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Editorial

Soil Fertility Management for Sustainable Crop Production

Wenhai Mi [1,*], Qingxu Ma [2,3], Xiaochuang Cao [4] and Lianghuan Wu [2]

1 College of Environmental Science and Engineering, Yangzhou University, Yangzhou 225127, China
2 Ministry of Education Key Lab of Environmental Remediation and Ecosystem Health, College of Environmental and Resource Sciences, Zhejiang University, Hangzhou 310058, China
3 School of Natural Sciences, Bangor University, Bangor LL57 2UW, UK
4 State Key Laboratory of Rice Biology, China National Rice Research Institute, Hangzhou 310006, China
* Correspondence: wenhaimi@126.com

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To feed the growing world population, which is expected to reach 9.7 billion by 2050, we will have to produce more food on less farmland. However, long-term cultivation led to soil degradation, including soil organic matter depletion, nutrient loss, and soil acidification. It is therefore increasingly important to develop more sustainable agricultural management practices to improve crop yield and soil fertility.

This Special Issue, entitled "Applied Research and Extension in Agronomic Soil Fertility", contains eleven papers reporting (1) the effect of organic amendments on crop yield and soil properties; (2) the changes in soil organic carbon and its fractions affected by fertilization or land use change; and (3) the development of crop growth models.

The application of organic fertilizers can effectively improve soil quality. Mi et al. [1] analyzed soil aggregate stability and the contents of aggregate-associated carbon affected by different fertilization management practices. Their results showed that the long-term combined application of cattle manure or rice straw increased the proportion of soil macroaggregate and soil organic carbon contents during the rice growth season compared to the chemical fertilization alone. Li et al. [2] focused on the effects of multiple organic fertilizers (including sheep manure, commercial organic fertilizer, and mushroom residue) on sweet potato growth and soil quality in newly reclaimed land. Their study showed that organic amendments significantly increased soil organic matter content, but showed no changes in the soil pH. In addition, the application of organic fertilizers had different influences on sweet potato biomass and soil nutrient contents, which depended on the type of organic amendments, the application time, and soil parameters. Similarly, Hsu and Lai et al. [3] observed that two kinds of chicken manure had a differential effect on crop yield and soil properties due to their different nutrient-release behaviors. Besides animal manure, plant residue was another management practice that effectively promoted soil organic carbon accumulation. Liu et al. [4] investigated the effects of both soil texture and plant residue chemical composition on soil organic carbon turnover. Their results showed that the clay loam soil favored soil organic carbon sequestration more than the sandy loam. Maize stems had a higher contribution to soil organic carbon accumulation than leaves due to the higher C/N, lignin/N, and O-alkyl in stem parts.

Biochar is a renewable resource and has been shown to improve plant growth and soil fertility. In this context, Zou et al. [5] used a meta-analysis to investigate the response of plant growth to biochar amendment. The results obtained indicated that biochar had positive effects on plant root biomass with a mean increase of 32%. The increment effect for plant root biomass was the largest for trees (+101.6%), followed by grasses (+66%) and vegetables (+26.9%). Feedstock sources and application rates of biochar were the main factors that determined its effects on plant root growth. In terms of rice plants, Xu et al. [6] evaluated the impacts of long-term biochar application on soil nutrients, carbon sequestration, and crop production. Their results showed that biochar addition was beneficial for increasing the soil macronutrient and total C contents, but decreased soil total

Fe and Mn. In addition, biochar application could promote the rice growth under stress environments. Huang et al. [7] reported that biochar alleviated rice salt stress by decreasing electrical conductivity while increasing soil nutrient conditions.

Intercropping has been practiced as a sustainable cropping system around the world to enhance productivity. Zhang et al. [8] evaluated the impacts of legume–maize intercropping and N fertilization on forage production. Their result showed that both lablab– silage maize and soybean–silage maize intercropping increased biomass yield, crude protein yield, and water use efficiency compared to the silage maize monoculture. Soil fertility was also affected by land use change. Si et al. [9] investigated the changes in soil organic carbon and its labile fractions under different land use. They found that woodlands had higher total soil organic carbon contents in the 0–40 cm soil depth. This might be ascribed to the absence of soil disturbance and greater root residue input. However, Yan et al. [10] observed that there were no differences in soil fungal diversity, althoughsoil fertility was lower in forest soil than tea gardens.

The leaf area index (LAI) is a key parameter that strongly influences crop yields. In this Special Issue, Su et al. [11] analyzed the relationships between grape biomass and LAI for different irrigation treatments in the Turpan area. When water consumption was in the range of 637.5–11,215 mm, the peak leaf area index was an important parameter to predict grape yield.

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