Fungal endophytes in spotted knapweed: Do they affect its invasiveness?

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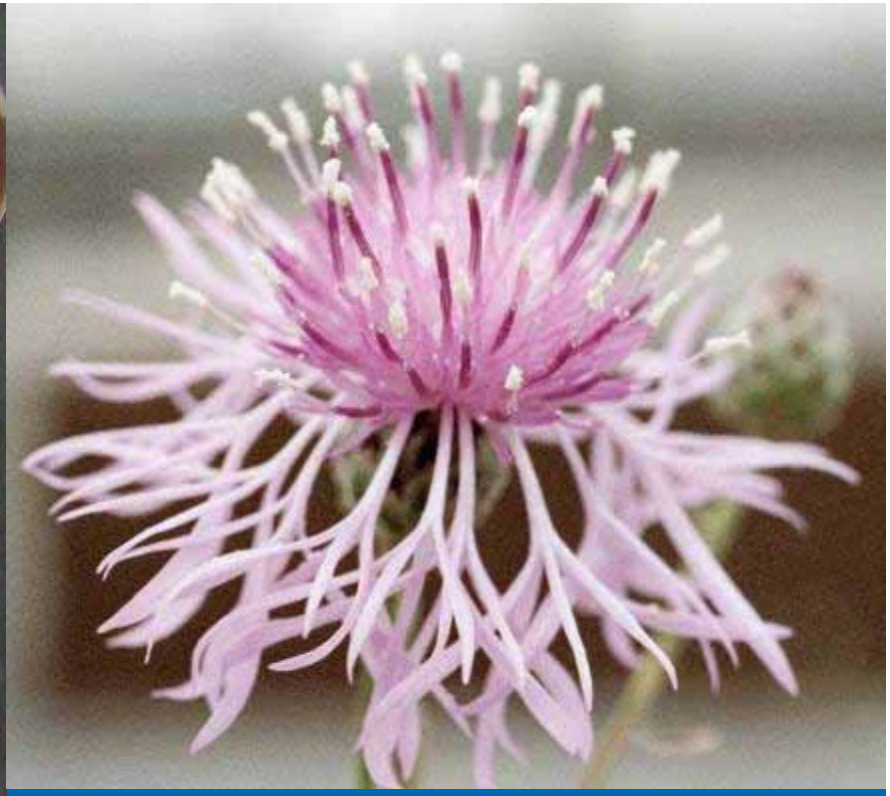
Bais, H.P., Vepachedu, R., Gilroy, S., Callaway, R.M., and Vivanco, J.M. 2003. Allelopathy and exotic plant invasion: from molecules and genes to species interactions. Science 301:1377-1380.

Catechin ...novel weapons hypothesis...questions raised by Hufbauer et al. in Ecology Letters late last year.



◄Endophytes in culture, isolated from viable, knapweed seeds

◄Endophytes in knapweed would be significant if they:

(1)varied in incidence in knapweed populations;

(2) varied in their functional roles in knapweed;

(3) affected the competitive ability of knapweed;

(4) affected knapweed interactions with its biocontrol agents.

(1)Variable incidence of endophytes in knapweed populations

- 17 different sites in 2004/5 (British Columbia, ID, WA, MI and MT).
- A random sample of 100 seeds from 5 plants from each site.
- Isolation frequency ranged from 0 to 85%. Frequencies of 0% tended to be in dry sites.

