

# PhD Thesis Review

Jana Duchoslavová: Role of clonal integration in plant competition

Review written by Dr Beáta Oborny

5 August, 2024

Physiological integration between ramets is an exciting option in clonal plants, and it can significantly influence the plant's growth and competitive ability. The thesis spans across various spatial scales and organizational levels, from resource flow between individual ramets to the development of plant communities.

This broad perspective characterizes each chapter. The amount of translocated resource(s) is measured by stable-isotope labelling. These data on translocation are complemented by their effect on biomass increment at the ramet level. Finally, the Discussion places the result into the context of the competitive ability of the whole clone, and its participation in the plant community.

The Introductions of the chapters are excellent reviews, I think. I would especially highlight the introductory part of the whole thesis (pages 8-22), which examines integration from many angles, and presents a large amount of literature in an inspiring manner. I would warmly recommend it as a teaching material at a course on clonal plants.

The Author emphasizes that the amount of translocated resource depends on several factors:

- the external resource gradient in the environment,
- the uptake capacity, which varies with the ramet's size and ontogenetic stage, and
- the actual flow of other resources.

I think this is an important summary, and should be considered in any experimental or theoretical study on integration.

The experiments presented in the thesis are clear in their objectives and are conducted with high professional standards, both in terms of experimental techniques and statistical analyses. The thorough consideration of biologically relevant factors is impressive. The Author considers

- both the acropetal and basipetal transport,
- sometimes for both nitrogen and carbon,
- and often in several ontogenetic stages of the ramets.

These phenomena have rarely been studied in clonal plants, and studying them together was new in Jana Duchoslavová's papers. Additionally, two kinds of treatments were applied in many cases: 1) varying the resource level at the mother's and daughter's site, and 2) severing the connection between mother and daughter. This was a large amount of work and provided a more complete understanding of clonal integration. On this basis, the Author suggested distinguishing between three strategies of integration. I think this suggestion is well-grounded, and useful for future studies.

**In summary, the Thesis is excellent, and I highly recommend it for defence.**

### Comments and questions

#### *I) About the shape of the resource utilization curve*

The net benefit of sharing a resource between two ramets hinges on the shape of the curve which describes how the resource is converted into ramet performance. The models cited in the Thesis (Eriksson and Jerling 1990, Caraco and Kelly 1991<sup>1</sup>) distinguish between three cases in which this function is monotonous.

- 1) A concave function, where integration is advantageous,
- 2) a convex function, where it is disadvantageous, and
- 3) a linear function, where it is neutral, assuming that all the other factors are equal.

The Thesis introduces only case 1 in Figure 2 (page 11), and explains the advantage of integration based on this. Later, however, the other cases may appear implicitly in Figure 4 (page 25). This needs clarification, as the alternative cases are not clearly described. The Author switches the interpretation of Figure 2, stating it "represents an increase in growth rate rather than in absolute biomass". Please, clarify this picture. What are the vertical axes in Figures 2 and 4? How are these Figures related to the three basic cases (see above)?

#### *II) About "granddaughters" and further generations*

Experimenting with clonal plants, it is usually a big dilemma whether or not to remove those parts of the clone that grow beyond the planned extent. Your questions and theoretical considerations originally focused on ramet pairs (mother and daughter). However, the daughters developed further ramet generations. Isn't it possible that these created further sinks, and thus increased the likelihood that you would see an "acropetal translocation strategy"? Additionally, could preventing rooting in the younger generations influence the results? What would you expect if only ramets pairs were maintained throughout the experiments?

These comments and questions aim to provide a broader context to the results and do not diminish the value of the thesis.

Beata Oborny

---

<sup>1</sup> Eriksson, O. and Jerling, L. 1990. Hierarchical selection and risk spreading in clonal plants. Pp. 79–94 in: de Kroon, H. and van Groenendael, J. (eds), *The ecology and evolution of clonal plants*. Backhuys Publishers, Leiden.  
Caraco, T. and Kelly, C.K. 1991. On the adaptive value of physiological integration in clonal plants. *Ecology* **72**: 81–93.