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Pyrrolizidine alkaloid variation in Jacobaea plants : from plant organ to cell level

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Thesis:

Pyrrolizidine alkaloid variation in *Jacobaea* plants:

From plant organ to cell level

by Tri Rini Nuringtyas

1. The specific distribution of pyrrolizidine alkaloids (PAs) in the mesophyll of *Jacobaea* sp leaves may form part of the plant's strategy to overcome the specialist-generalist dilemma (this thesis).
2. Until now, it was thought that PA synthesis in *Jacobaea* was exclusive to the root and diversification was exclusive to the shoot. The fact that *in vitro* cultures of shoots can synthesize PA's is in sharp contrast with this idea (this thesis).
3. The free base form of PAs is considered to be more toxic to herbivores than the *N*-oxide form (this thesis).
4. The spatial separation of PAs and chlorogenic acid may be a mechanism to ensure the effect of PAs as a defence compound (this thesis).
5. The importance of the spatial distribution of plant metabolites warrants the application of new metabolomic imaging techniques to plants, since laser microdissection coupled with NMR metabolomics is very tedious and time-consuming.
6. Antagonistic and synergistic effects occur between secondary metabolites. Therefore, the development of natural crop protectants should not be based on individual compound.
7. The diverse PA patterns are not likely to be selectively neutral and should therefore not be seen as the "patio ludens" of evolution. (Hartmann and Dierich, 1998).
8. The interaction between a host and an endophytic fungi does not have to be mutualistic (Clay, 1996; Jaber and Vidal, 2010).
9. Compounds produced by microbes are an underexplored resource for sustainable plant protection.
10. Many people wrongly assume that plant protection using plant based products is without risks for environment and human health.
11. Research is much like photography in that it is an art of observation. It is about finding something interesting in an ordinary place.