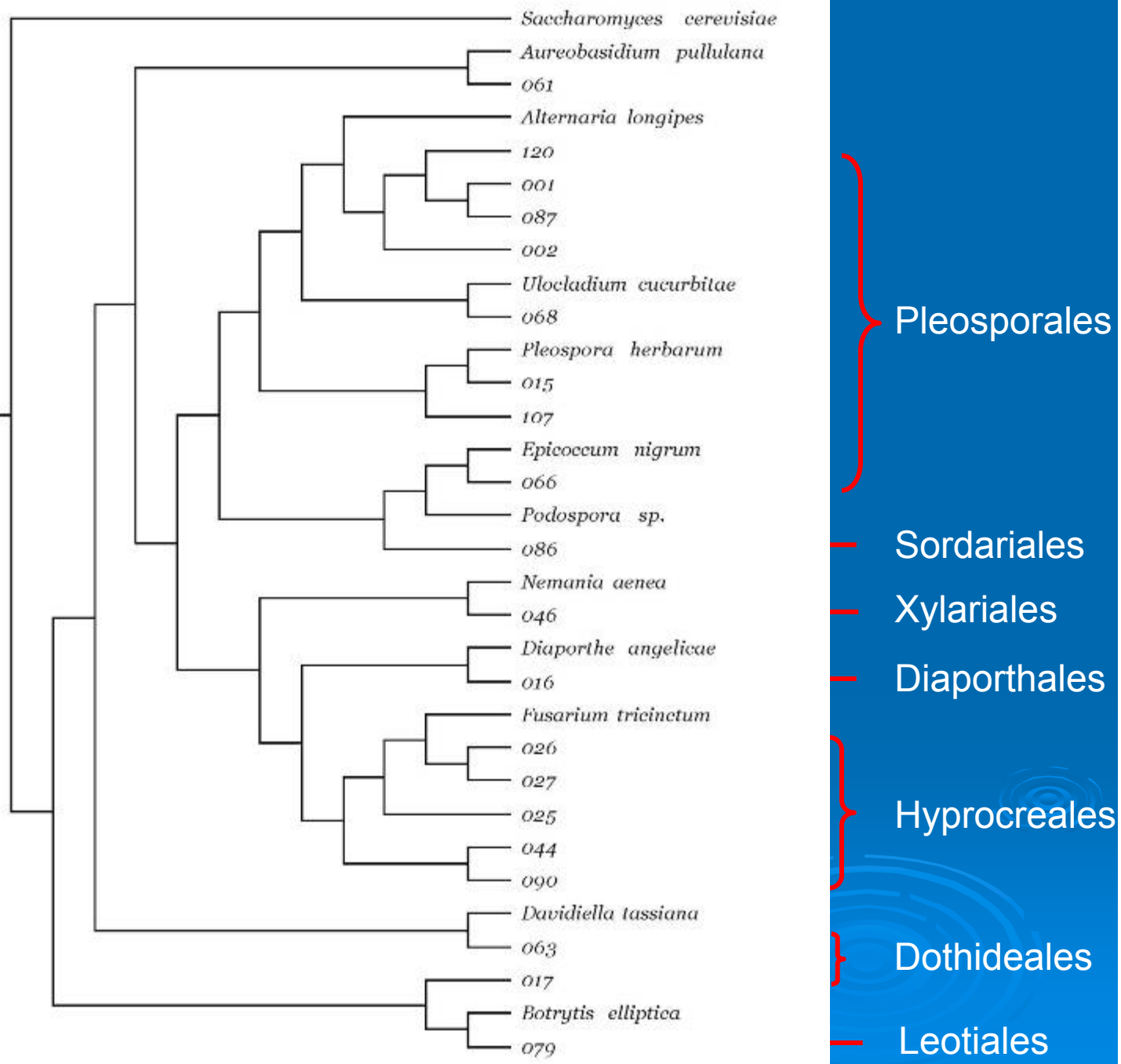
(1)Variable incidence in knapweed populations

