

Hoffmann Sándor (2012)

Impact of mineral and organic fertilization on the yield, C-content in the soil, as well as on C-, N- and energy balances in a long-term field experiment

Abstract

Data from a 49-year-long organic–mineral fertilization field experiment with a potato–maize–maize–wheat–wheat crop rotation were used to analyse the impact of different fertilizer variations on yield ability, soil organic carbon content (SOC), N and C balances, as well as on some characteristic energy balance parameters. Among the treatments, the fertilization variant with 87 kg ha⁻¹ year⁻¹ N proved to be economically optimal (94% of the maximum). Approximately 40 years after initiation of the experiment, supposed steady-state SOC content has been reached, with a value of 0.81% in the upper soil layer of the unfertilized control plot. Farmyard manure (FYM) treatments resulted in 10% higher SOC content compared with equivalent NPK fertilizer doses. The best C balances were obtained with exclusive mineral fertilization variants (73.8 and 73.7 t ha⁻¹ year⁻¹, respectively). N uptake in the unfertilized control plot suggested an airborne N input of 48 kg ha⁻¹ year⁻¹. The optimum fertilizer variant (70 t ha⁻¹ FYM-equivalent NPK) proved favourable with a view to energy. The energy gain by exclusive FYM treatments was lower than with sole NPK fertilization. Best energy intensity values were obtained with lower mineral fertilization and FYM variants. The order of energy conversion according to the different crops was maize, wheat and potato.