Effective population size, genetic diversity and immune function in soil arthropods

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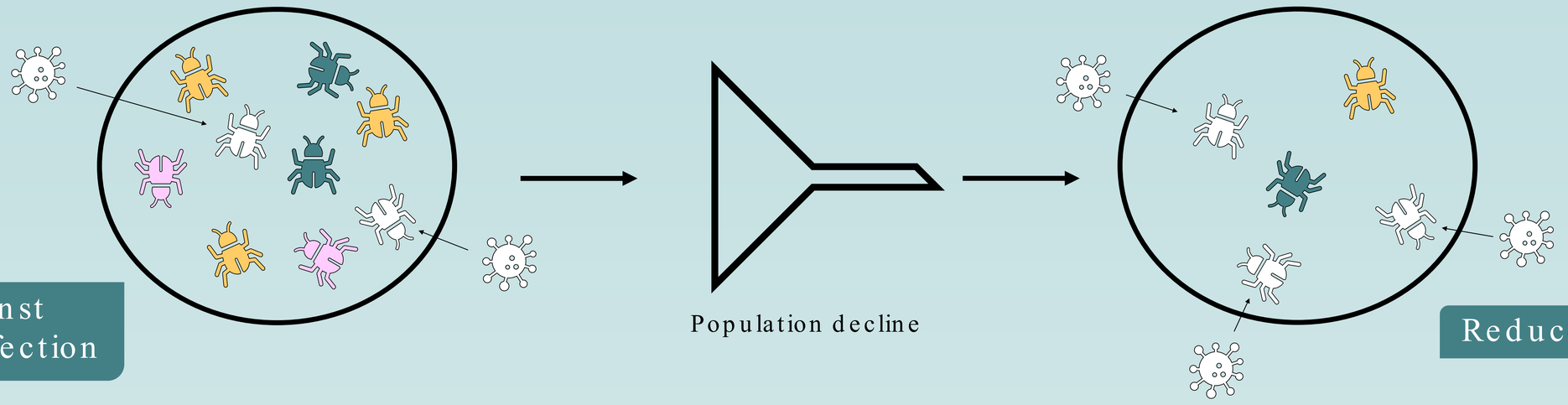
Background



Does reduced effective population size (N_e) and genetic diversity, from repeated bottlenecks, associate with functional immunity in soil arthropod populations?

Study System and Planned Work

Collembola

- Microarthropods that impact soil processes
- Can have large population sizes
- Relatively limited dispersal
- Exposed to infectious fungi and bacteria

Conventional Agriculture

- Tilling -based methods
- Multiple bottlenecks annually [1]
- Possible reduction in genetic diversity and immunity

Conservation Agriculture

- Reduced or no-tilling methods
- Minimal mortality[1]
- No reduction in genetic diversity and immunity

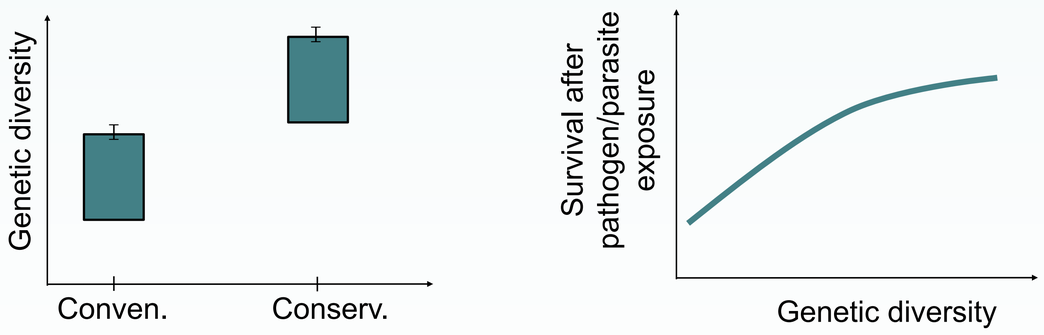
Immunity assays

- Lab cultures from respective sampled fields
- Reflects natural genetic diversity
- Expose cultures to different diseases and parasites
- Measure population survival rate

Whole genome sequencing

- Pooled sequencing
- Genetic diversity at population -level

Predictions



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References

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2. Holderegger, R. & Gugerli, F. (2012), *Molecular Ecology* , *21*(23), 5640-5642
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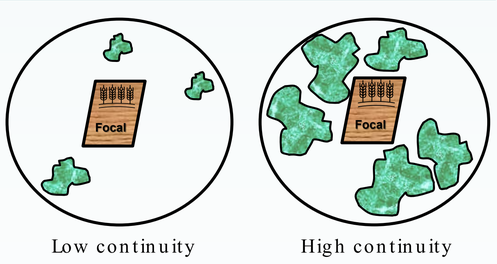
Further Development

Spatial continuity

- Surrounding natural habitats as source of migrants and new genetic material[2]

Does high continuity of surrounding habitats provide genetic rescue?



Genetic load

- Small N_e have more slightly deleterious mutations than large N_e [3]
- Small N_e have less highly deleterious mutations

Do small N_e have more slightly deleterious mutations and associate with reduced functional immunity?