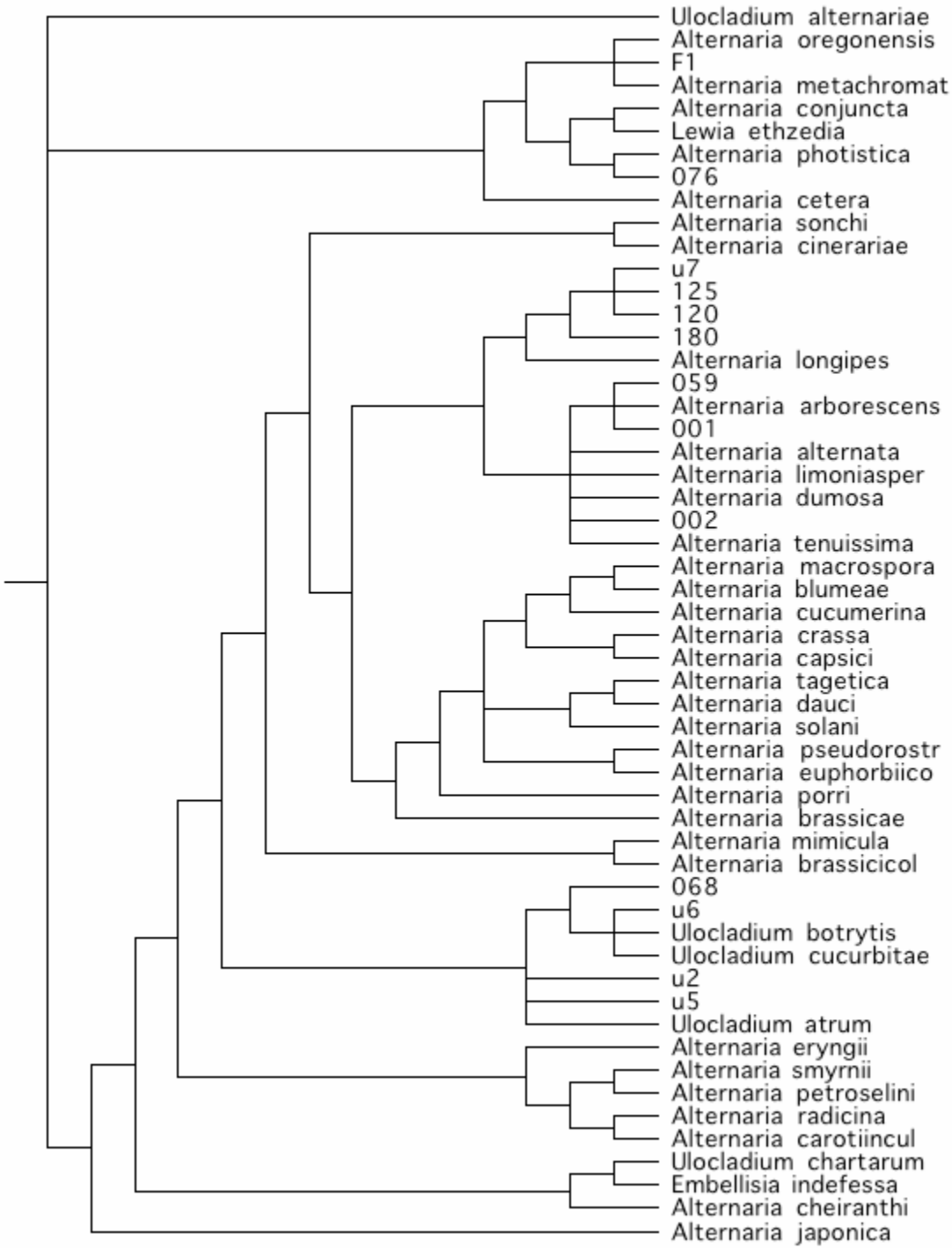
- 13 sites in the native range (Romania, Hungary Austria, Germany, France and Switzerland).
- Endophyte isolation frequencies ranged from 13 to 73%.

(2)Variation in functional roles? First, what taxa did had we found?

