

## Mesofauna – central to nutrient cycling!

Maintaining a healthy soil requires more than just the addition of NPK to maintain soil fertility. Soil is not only capable of storing nutrients but transfers these to the root surface for uptake by the plant. An unhealthy plant is likely to be the result of an unhealthy soil. A healthy soil contains nutrients, microbes, fungi, trace elements and mesofauna, which all work together and form an essential system for sustainable plant growth. There are two main groups of mesofauna living within the soil – springtails and mites.

### Springtails

Springtails are small, soil and litter dwelling arthropods (related to insects). They are soft-bodied, wingless and mostly blind. Body length ranges from about 0.2 – 6 mm. Springtail colours vary but most are grey, white or purplish. Springtails have six legs (like insects), although have a unique means of locomotion – the “spring tail”. This is a fork-like tail structure (furcula) that is folded up under their body during normal locomotion. However, when disturbed (e.g. to escape predation), the furcula is released and pushes the springtail off the ground, allowing it to jump a distance equivalent to 10 times its own body length!!



Springtails are abundant in decaying plant material and are one of the principle decomposers in soil. Most springtails consume fungi, algae, lichens, decaying plant material and bacteria; fertilising the soil in the process. And some act as predators to even smaller soil animals, or consume carrion within the soil. However, none of them bite and they are harmless to humans and animals.

In moist soils with high amounts of organic matter, large numbers may be present – thousands per metre square!

### Role

Springtails appear to be extremely important in the biological cycles of plant systems because they assist in the decomposition of litter. They are generally present in large numbers and often form an important food source for generalist soil predators.



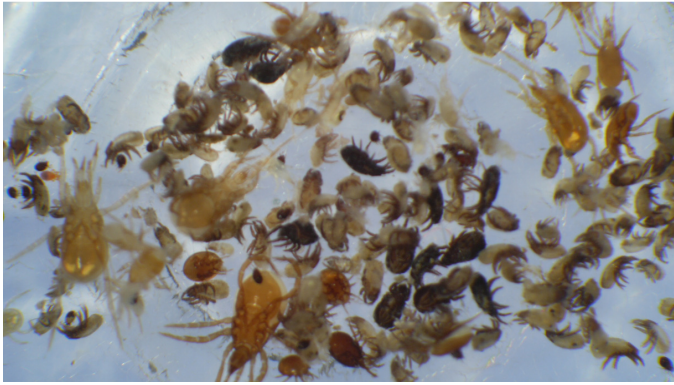
### Three main groups of springtails –

- Elongated Entomobryomorpha (above)
- Plump Poduromorpha (left)
- Globular Symphypleona (below)



### Ecology

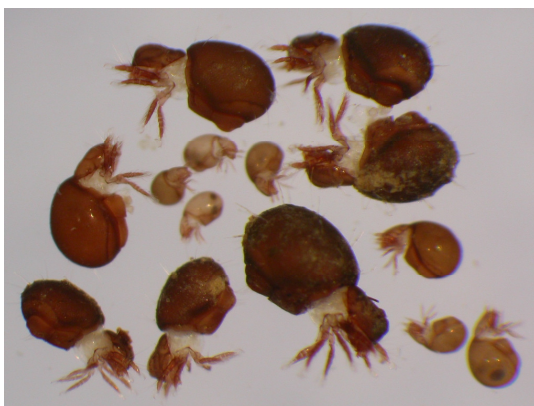
Springtails are known to carry spores of mycorrhizal fungi and “helper” bacteria on their cuticle, leading to the establishment of plant-fungal symbioses and thus are very beneficial to agriculture. They also reduce the occurrence of plant fungal diseases through consumption of the hyphae and spores of these fungi.



Organic matter in the soil ensures a continuous food source for soil microbes. As the microbes metabolise organic matter, they help maintain good soil structure by developing compounds that cement small soil particles together into aggregates, increasing drainage and moisture retention. The mesofauna live in the pore system and feed upon these microbes as well as decomposed plant material and mineral particles, or are predatory and reside between the soil aggregates feeding on crop pests (e.g. fly larvae or wireworms).

## Mites

Mites are at first glance similar to spiders (Arachnida). However mites can be distinguished from spiders by their lack of a waist between the thorax (where the legs are attached) and the abdomen. This gives the characteristic appearance of a single oval body, with head and legs attached to it. Mites range in size from 0.1 – 5 mm with some species visible to the naked eye. Some species are hairy and vary in colour from clear / white to a dark brown.



### Three main groups

Mesostigmata – predatory (above)  
 Oribatida – decomposers (left)  
 Prostigmata – omnivorous (below)

Mites are more variable in their function within the soil compared to springtails. Some are important predators of pest insects (Mesostigmata).



Whilst some species are important in the breakdown of litter, organic residues and the recycling of nutrients (Oribatida and Prostigmata).

The movement of mites through the soil can also introduce fungal spores and bacteria to fresh plant matter so that decomposition can begin. Their microbial grazing can stimulate and regulate microbial activity, just as livestock grazing can stimulate herbage growth.

More information-

[http://www.nhm.ac.uk/resources-rx/files/35feat\\_springtails\\_most\\_abundant-3056.pdf](http://www.nhm.ac.uk/resources-rx/files/35feat_springtails_most_abundant-3056.pdf)

<http://www.nhm.ac.uk/research-curation/life-sciences/terrestrial-invertebrates/research/mite-research/index.html>

This factsheet has been produced by the PROSOIL project, which has received funding through the Rural Development Plan for Wales 2007 - 2013 which is funded by the **Welsh Government and the European Agricultural Fund for Rural Development.**