B-44: Long term response of rice to added phosphorus on Alfisols in North-Central province

K M Senevirathna Banda, K M A Kendaragama, D M G Ethakada
(*Field Crops Research and Development Institute, Maha Illuppallama*)

Most of the phosphorus (P) response studies in the past for rice on Alfisols of North-Central province revealed that there is no response to added P. However, their soil test reports showed an increasing trend in available P in soil at harvest in accordance with P application. This emphasized the need of long-term response studies to estimate plant nutrient requirements. The present study aims at determining the long-term yield response of rice to added P on Alfisols of North Central Province.

This investigation was initiated during Maha 91/92 season in farmers' fields at Onegama (pH 6.5, Olsen P 4ppm), Chandanapokuna (pH 6.3, Olsen P 6.5 ppm) and Maha Illuppallama (pH 6.2, Olsen P 11 ppm) in Low Humic Gley (LHG) soil which is widely used for rice cultivation during both Yala and Maha seasons. Farmers practice rice-rice cropping pattern and use the N:P:K fertilizer mixture (V mixture) at different rates. The experiment was designed with 5 treatments of P (0, 25, 50, 75 and 100 kg P_2O_5/ha) which were arranged in a RCB design with 4 replicates. This experiment was conducted for 3,5 and 6 consecutive seasons at Candanapokuna, Maha Illuppallama and Onegama respectively. Total P was given at planting in the form of TSP. In addition to P, each treatment received 150 kg N/ha as urea and 50 kg K_2O as MOP. Rice variety Bg-300 (3 month age) was transplanted at random. Other cultural practices were adopted as recommended in crop management.

Results showed that, there was no yield response to added P in any location at first Maha season irrespective of the level of soil Olsen P. However, quadratic pattern of yield response to added P was observed in all locations in following Yala season. Consequently, this pattern was observed throughout the study period in 2 locations, Chandanapokuna and Onegama where, Olsen P in the soil is at 4 and 6.5 ppm respectively, with an exception observed in the 5th season at Onegama. Maximum yield response reported at each season in 2 locations, since second season were 80 and 69 kg P_2O_5/ha at Chandanapokuna and 59, 63, 74, 100 and 73 kg P_2O_5/ha at Onegama. No yield response was reported at Maha Illuppallama in the third Maha season where soil Olsen P is at 11 ppm and similar results were found in subsequent Maha season too. However, yield response reported to added P at Maha Illuppallama during second and fourth Yala seasons was 85 and 69 kg P_2O_5/ha respectively. Average yield response during the study period to added P in each location was 77, 73 and 69 kg P_2O_5/ha in Chandanapokuna, Onegama and Maha Illuppallama respectively. Result further showed that yield response to added P is lower at the Maha season than the Yala season.

If application was done in previous season for LHG soils, where Olsen P is less than 6.5 ppm has an ability to produce better rice yields at following season, without adding any P. Similarly satisfactory yield can be obtained in Maha season without any P addition, where, soil Olsen P level is 11 ppm or greater. Therefore, P application in alternative season can be more beneficial for these soils. Yield significantly responded to added P in both seasons, where soil Olsen P level is less than 6.5 ppm. Rice yield response pattern on P in Maha season depends on the Olsen P level in the soil.

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