Diversity of Knapweed Endophytes

MP tree from phylogenetic analysis of ITS1, 5.8S and ITS2 gene sequences

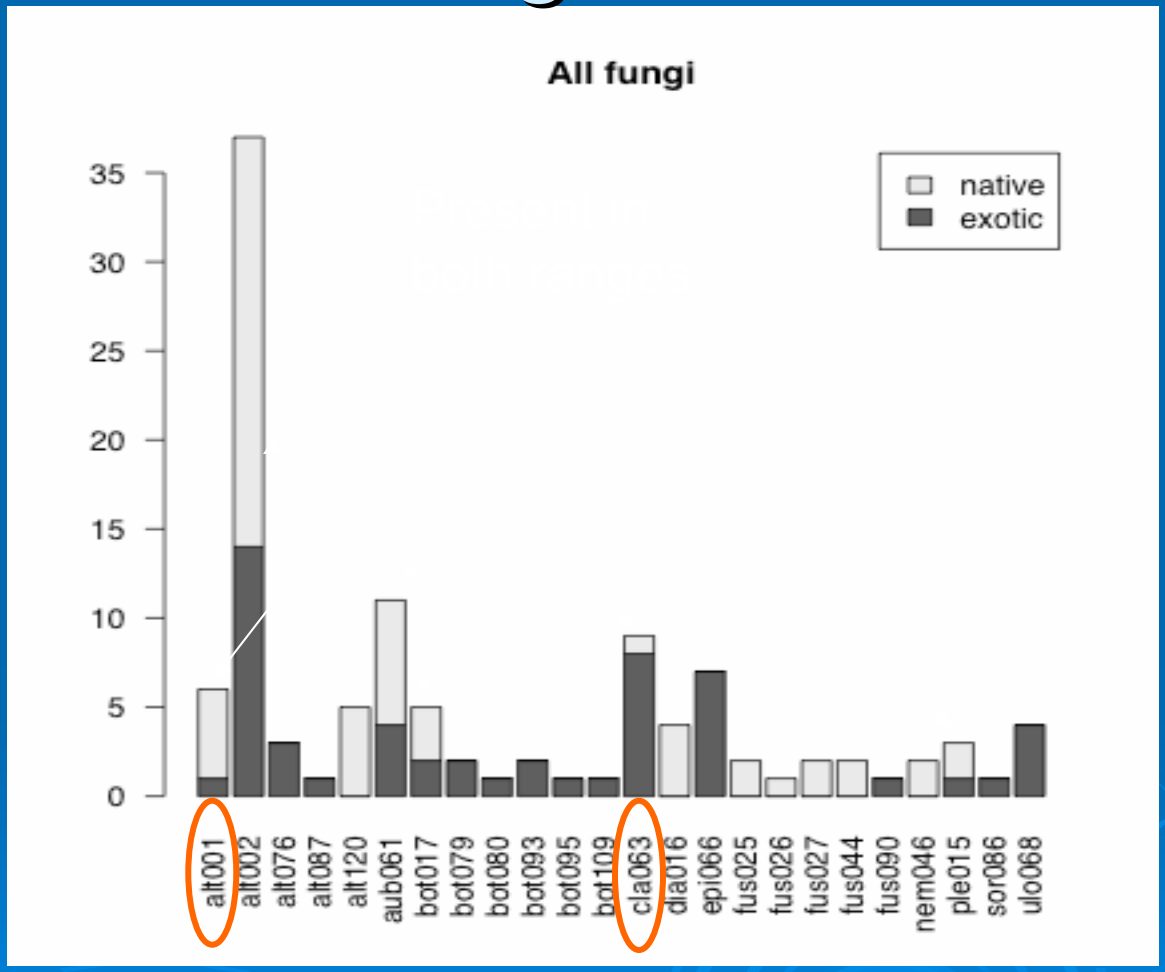




Majority rule consensus tree from MP analysis of *Alt a 1* gene sequences

Micromorphology is also helpful; even the *Alt a1* haplotypes appear to differ…

