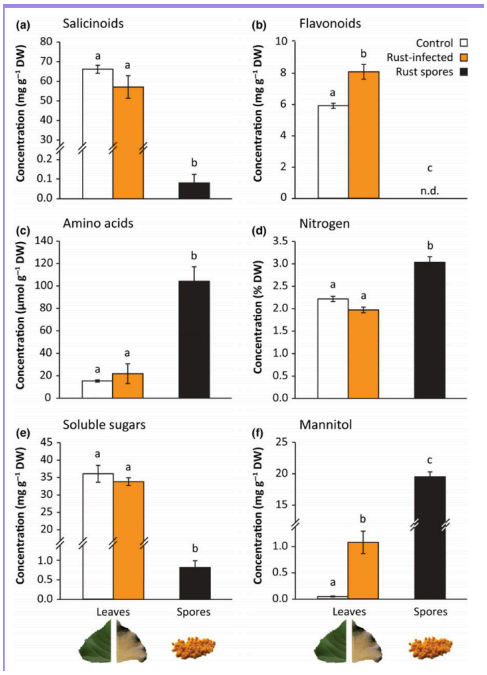
26_01_27 BSBI webinar notes

Plant pathogens are everywhere

- Although they are ubiquitous, it takes time to get your eye in. Many are tiny leaf spots. It is worth spending time in a habitat where there are many obvious species (particularly pavements/brownfield sites) to get used to spotting them.

So what? 1

- There are many species of specialised fungivorous insects, most iconically the mildew-eating ladybirds and the rust-eating midges
- Many mostly herbivorous animals also eat plant pathogens (Eberl et al., 2020)
    - some slugs prefer rust-infected leaves, which accumulate carbohydrates and lipids relative to uninfected leaves (Ramsell & Paul, 1990)
- Erebid moth larvae strongly prefer rust-infected poplar leaves, consuming rust spores preferentially over leaf tissue (Eberl et al., 2020)



Rust spores contain less defense compounds, more amino acids + nitrogen, more mannitol (a sugar alcohol; Eberl et al., 2020)

So what? 2

Model code on my github

- Seedlings close to adult plants of their own species are more likely to die from disease

    - adults are more spread out than you would expect based on the distribution of seeds
    - this effectively creates gaps that are filled by other species and leads to a higher number of species overall
- tropical forests contain many many tree species, most of which basically do the same thing ecologically (that is, grow slowly in late-successional shade and form part of the canopy)
- Janzen and Connell both independently proposed in 1970-71 that species-specific enemies/pathogens prevent any one species from becoming dominant, explaining the high diversity of tropical trees
- Though rarely mentioned Gillett also had some ideas that can be seen as precursors to this in a 1962 paper, including the idea that "pest pressure" more strongly impacts more abundant species leading to Conspecific Negative Density Dependence
- More recent experimental evidence confirms the role of plant pathogens in maintaining biodiversity in plant communities

Floricolous downy mildews

- These change the structure of the flowers, often seemingly to create more surface area for them to produce spores on.
- *Peronospora radii* on *Tripleurospermum maritimum*
    - earlier flowering
    - sometimes more ray florets
- *Peronospora violacea* on *Succisa pratensis*
    - abortion of the anthers
    - considerably larger petals

References

Connell, 1971. On the role of natural enemies in preventing competitive exclusion in some marine animals and in rain forests. *Dynamics of Populations* (Oosterbeek 1970), 298–312.

Eberl et al., 2020. Herbivory meets fungivory: Insect herbivores feed on plant pathogenic fungi for their own benefit. *Ecology Letters*, **23**(7), 1073–1084. https://doi.org/10.1111/ele.13506

Ellis, 2001-2026. *Plant parasites of Europe: leafminers, galls and fungi*. https://bladmineerders.nl (accessed January 27, 2026)

Gillett, J. B. (1962). Pest Pressure, an Underestimated Factor in Evolution. *Systematics Association Publication Number 4: Taxonomy and Geography*, 37–46.

Janzen, 1970. Herbivores and the Number of Tree Species in Tropical Forests. *The American Naturalist*, **104**(940), 501–528. https://doi.org/10.1086/282687

Ramsell & Paul, 1990. Preferential Grazing by Molluscs of Plants Infected by Rust Fungi. *Oikos*, **58**(2), 145–150. https://doi.org/10.2307/3545421