

# **Fertiliser Recommendations**

*for Agricultural and Horticultural Crops (RB209)*



Ministry of Agriculture, Fisheries and Food

# Fertiliser Recommendations

for Agricultural and Horticultural Crops (RB209)

<b>Principles</b>	
<b>Organic Manures</b>	
<b>Using the Tables</b>	
<b>Arable and Forage Crops</b>	
<b>Vegetables and Bulbs</b>	
<b>Fruit, Vines and Hops</b>	
<b>Grass</b>	

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## FOREWORD

The first comprehensive set of fertiliser recommendations published by MAFF for England and Wales appeared in October 1973 as the first edition of *Fertiliser Recommendations for Agricultural and Horticultural Crops (RB209)*. Subsequent revisions were published in 1979, 1983, 1985, 1988 and 1994.

The recommendations in this latest revision are based upon information available from Research and Development work carried out by many organisations. In recent years MAFF has sponsored a large programme of research on nitrogen aimed at understanding the factors that influence both the supply of nitrogen to the crop and losses of nitrogen to the environment. Ways of quantifying and utilising the nitrogen supplied from organic manures has also been intensively studied. This revision allows the new knowledge to be incorporated into improved recommendations which are intended to be of practical value to the agricultural industry.

**The recommendations given in this book are those which give the best financial return for the farmer.**

This is of particular importance for nitrogen since many crops give large responses to this nutrient. For other nutrients the recommendations take account of the need to maintain adequate soil reserves of available nutrients as well as crop response. Where farm manures or sewage sludges are used, guidance is given on ways of calculating the nutrients supplied from specific materials using different application techniques.

Careful attention to fertiliser decisions, maximising the value of the nutrients in organic manures and the accurate field application of both fertilisers and organic manures are important first steps towards achieving the right balance between profitable agricultural production and environmental protection. *The Water, Air and Soil Codes (MAFF PB0587, PB0618 and PB0617)* provide further essential guidance on the use and handling of fertilisers and organic manures to minimise the risk of nutrient losses to the water and air environments, and to protect soil quality.

## **ACKNOWLEDGEMENTS**

This latest revision has been led by ADAS compiling information from many sources, and with guidance from a Steering Group comprising representatives of the main user organisations. MAFF gratefully acknowledges the unstinting support and contributions of the following organisations for their work on the Steering Group.

ADAS

Association of Independent Crop Consultants (AICC)

British Institute of Agricultural Consultants (BIAC)

Country Landowners' Association (CLA)

Environment Agency (EA)

Farming and Rural Conservation Agency (FRCA)

Fertiliser Advisers Certification and Training Scheme (FACTS)

Fertiliser Manufacturers Association (FMA)

Institute of Professional Soil Scientists (IPSS)

National Assembly for Wales Agriculture Department (NAWAD)

National Farmers Union (NFU)

Potash Development Association (PDA)

United Kingdom Agricultural Supply Trade Association (UKASTA)

During the revision process, a wide range of research information was considered from projects funded mainly by MAFF, the Levy Bodies, Water UK and the fertiliser industry. The key research organisations involved in the technical working groups were ADAS, the Institute of Arable Crops Research (IACR), the Institute of Grassland and Environment Research (IGER) and Horticulture Research International (HRI). In addition, the practical experience of many experienced consultants was also considered.

The contributions of the many organisations and individuals involved in the revision process is gratefully acknowledged.

Rural and Marine Environment Division,  
Ministry of Agriculture, Fisheries and Food

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## INTRODUCTION

This book has been produced for use by agricultural consultants, farmers and their agents, and all other organisations concerned with developing and maintaining a sustainable agricultural industry. It describes the principles of crop nutrition and gives recommendations for the use of lime, fertilisers and organic manures for field crops and grassland grown in England and Wales. It is an essential source of reference for farmers and advisers qualified under FACTS (Fertiliser Advisers Certification and Training Scheme) and those seeking qualification.

**The primary aim of the recommendations is to maximise the economic return from the use of fertilisers.** Adoption of the recommendations will also reduce the risk of applying more fertiliser nutrients than the crop needs and will thereby minimise the risk of causing nutrient pollution of the environment.

The recommendations in this book support MAFF's view on good agricultural practice for the use of fertilisers including the use of lime and organic manures. It is one authoritative source of advice and provides a national standard. However, other systems may give equally accurate recommendations. There are several computerised systems available or being developed that use more complex calculations than are possible in a book format. Although this may allow more factors, including recent weather, to be taken into account, the extra complexity will not necessarily give a more accurate recommendation.

The recommendations in this book are not designed for use in organic farming systems where the use of soluble inorganic fertilisers is prohibited except for a few fertilisers which can be given exemptions for specific circumstances. Further information can be obtained from the appropriate organic sector body. The recommendations are appropriate for Integrated Farm Management where the aim is to optimise the use of fertiliser inputs as part of an efficient and profitable production system that minimises environmental impact.