Distribution of endophytes in native and invaded ranges

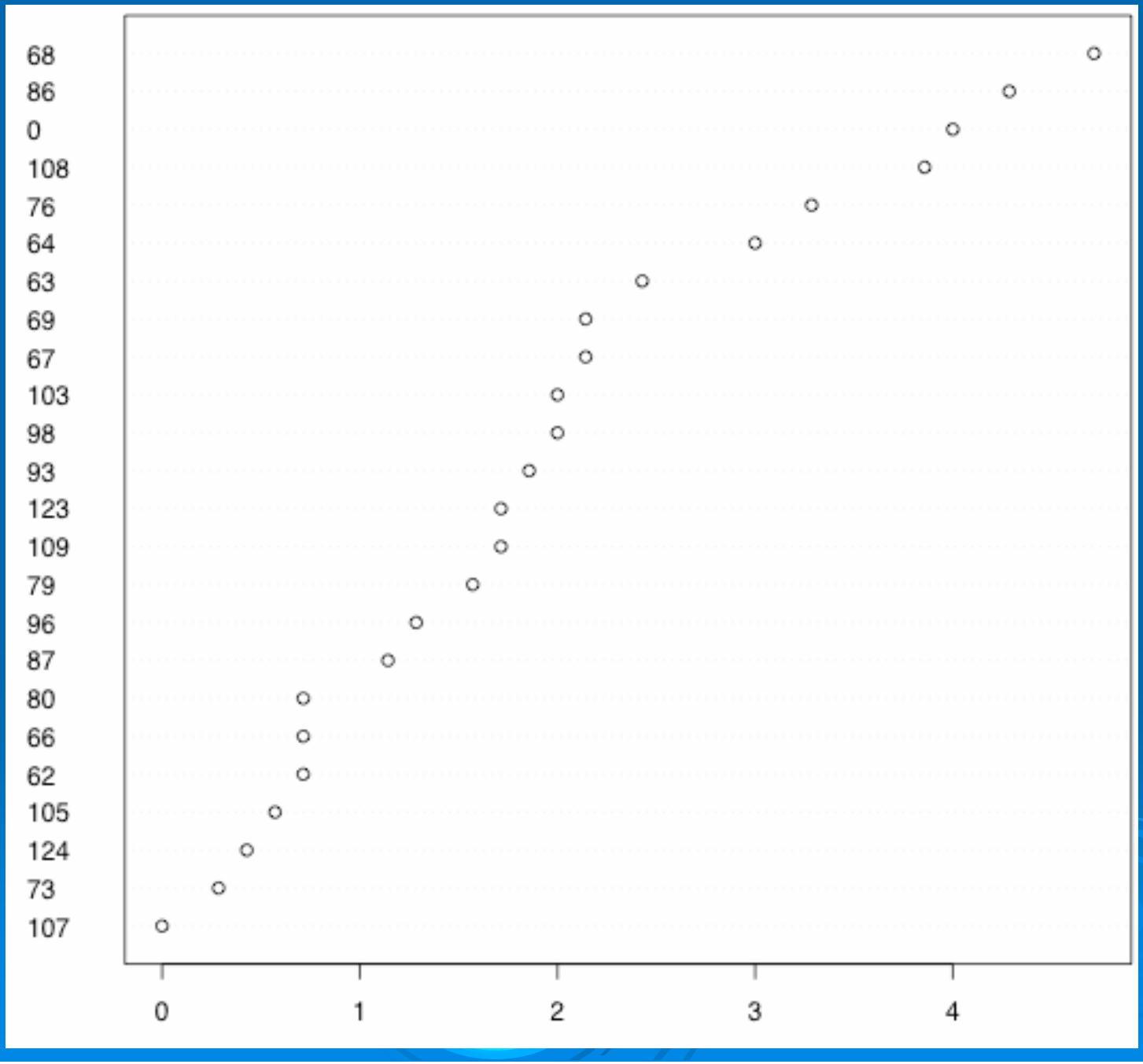


ITS sequence of 37 morphotypes belonged to 24 different haplotypes

(2)Variation in functional roles?

Endophyte isolate ‘124’ (*Fusarium* sp.) suppresses flowering of knapweed.

