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1s6b A healthy soil as a basic enabling condition for the transition towards circular land management and land use

EFFECTS OF SOIL MANAGEMENT OPTIONS ON SOIL FUNCTIONS: RESULTS FROM FOUR LONG-TERM EXPERIMENTS IN THE NETHERLANDS

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A current policy goal is that all Dutch soils are sustainably managed by 2030. The policy is focused on carbon sequestration in soils and climate adaptation. Soil management options, tested in four long term experiments in the Netherlands for at least 8 years, were evaluated on their contribution to five soil functions (primary productivity, water purification and regulation, biodiversity and habitat provision, nutrient cycling and climate regulation in the form of carbon sequestration) relative to standard practice. In addition, the management options are evaluated on practical applicability (needed knowledge and competences, equipment, labour requirements and cost-benefits). Soil management options in these experiments included the application of compost, reduced tillage, various soil disinfestation measures, use of cover crops, fertilization measures and addition of organic matter as well as combinations of two or more of these measures. Reduced tillage, application of compost and other organic matter amendments were studied in more detail. One or more indicators were selected to represent each function in the analysis. The effects of the soil management options are neutral to positive for most soil functions however the applicability and cost-benefits are often negative compared to standard practice. Results show that reduced tillage on average has a neutral effect on crop yields across all soil types, however dependent on the crop species, with small-seeded crops having lower yields than in the control treatment. The application of compost can lead to increased yields, especially when the organic matter addition by other fertilization practices is low. Other results include: an improvement of biodiversity indicators by the use of reduced tillage, a possibility for increased carbon sequestration from the application of compost and changed soil nitrogen conditions by the use of reduced tillage. This evaluation of soil management options on their contribution to soil functions and applicability gives useful insight in trade-offs and applicability of options for policy and farming practice. This research was carried out in the PPP Better Soil Management (Beter Bodembeheer).

Keywords: Sustainable soil management, long-term experiments, compost, reduced tillage