DOCUMENT 10

Soil science in crop and livestock production

WORKING WITH SOIL
setting standards in soil science

Background

Soil management is an important component of sustainable crop and grazing livestock production systems. Soil fertility is of paramount importance in all forms of agricultural production ranging from intensive to organic; the aim being to simultaneously increase the efficiency with which inputs are used while reducing the negative environmental impacts of food production. Nutrients, organic matter and lime are added to agricultural soils to optimise soil fertility and crop production. In arable and horticultural systems, forms of cultivation, and other soil management activities are employed to improve soil structure and create seedbeds. Soil science has a critical role to play in managing arable, horticultural and forage crops and grassland systems for food production and environmental protection.

Professional soil scientists are involved in advising farmers and agronomists on soil and nutrient management practices to optimise agricultural production, enhance soil fertility and minimise pollution risk. Professional competence in soil science for crop and grassland production builds upon foundation skills in field soil investigation, description and interpretation (IPSS PCSS Document 1); and is linked to competencies in Agricultural Land Classification (BSSS PCSS Document 2), integrated soil and water management (BSSS PCSS Document 3) and the use of organic materials on land (BSSS PCSS Document 7).

Qualifications

Professional scientists with competence in soil science for crop and livestock production will have graduated in a relevant science subject (and may also have a second degree) and will have a number of years of relevant experience. They will have, or will be adequately qualified for, membership of a relevant professional body, such as the British Society of Soil Science. They may have the BASIS Soil and Water Management Certificate and should be FACTS (Fertiliser Advisers Certification and Training Scheme) qualified if advising on soil and crop nutrition.

DOCUMENT 10

Soil science in crop and livestock production

WORKING WITH SOIL
setting standards in soil science

Minimum competencies

Skills:

1. Competency in the Foundation Skills (field soil investigation, description and interpretation) as per BSSS PCSS Document 1
2. The ability to apply the principles of soil science to relevant aspects of all approaches to crop and grassland management and to advise on the advantages and disadvantages of adopting different cropping systems in particular circumstances
3. The ability to assess soil structural conditions and soil erosion risk, and to advise on management practices to reduce compaction, erosion and loss of organic matter
4. The ability to advise on and interpret the additions of plant nutrients, organic matter and lime to agricultural land in relation to recommendations in AHDB's Nutrient Management Guide (RB209), SRUC Technical Notes or similar industry standard documents
5. The ability to estimate the nutrient requirements of a particular crop and appraise a range of nutrient sources available to clients, prior to constructing nutrient management plans and making fertiliser recommendations (where appropriate) to meet crop requirements, with due regard for the environment
6. The ability to give advice on the nutritional requirements of specific crops based on a sound understanding of needs and variables, and environmental considerations
7. The ability to assess the need for irrigation and/or under drainage systems and secondary treatments such as mole drainage and sub-soiling
8. The ability to communicate soil science for crop and grassland management accurately and informatively, verbally and in writing

Knowledge:

1. Knowledge of soil biological, physical and chemical properties, the basis of soil fertility in supporting plant growth, the ways that nutrients are held and exchanged in the soil, soil:root interactions and management of the inter-relationships between plants, soil, water and air
2. Knowledge of the impacts of soil use and management on agricultural production and environmental protection
3. An understanding of the potential benefits and impacts of all forms of cultivation and the use of farm machinery on soil
4. An understanding of the main soil degradation processes (e.g. compaction, erosion and loss of organic matter) and the sustainable soil management or 'regenerative' practices that can mitigate them
5. An understanding of the role, value and nature of different types of organic materials, their storage, handling and spreading properties, and issues involved in assessing the nutrient contribution of organic materials1
6. An understanding of the various chemical and physical properties of fertiliser types in order to advise farmers/growers on the most appropriate forms of fertiliser for their specific requirements, and calculate unit costs and undertake cost comparison of different products
7. Knowledge of integrated crop nutrient management and the various factors that, together with fertiliser and organic material applications, can be used to satisfy crop nutrient requirements
8. An understanding of the economic and environmental importance of accurate solid and liquid fertiliser spreading, and of the methods and tests used to ensure accuracy of application
9. An understanding of the fate and behaviour of pesticides and other xenobiotics applied to land
10. An understanding of soil water regimes and the need for and impact of irrigation and/or land drainage/secondary treatments
11. An understanding of different methods of irrigation and the planning of irrigation applications to obtain best crop yield at least environmental damage
12. An understanding of the reasoning behind and requirements of agri-environment scheme options and actions that are available to support good soil and nutrient management
13. Knowledge of legal and environmental issues related to the application of fertilisers and organic materials on agricultural land, including national and local regulations and designations of relevance, such as the Farming Rules for Water (in England), Nitrate Vulnerable Zones, Water Protection Zones and/or nature conservation designations
14. An understanding of the Nitrates and phosphates: plan organic fertiliser and manufactured fertiliser use - GOV.UK (www.gov.uk) and Rules for farmers and land managers to prevent water pollution - GOV.UK (www.gov.uk) and/ or the Prevention of Environmental Pollution From Agricultural Activity (PEPFAA) Code (Scotland) https://www.gov.scot/publications/prevention-environmental-pollution-agricultural-activity-guidance/ and/or the DAERA Codes of Good Agricultural Practice for the Prevention of pollution of Water, Air and Soil and of Good Agricultural Practice for the Reduction of Ammonia Emissions https://www.netregs.org.uk/environmental-topics/land/land-topics-for-agriculture/codes-of-good-agricultural-practice/

1 See BSSS PCSS document 7 Soil science for the application of organic materials to land

Disclaimer: The BSSS Working With Soils Initiative provides generic advice on the skills and competencies required by persons carrying out work within the scope of each document. The publishers, authors and the organisations participating in this publication accept no liability whatsoever for any errors or omissions contained in this leaflet, or for any loss or damage arising from interpretation or use of the information, or reliance upon the views contained herein. Any such use must be made with due acknowledgment. © 2024, British Society of Soil Science.
Working with Soil – Professional Competency in Soil Science https://soils.org.uk/working-soil-0 1 See BSSS PCSS document 7 Soil science for the application of organic materials.