Effects on rate of germination of Idaho fescue

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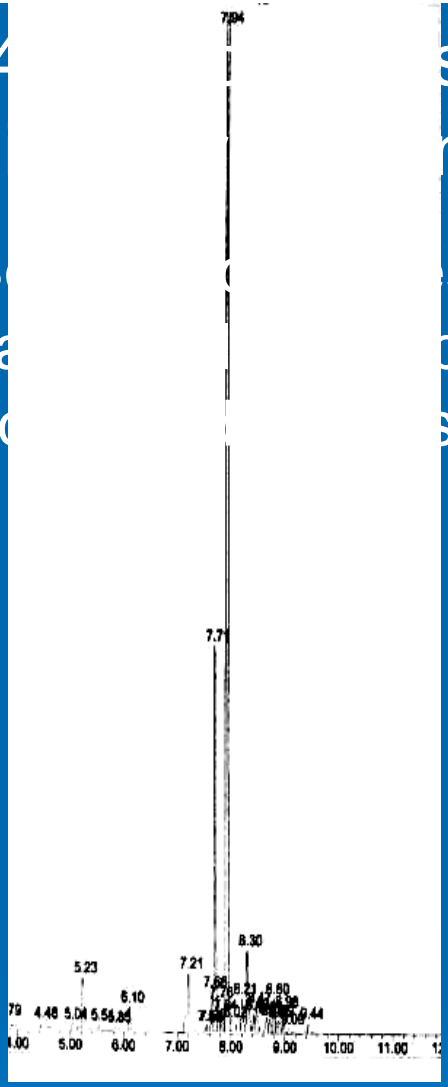
(3) Endophytes change the competitive ability of knapweed

In model competition experiments [knapweed plants grown with Idaho fescue], E+ knapweed plants were significantly bigger than their E- counterparts. The opposite was true of fescue: E+ plants were significantly smaller than the E-.

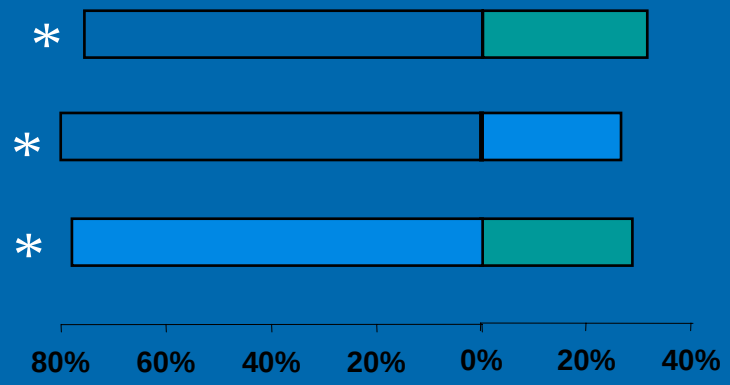
(4 s change interactions of knapweed with b nts.

S s produce sesquiterpenoid volatiles; these sa belled seedhead weevils, when inoculated into po s 12h prior to weevil introduction.

