

Managing soil fertility, especially nitrogen (N) and phosphorus (P), to sustain increased crop productivity is a complex challenge, especially in cultivated Nitisols. Experiments were conducted over eleven (11) cropping seasons in the acidic Nitisols to assess the impact of soil management strategies on soil N, P, and crop productivity. Fourteen treatments were laid out in a Randomized Complete Block Design. The treatments include; control (C), conventional tillage + inorganic fertilizer (CTF), conventional tillage + maize residues + inorganic fertilizer (CTCrF), conventional tillage + maize residues + inorganic fertilizer + goat manure (CTCrGF), conventional tillage + maize residues + Tithonia diversifolia + rock phosphate (CTCrTiR), conventional tillage + maize residues+ goat manure + Dolichos lablab (CTCrGL), conventional tillage + maize residues + Tithonia diversifolia + goat manure (CTCrTiG), minimum tillage (MT; no amendments), minimum tillage + inorganic fertilizer (MTF), minimum tillage + maize residues + inorganic fertilizer (MTCrF), minimum tillage + maize residues + inorganic fertilizer + goat manure (MTCrGF), minimum tillage + maize residues + Tithonia diversifolia + rock phosphate (MTCrTiR), minimum tillage + maize residues+ goat manure + Dolichos lablab (MTCrGL), and minimum tillage + maize residues + Tithonia diversifolia + goat manure (MTCrTiG). Available P was significantly higher by 51, 48, 43, 38, 37, 36 and 27% under MTCrGF, CTCrGF, MTCrF, CTF, CTCrF, MTCrGL, and CTCrTiG than the control. Available soil N was significantly higher (59, 59, 59, 57, 57, 57, 55, 55, 55, 50, and 50%) under MTCrGL, CTCrGL, CTCrTiR, MTCrTiR, MTCrF, CTCrTiG, MTF, CTCrGF, CTF, MTCrTiG and MTCrGF compared to the control. Grain radiation use efficiency was significantly higher under CTCrGF, MTCrF, CTCrTiR, CTF, MTCrTiG, CTCrF, MTCrGF, CTCrTiG, and MTCrTiR than the control by 95, 93, 93, 93, 92, 92, 92, 91 and 88% during the SR2020 cropping season. In the LR2021 season, it was significantly higher under CTCrGL, MTCrGL, CTCrGF, CTF, MTCrGF, CTCrF, MTF, MTCrF, MTCrTiG, MTCrTiR, CTCrTiG and CTCrTiR than the control by 80, 79, 78, 77, 77, 74, 73, 72, 70, 67, 66 and 62%. Grain yield was significantly higher under CTCrGF, MTCrF, CTCrF, MTCrGF, MTCrTiG, CTCrTiR, CTF, CTCrTiG, and CTCrTiR than the control in the SR2020 season by 95, 93, 93, 93, 92, 92, 92, 92 and 88%. During LR2021, CTCrGF recorded the highest grain yield, which was 74% higher than the control, while CTCrGL, MTCrGF, MTCrGL, CTF, MTCrF, CTCrF, MTF, MTCrTiG, CTCrTiG, MTCrTiR, and CTCrTiR, had higher yields than the control by 73, 71, 70, 69, 69, 66, 65, 64, 58, 55 and 49%. Overall, CTCrGF, CTCrGL, MTCrGF, and MTCrGL had a comparative advantage regarding soil fertility and crop productivity in acidic Nitisols, strongly illustrating the concept of 'complementarity' in integrated soil fertility management.