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Abstract: Maize-wheat is the third most important cropping system in India (1.8 m ha) and second most important in Jharkhand. Both the crops are fertilizer responsive and exhibit full yield potential when supplied with adequate quantities of nutrients at proper time. But poor economic resources of the Jharkhand farmers compel to go for imbalance fertilizer use leading to deterioration of soil fertility and crop productivity. Considering this fact, a long term experiment was started since 1983 at Birsa Agricultural University Farm, Ranchi, on maize-wheat cropping system with different fertilizer level to find out growth, productivity, economics, nutrient utilization and soil fertility. The present investigation was part of this long term experiment started after 29th crop cycle during 2013-14 and continued for two consecutive years. Experiment was laid out in partially confounded design with 18 treatments and one control replicated four times. Treatments comprising of three levels of nitrogen: 40, 80 and 120 kg N ha⁻¹, three levels of phosphorus: 0, 40 and 80 kg P₂O₅ ha⁻¹ and two levels of potassium: 0 and 40 kg K₂O ha⁻¹. Variety used for maize and wheat was Suwan and K 9107 respectively. At the beginning (1983), experimental soil was sandy-loam in texture having pH (6.4), available N (260 kg ha⁻¹), available P (19.5 kg ha⁻¹) and available K (195 kg ha⁻¹). However, before start of present investigation it varies depending on the fertilizer level. Maximum reduction in pH (4.65) was observed in plot receiving only nitrogen (N120P0K0 kg ha⁻¹). Result revealed that maize fertilized with N120P80K40 kg ha⁻¹ produced maximum grain (42.09 q ha⁻¹) and stover (56.23 q ha⁻¹) yield, net return (₹ 26,785 ha⁻¹) and B:C ratio (0.89) due mainly to maximum dry matter production (1143 g m⁻²), plant population (54,372 ha⁻¹), number of cob per plant (1.65), number of grains per cob (438) and 100 grain weight (25.25 g). Similarly, wheat raised with N120P80K40 kg ha⁻¹ produced maximum grain (45.22 q ha⁻¹) and straw (61.91q ha⁻¹) yield, net return (₹ 40,611 ha⁻¹) and B:C ratio (1.29) owing to high dry matter production (1316.46 g m⁻²), effective tillers (367 m⁻²), number of grains per spike (41) and 1000-grain weight (45.38 g). Maize-wheat cropping system, fertilized with N120P80K40 kg ha⁻¹ to both the crops in sequence also produced maximum maize equivalent yield (94.14 q ha⁻¹), net return (₹ 67,396 ha⁻¹) and B:C ratio (1.09) along with sustaining the soil fertility with soil pH (5.02), available N (328.61 kg ha⁻¹), P (76.81 kg ha⁻¹) and K (87.98 kg ha⁻¹) without much deteriorating the soil health. However, continuous application of only nitrogenous fertilizer (N120P0K0 kg ha⁻¹) for long term, not only deteriorate the soil health (pH 4.52, available N 262.66, P 12.18, and K 106.08 kg ha⁻¹) but also drastically reduced the crop productivity. On the basis of above findings it may be concluded that balance fertilization with N120P80K40 kg ha⁻¹ in long-term maize-wheat cropping system maintained maximum individual crop yield (42.09 q ha⁻¹ maize), (45.22 q ha⁻¹ wheat) as well as system yield (94.14 q ha⁻¹ MEY) and gave profitable economy return of ₹ 26,785; 40,611 and 67,396 ha⁻¹ and B:C ratio of 0.89, 1.29 and 1.09 for maize, wheat and maize-wheat cropping system respectively.

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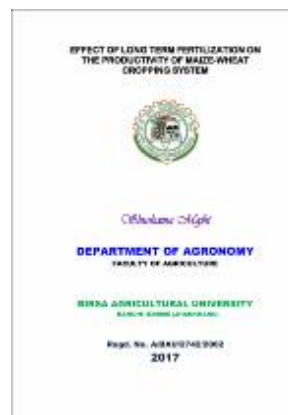
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