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Shift in Cropping System: Is a Sustainable Means of Improving Crop Production and Maintaining Soil Health?

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Abstract

Sustainable intensification has been getting popular in terms of crop production, enhancing resilience to climate induced stresses. It comprised with various integrated approaches to maximise crop yields while maintaining soil quality. Thus, changes in cropping pattern, i.e. shifting in cropping systems might responsible for producing higher yield whilst arable land is limiting. In recent decades, there is increase in freshwater demand for agricultural purposes. Due to higher demand of water, there is a possibility of reduction in traditional rice or rice-wheat system in South Asia including Bangladesh which can be altered by maize, legumes, vegetables. Previous study conceptualised the most accepted concept of land use transition stages, where there is tendency of replacing dry season rice by high value crops that termed as "diversification phase". The replacement in cropping systems is mostly occurring because of water shortage in a region including other factors such as economy, climate change and globalisation. An experiment conducted in Africa revealed that shifting from pastoral land to crop cultivation occurred due to unavailability of economic alternatives. Such system shifts are important to generate more income by the marginal farmers and fulfiling the demand by urban consumers. It was reported that shifting from rice to maize improves the yield of dry season crop along with affecting organic matter, C and N present in soil as well as interfering availability of P and other micronutrients. In addition, the minimum water conserving crop cultivation cause improvement in the declining trend of soil fertility status e.g. soil aeration improves soil C mineralisation and augmented N loss. In this review paper, we highlight the potential effects and trade-off of system shifts on the availability of nutrient fluxes, carbon mineralisation and water use efficiency. These influence the supply-demand synchrony of nutrients and water management strategy in the newly emerged cropping systems, especially focussing on south Asian agriculture systems.

Keywords: Crop production, resource use efficiency, supply –demand synchrony, sustainable intensification, system shift

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