# Article of results and discussions about fungi

我们是2021 MCM contest的参赛团队，在本次比赛中我们选择了”Fungi”问题。在解决这个问题的过程中，我们进行了深入的探究和分析并建立相关模型，成功解决了题目中的问题。同时我们也对真菌在生态系统中的作用以及它与环境的相互作用等问题有了更深入透彻的理解和认识。

We are the participating team of 2021 MCM Contest. In this contest, we chose the issue of "Fungi". In the process of solving this problem, we conducted in-depth exploration and analysis, established relevant models and finally successfully solved these problems. At the same time, we have gained a deeper understanding of the role of fungi in ecosystems and their interaction with the environment.

分解者在地球圈的碳循环中是必不可少的一部分，真菌是分解者的重要组成部分，真菌的重要作用在于可以分解枯枝落叶和木质纤维，因此研究真菌作用和保证木质纤维分解速率对维护碳循环的正常进行有重要意义。

Decomposers are an essential part of the carbon cycle in the earth's circle, and fungi are an important part of the decomposers. The important role of fungi is to decompose dead branches and wood fibers. Therefore, it is of great significance to study the effects of fungi and ensure the decomposition rate of wood fibers to maintain the normal progress of the carbon cycle.

上一段仅仅描述了我们都了解的真菌的一面，而通过我们的模型分析得到的结论可以帮助我们更深入地认识和了解真菌的鲜为人知的一面及其与环境的相互影响作用。

While the previous paragraph described only one side of fungi that we all know, the conclusions from our model analysis can help us to further understand and understand different sides of fungi and their interaction with the environment.

我们的模型分析和结论总结如下：温度、湿度、天气气候、真菌种类以及不同种类真菌的物种组合都会影响整体的木质纤维分解速率；环境变化对真菌分解速率有一定的影响，这种影响在不是很严重的时候会被真菌-环境系统抵抗或者消除恢复；真菌群落的多样性一定程度上决定了系统对于环境变化的抵抗能力和自我恢复能力，物种多样性越高，系统抵抗能力越强，在遭到破坏时也就越容易恢复。

Our model analysis and conclusions are summarized as follows: temperature, humidity, weather and climate, fungal species and the species combination of different fungal species will affect the overall lignin fiber decomposition rate; Environmental changes have a certain effect on the decomposition rate of fungi, which can be resisted or eliminated by the fungus-environment system when it is not very serious. To some extent, the diversity of the fungal community determines the resistance and self-recovery ability of the system to environmental changes. The higher the species diversity, the stronger the resistance ability of the system is, and the easier it is to recover when damaged.

首先，通过上述分析，在维持真菌分解作用时，真菌的多样性起到了至关重要的作用，当环境发生局部变化或者短期变化时，真菌-环境系统不需要外力介入就可以通过系统内的自我调节来维持分解作用正常进行，这是一种可持续的环境系统。

First, the above analysis suggests that fungal diversity plays a crucial role in maintaining fungal decomposition. When local or short-term changes occur in the environment, the fungus-environment system can maintain the normal decomposition through the self-regulation within the system without external intervention, which is a sustainable environmental system.

其次，要防止火灾、洪水等严重的自然灾害和化学药剂泄露等物理化学重大破坏。这类事故会导致的巨大环境变化，这种变化超过了系统的自我调节能力，会破坏真菌多样性严重影响木质纤维的分解和区域内的碳循环进而威胁其他生物环境的正常活动。如果要进行灾后重建生态系统，在投放真菌时要注意真菌的种类搭配和投放规模，因为在模型中的初始条件决定了最终的模型稳定情况。

Second, we should prevent serious natural disasters such as fires and floods and major physical and chemical damage such as chemical leaks. Such accidents can cause huge environmental changes that exceed the system's ability to self-regulate, destroy fungal diversity and seriously affect the decomposition of wood fibers and the carbon cycle within the region, thereby threatening the normal activities of other biological environments. If the post-disaster reconstruction of the ecosystem is to be carried out, attention should be paid to the combination of fungus species and the scale of fungus release when releasing fungi, because the initial conditions in the model determine the final stability of the model.

同时，要防止外来真菌物种的入侵，真菌物种的增加不一定会增加物种多样性，只有当真菌间的相互作用关系满足系统稳定性要求才能够增加物种多样性。

At the same time, we should pay attention to prevent the invasion of foreign fungal species. An increase in fungal species does not necessarily increase species diversity. Species diversity can be increased only when the interaction between fungi satisfies the requirement of system stability.

最后，通过此次对真菌问题的研究，我们认识到让更多的人意识到保护物种多样性的重要性。如果分解者遭到破坏，生态系统就会被破坏，那么作为生态系统的成员之一的我们人类也不可能幸免，我们的正常生产和生活也一定会受到严重影响。因此保护生物多样性和我们每个人都是息息相关的，我们必须重视起来，采取切实的行动保护好我们的家园。

Finally, through this study on fungi, we realize the importance of making more people aware of the conservation of species diversity. If the decomposers are destroyed, the ecosystem will be destroyed. As a member of the ecosystem, we humans are not immune. Our normal production and life will also be seriously affected. Therefore, the protection of biodiversity is closely related to each of us. We must pay attention to it and take practical actions to protect our homes.