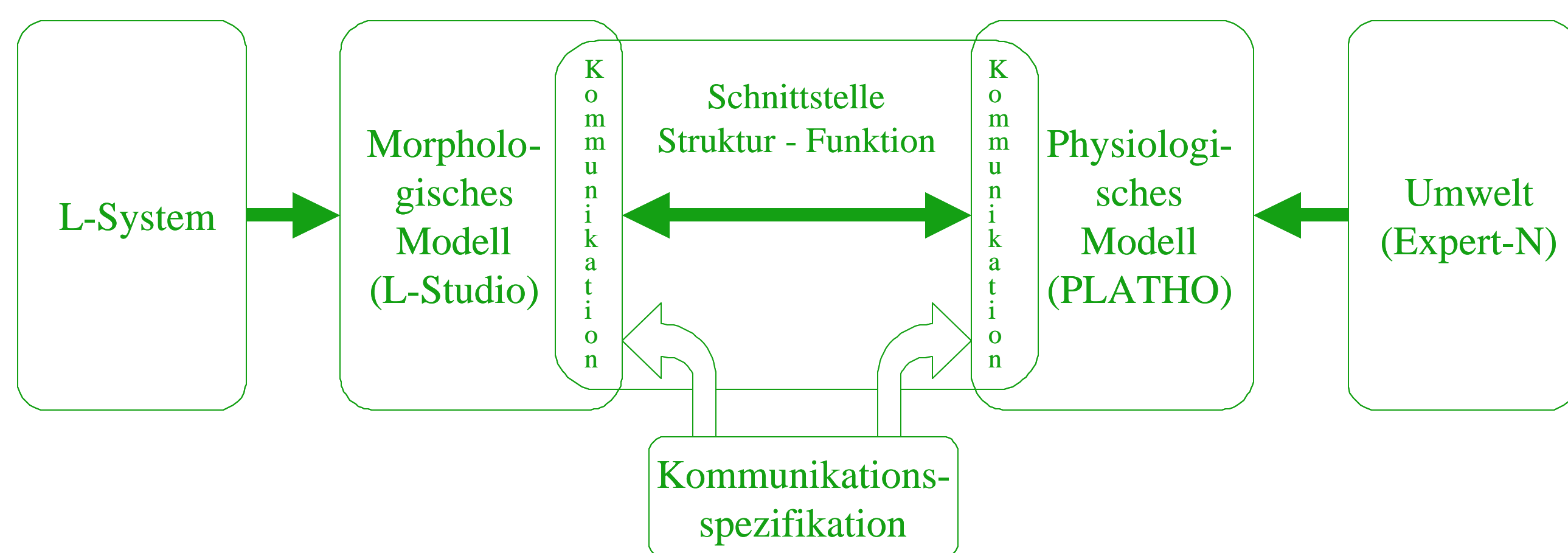
- Aggregation and integration of knowledge and hypotheses about the plant-mycorrhizosphere system
- Enhancement of the understanding of mechanisms that govern the system
- Test of working hypotheses of the SFB
- Investigation of theoretical questions about the possible behaviour of the system

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## Model improvement and extension

1.) Coupling of the “physiological“ plant model with a structural modelling approach → “**ecomorphological model**“



