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Mini Review

N addition introduced illicit competition to plants is the reason of the negative impacts on plant species diversity

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Abstract

In a published paper in Oecologia, the authors found that mowing mitigates the negative impacts of N addition on plant species diversity. After reading the paper, their results gave me a chance to think the mechanism of nitrogen enrichment on biodiversity. The most fundamental reason of nitrogen addition decreasing biodiversity is it introduced illicit competition to different species. Maintenance of biodiversity is how many species can obtain living conditions in the certain ecosystem. All control experiments must pay attention to introducing illicit competition to different species.

With more Nitrogen deposited to terrestrial ecosystem, Ecologist designed different experiments to examine the influence of nitrogen enrichment to biodiversity and other community factors. Most of the results indicated that nitrogen enrichment decrease biodiversity, but the mechanism of this negative effect was not certain.

In a published paper in Oecologia, the authors found that mowing mitigates the negative impacts of N addition on plant species diversity [1]. After reading the paper, their results gave me a chance to think the mechanism of nitrogen enrichment on biodiversity.

The most fundamental reason of nitrogen addition decreasing biodiversity is it introduced illicit competition to different species. Generally, nitrogenous fertilizer was disposed on the soil surface in most nitrogen addition experiments, and then migrated into the soil by soil water or rainwater. So there were differences among the chance and ability of roots in different layer of soil to obtain nitrogen. And a recent paper indicated this [2]. The roots of different species (especially of different groups) are not in the same layer of the soil [2]. Some of the plants with roots in up-layer of soil obtained more nitrogen easily or earlier, and took much more advantages in the competition with other plants. With the increasing of pressure of these plants to other species which cannot access additional N timely, these species disappeared. After mowing, the N in parts of the leaves and stems of some dominant species can not be back to roots and buds, and this will decrease the competition of these species in the coming year. And other species will have more opportunity to grow. This is the opposite effects of N addition, so mowing mitigates the negative impacts of N addition on plant species diversity [1].

After all, maintenance of biodiversity is how many species can obtain living conditions in the certain ecosystem. And that is to say how many species had the competitiveness in the ecosystem. The regulation of biodiversity is the changes of the ecosystem developed to the direction of more species competitiveness increase or fewer species competitiveness increase. The human agriculture ecosystem is an extreme example of to the direction of increasing the competitiveness of crops.

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Nitrogen addition experiments can not reflect the influence of nitrogen on biodiversity in the ecosystem, and it is not worth to do such nutrient addition experiments in different ecosystem globally. Nitrogen addition experiments must be designed to deal with the illicit competition to plants. Nitrogen add to different depth of soil directly is a possible method. All control experiments must pay attention to introducing illicit competition to different species.

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Author contributions

WL conceived and designed the experiments. WL wrote the manuscript.

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