battle) between two species. Usually the two species can live with each other for years.

The interaction patterns between fungi are not fixed, but varies under different environmental conditions. And the variability of environments assures that, those fungi being driven out of in some conditions many grow well in some other conditions.

Since some fungi can adapt to a broad range of temperature/ humidity while others can grow very fast in suitable environments, some combinations of several types of fungi are more stable, with higher growth rates in certain environments. For example, the pair *f.fom.n*[1] and *m.trem.n*[2] can live persistently in arid areas, and the pair *h.crust.n*[3] *and p.har.n*[4] *tend to live in tropical rain forests stably.*

8.1.3 Diversity of Fungal Communities and Biodiversity

As mentioned above, there is great diversity in fungal communities. Why should there be so many species of fungi? Is there any benefit for the community or the ecosystem? Lets see the result of am experiment by computer simulation:

In the experiment, there are five groups of fungi. Each group has the same number of initial colonies and is place on a wood plate. The only difference between the groups is the number of species in each group. The result is: the decomposition efficiency (described as the amount of wood decomposed in a certain period of time) of the group with four different species reaches twice of the efficiency of the group with a single species, and 1.25 times of the group with two species.

The above result indicates that: the higher the diversity is in the fungal community, the higher efficiency of ground litter decomposition is. The high diversity of fungi communities also maintains the stability of the community. Because when there are some fluctuations or changes happening in the environment, higher diversity of species assures higher probability for fungi to adapt to the new conditions, thus more opportunity for the carbon cycle of the ecosystem to stay steady. What's more, higher diversity of fungi means that more different types of dead plants can be decomposed. This indicates that the number of plant species able to exist in the ecosystem will be larger. As a result, the number of animal species will also be larger, and the total *biodiversity* will also be higher.

In conclusion, the main contributions of fungi to ecosystems are:

- Decomposing the ground litter
- Assuring the regular operation of carbon circle.
- Improving the biodiversity in ecosystems.

1 *f.fom.n*: short name of *Fomes_fomentarius_TJV93_7_A3E*, a species of fungi.
2 *m.rem.n*: short name of *Merulius_tremullosus_FP102301_C3E*, a species of fungi.
3 *h.crust.n*: short name of *Hyphodontia_crustosa_HHB13392_B7B*, a species of fungi.
4 *p.har.n*: short name of *Phellinus_hartigii_DMR94_44_A10E*, a species of fungi.

Glossary

organic carbon:

A form of carbon which is existing in organic substances, such as glucose.

inorganic carbon:

A form of carbon existing in inorganic substances, such as carbon dioxide.

hyphal extension rate:

The extension rate of fungal hyphae, which describes the growth rate of fungi. Usually with the unit of mm/day.

moisture/ temperature niche widths:

The difference between the maximum and minimum moisture/ temperature levels in which half of a fungal community can maintain its highest growth rate.

biodiversity:

The variety of life in the world or in a particular ecosystem.

Reflection Questions

Q1: If fungus A grows faster than fungus B and it is more competitive, which species tends to tolerate a wider range of moisture? Please give your explanations.

Q2: Describe the four typical categories of interactions between different species of fungi.

Q3: List at least three benefits that a fungal community with multiple species brings to the local ecosystem.