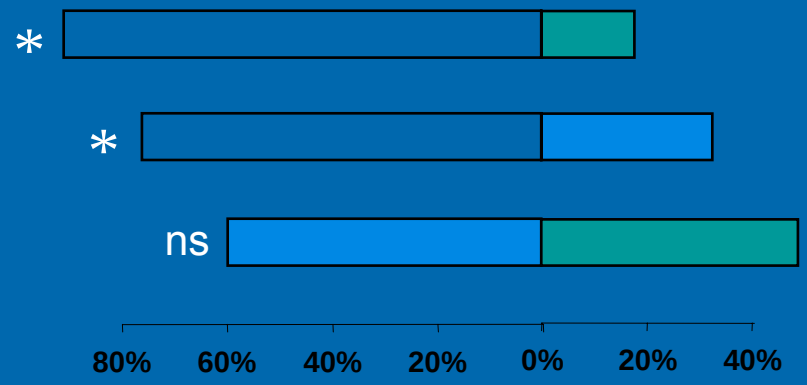


Control (broth) *Alternaria alt2a* *Epicoccum CID66*

C. maculosa flowers

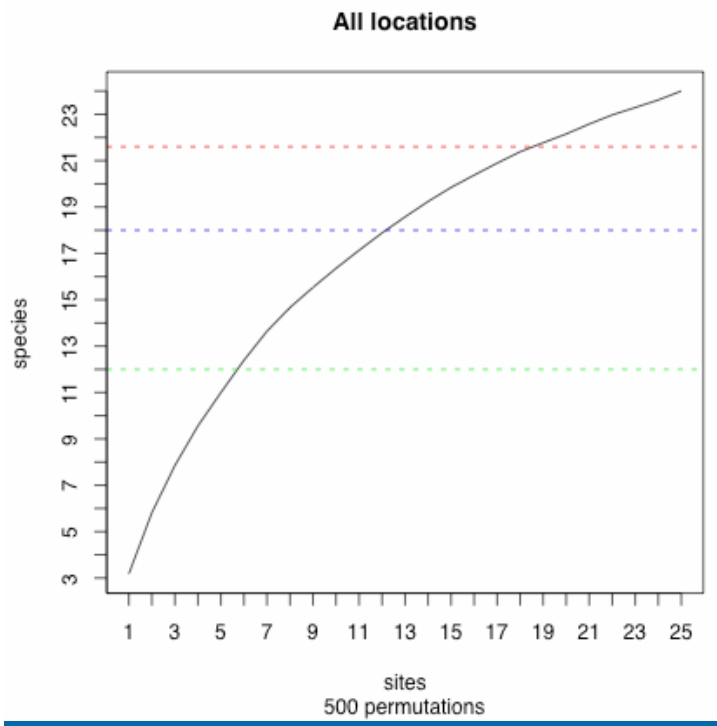


Artificial flowers (cotton fiber)



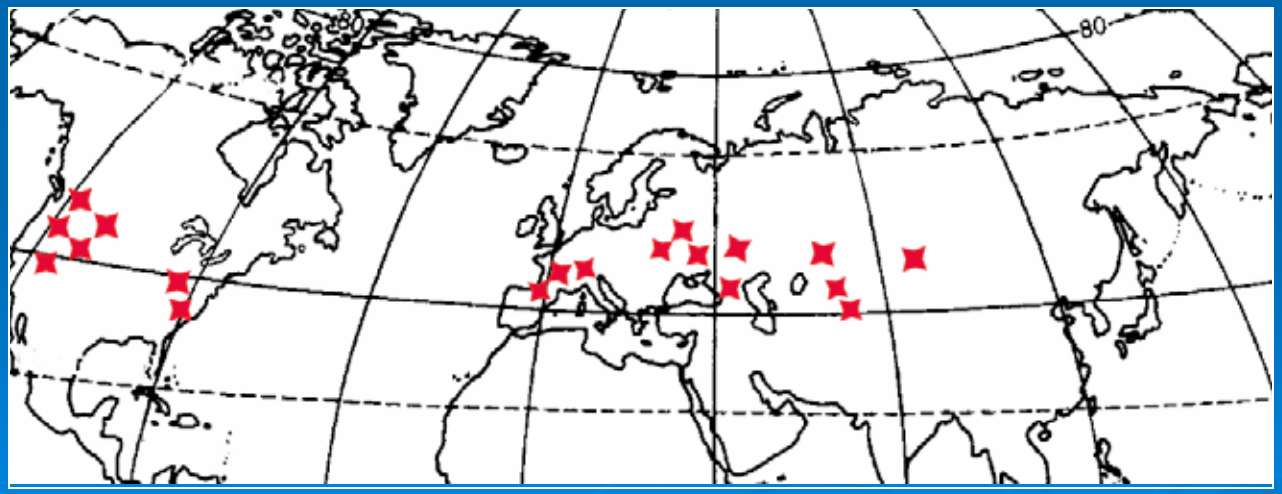
Choice test arenas

Larinus minutus Gyllenhal



Sampling-2006

Accumulation curve for 2004/2005



25 sites in each range, thanks to key collaborators