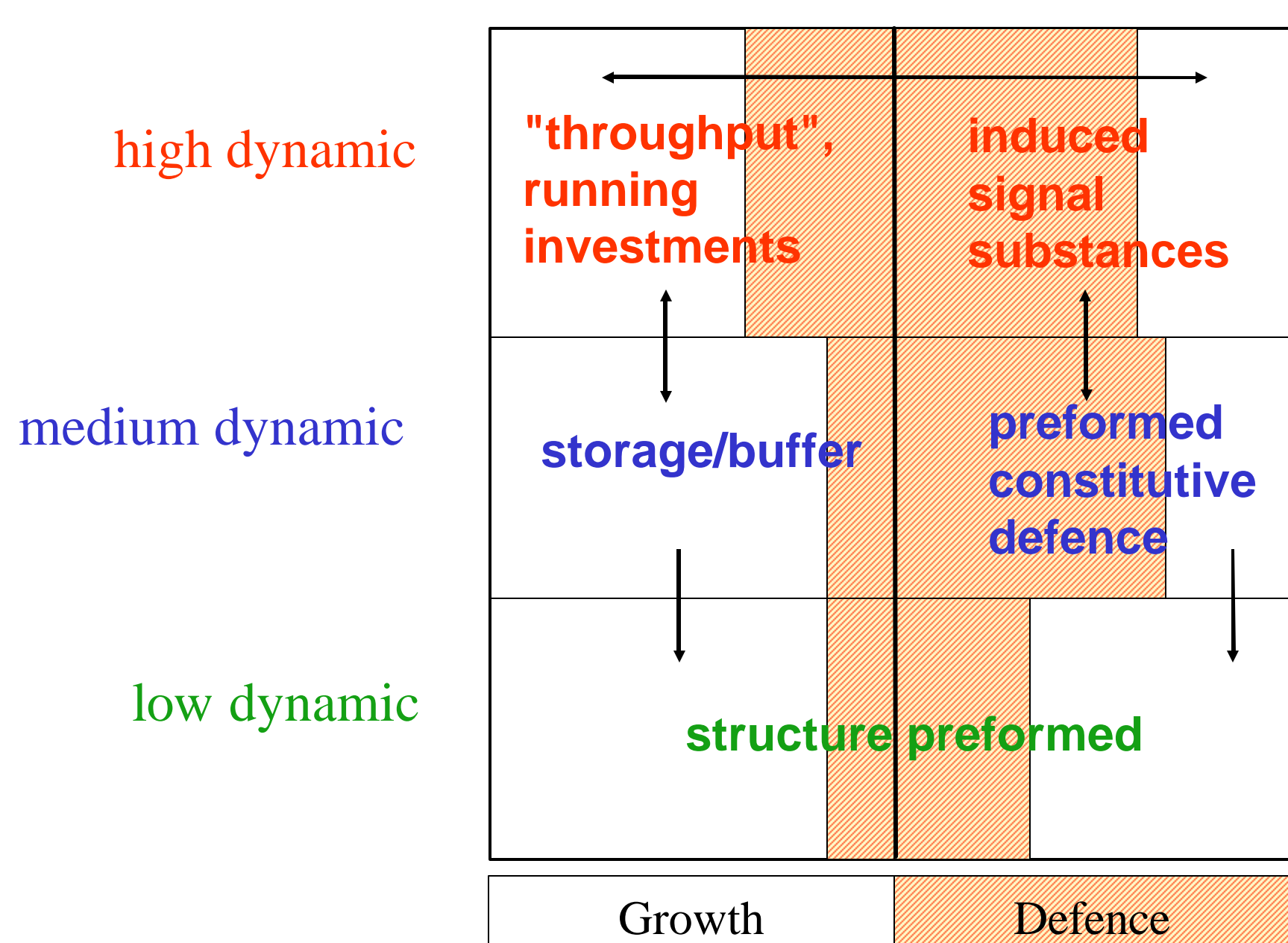
Aims: Utilisation of local information about geometry, environment and physiology to consider source-sink relations within the plant and to analyse space sequestration strategies of different plant species. Parameterisation of the structural model with data from A8 (apple), B5 (beech and spruce) and B6 (sunflower).



Consideration of plant structure enables the

- simulation of defence reactions on the level of single leaves/organs
- examination of non central allocation strategies
- improvement of modelling competition for light and nutrients

2.) Improved modelling approach for the simulation of C- and N-flows between biochemical pools