The principles of nutrient management and the basis of the recommendations are explained in section 1. In section 2, detailed guidance is given on how to maximise the value of the nutrients contained in organic manures, including sewage sludges, and how to calculate the nutrients supplied from a specific manure application. Instructions on how to use the tables and nutrient Index systems are given in section 3. In sections 4 to 7, detailed recommendations are given for all major field crops, fruit/vines and hops, and grassland.

Although the main purpose of this book is to provide recommendations for the optimum rate and timing of fertilisers, information is also given on a wide range of important related topics, such as soil sampling methods and fertiliser application. References are given to other sources of authoritative and detailed information. A full list of references is given in section 8.

## **SUMMARY OF MAIN CHANGES FROM PREVIOUS EDITION**

### **New Soil Nitrogen Supply (SNS) Index System**

- The Nitrogen Index system has been completely revised. The new Soil Nitrogen Supply (SNS) Index system has 7 Indices ranging from 0 (low) to 6 (high) and provides an assessment of the total amount of nitrogen from the soil that is likely to be available for crop uptake during the growing season. The new SNS Index system takes account of previous cropping and manuring, soil type, soil organic matter content and winter rainfall.
- Each SNS Index is defined in terms of the amount of nitrogen (in kg/ha) that is estimated to be available from the soil for uptake by the next crop. This allows use of the SNS Index system where soils have been sampled and analysed for mineral nitrogen.
- A recommended method is given for sampling soils for Soil Mineral Nitrogen (SMN) and how to use this information to calculate the Soil Nitrogen Supply.

### **Updated Nutrient Values from Organic Manure Applications**

- Typical values of the total nutrient content of farm manures and sewage sludges (biosolids) have been updated. Nutrient output values for different livestock types have also been updated.
- Guidance is given on the use of rapid on-farm analysis for measuring the ammonium-N content of slurries and the use of laboratory analysis for assessing manure nutrient content. Recommended methods are given for sampling different manure types prior to analysis.
- Tables for calculating the available nutrients from a manure application have been updated. Calculations for nitrogen are based on manure type, rate, timing and method of application, and winter rainfall.

### **New Crop Recommendations**

- Recommendations for many crops have been updated to take account of new research information and/or changing crop management practices or market requirements.
- The use of trends in grain nitrogen concentration is recommended to help future nitrogen decisions for winter wheat.

### **Sulphur Recommendations**

- The risk of sulphur deficiency is becoming more common. Recommendations are given for the diagnosis and prevention of deficiency.

### **Phosphate and Potash Recommendations**

- A table of the typical phosphate and potash contents in crop material is given.
- Guidance is given on how to adjust fertiliser rates to build up soil Index levels which are currently low, or to run down high Index levels.
- Guidance is given on ways to minimise phosphorus pollution of surface waters.

### **Overall Presentation**

- More detail is given on the principles and basis of the recommendations. This will provide the user with a clearer understanding of how in practice to apply the information contained in this book.
- References are given to other sources of useful information.

## **THE BASIS OF GOOD PRACTICE**

### **Reliable Information**

- Soil type.
- Field cropping and manuring history.
- Regular soil analysis for pH, P, K and Mg.
- Nutrient surplus or deficit from applications to previous crops.
- Soil analysis for soil mineral nitrogen.
- Winter rainfall.
- Tissue analysis where appropriate (e.g. for fruit crops and for sulphur and potassium on grassland).

### **Correct Decisions on the Economic Optimum Requirement of Crops for Applied Nutrients from Fertilisers and Organic Manures**

- Consider market requirements for crop quality.
- Consider adjusting phosphate and potash for yield level.

### **Assessment of Available Nutrients from Organic Manures**

- Apply manures in spring if possible, and incorporate rapidly into the soil following application.
- Make use of manure analysis (on-farm and laboratory testing).
- Calculate available nutrients based on manure type, method and time of application.

### **Decisions on the Rate, Method and Timing of Fertiliser Application for Individual Crops**

- Allow for nutrients supplied by organic manures.
- Apply nitrogen to match periods of high crop nitrogen uptake.
- Consider placement of fertilisers for responsive crops.

### **Careful Selection of Fertilisers**

- Consider the cost effectiveness of alternative fertiliser materials.
- Take account of the nutrient percentage and the availability of nutrients for crop uptake.
- Make sure that the physical quality of solid fertilisers will allow accurate spreading.

### **Accurate Application of Fertilisers**

- Regularly maintain and calibrate spreaders and sprayers.

### **Record Keeping**

- Accurate field records help fertiliser use decisions.

This book gives information for all of the above stages, including a list of sources of other useful information.