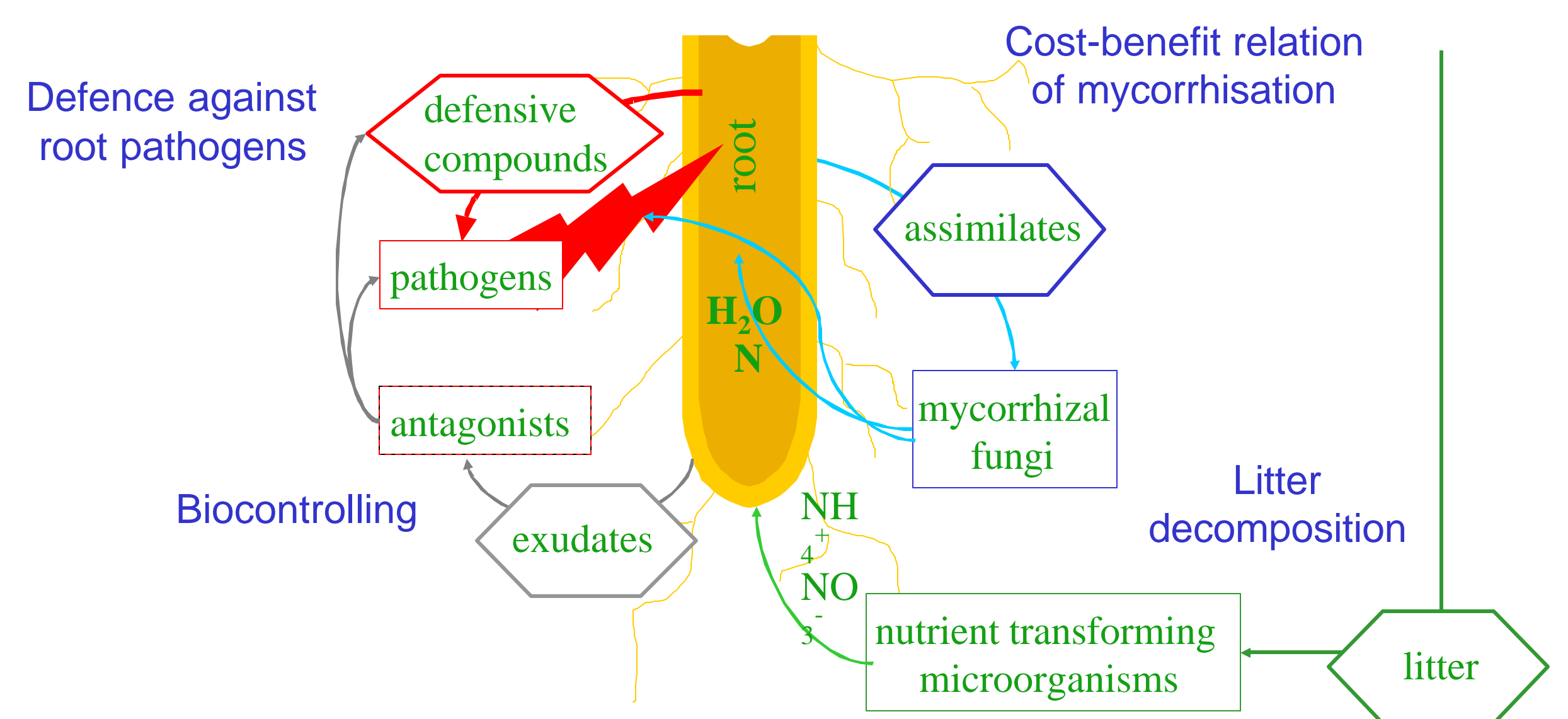


Aims:

- Distinction of biochemical pools with respect to their dynamics
- Differentiation between transient induced and persistent constitutive defensive compounds
- Simulation of defence reactions under consideration of defence related gene expression: estimation of parameter values by means of multiple linear regressions

Parameterisation: data from A1, A8 (apple), A10 (potato)

3.) Parameterisation of a comprehensive sub-module for modelling interactions within the mycorrhizosphere



•Aims: scenario calculations

•Parameterisation in cooperation with A1, A6, B5, B7 and B9 (beech).

## Model application

Retracing experiments by means of simulation:

- balancing flows of C, N and H<sub>2</sub>O in the experiments in phytotrons, containers and lysimeters
- comparison with experimental results on growth and resistance of potato, apple, beech, spruce
- test of the underlying hypotheses relating to the plant internal “trade-off” between growth and defense
- Uncovering further need of research where model predictions disagree with experimental results

Scenario calculations under other than the experimental conditions:

- estimation of possible reactions of the plant soil system under different biotic and abiotic stress situations
- Extrapolation of experimental results to other site conditions and to long term simulations

Co-operation with project C3:

- Test of the compatibility of the models PLATHO and BALANCE: comparing simulation results for objects that can be simulated by both models
- Parameterisation of BALANCE-processes by means of PLATHO-simulations (photosynthesis, rhizosphere)
- Coupling of both modelling approaches in concerted scenario simulations: simulation of competition between young beeches and spruces under field conditions in an adult stand