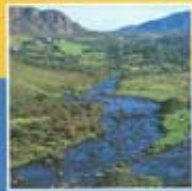


FERTILIZERS AND ANIMAL MANURES



*CODE OF GOOD PRACTICE
FOR THE ENVIRONMENT
AND QUALITY FOOD PRODUCTION*



THE FERTILIZER ASSOCIATION OF IRELAND

QUALITY FOOD WITH FERTILIZER

Soil is the medium for plant growth. For sustainable plant and animal production this medium must be supplied with adequate amounts of major and minor nutrients which are essential for plant and animal growth. To support plant and animal production soil nutrient levels must be maintained. Assuming soil pH is satisfactory the common limiting major nutrients are Nitrogen (N); Phosphorus (P); Potassium (K) and sometimes Sulphur (S).

All of these nutrients are involved in key processes within the plant and a deficiency of any one will limit plant growth, whether it be grass for animal consumption or root and cereal crops for both human and animal consumption.

World population today stands at 5.8 billion and is expected to increase to 8.0 billion by 2020. Cereals are the world's most important stable nutrient source and to meet future demand, cereal production will need to double by the year 2020. Production of other foodstuffs will also have to increase significantly.

Fertilizer, both organic and inorganic, will have to play a vital role if the food production necessary to support the increased population is to be provided.

Efficient recycling of organic manure will provide some of the nutrients necessary but modern crop production will need additional nutrients in the form of inorganic fertilizers. Such nutrients are not artificial, i.e. the nutrients in inorganic fertilizers are natural products and simply supply the shortfall necessary for sustainable crop production.

Nitrogen, Phosphorus and Potassium are naturally occurring elements, which are processed into forms which are readily available for crop growth.

In conclusion, application of inorganic fertilizer is simply the addition of nutrients necessary for crop production to the soil nutrient pool. It is misuse of fertilizer or the use of them at the wrong rates and times which leads to environmental damage. The purpose of this pamphlet is to outline a code of practice for optimum production without damaging the environment.

OBJECTIVES

This Code of Good Practice has been prepared to maintain optimum production of quality food while at the same time minimising nutrient loss through leaching, runoff or losses to air, and thereby prevent any avoidable rise in nitrate and phosphate levels in water.

REASONS

There are 2 excellent reasons for so doing:-

1. Plant nutrients are valuable.
1 tonne of nutrient N costs over £400.
1 tonne of nutrient P costs over £800.
1 tonne of nutrient K costs over £300.
2. Our waterways must be protected from nutrient enrichment. The EC Water Quality Directive requires that drinking water must not contain more than 50mg/l. nitrate (11.3mg/l, expressed as N) and establishes a guideline level of 25 mg/l. of nitrate. Phosphorus and nitrogen in water may give rise to eutrophication. Nutrient enrichment of the water leads to an overgrowth of algae and aquatic plants which in turn cause a depletion of oxygen in the water, leaving it unable to sustain other forms of life. If animal manure finds its way into water it increases B.O.D. levels and depletes oxygen supply. Resultant harmful bacterial contamination of the water is a health hazard. Nitrate and phosphates are released, increasing vegetative growth and leading to further eutrophication.

THE FAVOURABLE POSITION IN IRELAND

There are water quality problems in several parts of the European Union. Overall in Ireland the quality of our water is good. It is important that we now redouble our efforts to ensure that our existing high water quality is preserved while improving the quality of our polluted waters.

CODE OF GOOD PRACTICE

N-FERTILIZERS

1. Aim to have all N fertilizer applied by early to mid-September.
2. Use only the Teagasc recommended levels of N which take account of the availability of soil N.
3. Avoid N fertilizer application during extended drought periods.
4. Maintain a balance of nutrients in the soil. A deficiency of other nutrients can increase the potential for nitrate leaching.

ALL FERTILIZERS

5. Match fertilizer application to yield expectations making due allowance for animal manure applied.
6. When applying inorganic fertilizer avoid direct contamination of water courses by leaving a buffer zone of 1.5 metres.
7. Avoid fertilizer spreading on or near hedgerows.
8. Do not apply fertilizer when heavy rain is forecast.
9. Do not apply fertilizer when soils are saturated.
10. Do not apply fertilizer when soils are frozen or snow covered.
11. Maintain spreading equipment in prime condition and calibrate equipment for even application.

ANIMAL MANURES

12. Apply animal manures at rates which take account of the crop requirements. The shortfall between the nutrients applied in the manure and crop requirements should be made up with fertilizers.
13. Cattle slurry should be recycled to land conserved for hay or silage at not more than $55\text{m}^3/\text{ha}$ (5,000 gls. per acre) per year, and not more than $33\text{ m}^3/\text{ha}$ (3,000 gls. per acre) in one application. Root crops can accept up to $44\text{m}^3/\text{ha}$ (4,000 gls. per acre) in one application early in the growing season.

14. Pig slurry should be applied at lower rates because of its higher phosphorus content. $27.5\text{m}^3/\text{ha}$ (2,500 gls. per acre) may be applied for first cut silage and to root crops. 11m^3 (1,000 gls per acre) per year will normally be adequate for grazing and cereals.
15. Slurry should be applied when plants require the nutrients i.e., at the start or during the growing season.
16. Farm Yard Manure (F.Y.M.) should be stored to minimise nutrient loss and applied to soil using Teagasc recommendations.
17. Do not apply slurry when heavy rain is forecast within 48 hours.
18. Do not apply slurry to soils that are saturated.
19. Do not apply slurry when soils are frozen or snow covered.
20. When applying slurry avoid direct contamination of watercourses by leaving adequate buffer zones.

Streams and drains	10 metres.
Lakes and rivers	20 metres.
Domestic wells	50 metres.
Public water sources	50 - 300 metres.
21. Maintain spreading equipment in prime condition and calibrate equipment for even application.
22. Minimise slurry odour and nutrient losses to air by adopting a common sense approach:
 - (i) Avail of suitable weather conditions.
 - (ii) Use of best practices.

Band spreading is more environmentally friendly than splash plate.

SOIL COVER

23. Whenever possible, avoid leaving soil bare over the winter. The growing of winter crops or catch crops reduces nitrate leaching.

SOIL NUTRIENT PROGRAMME

When devising a fertilizer programme the soil fertility status must be known on foot of regular soil testing. The amounts applied can then be determined to ensure optimum yields without causing environmental damage. There must be full recognition of all sources of nutrients, both organic and inorganic. Regular soil testing is very important to help maintain a balance of nutrients in the soil

APPENDIX

N = Nitrogen

P = Phosphorus

K = Potassium

FERTILIZERS

Make sure that you understand the precise nature of the recommendation. Kilograms per hectare (kg/ha) are different from units per acre.

1 unit per acre	=	1.23 kg/ha.
100 units per acre	=	123 kg/ha.

EXAMPLES

1 bag of 27.5 % N	=	27.5 units N	=	13.7 kg. N.
1 bag of 18-6-12	=	18.0 units N	=	9.0 kg. N.
	=	6.0 units P	=	3.0 kg. P.
	=	12.0 units K	=	6.0 kg. K.
1 hectare (ha)	=	2.47 acres.		
1 part per million (ppm)	=	1 milligram per litre (1 mg/l).		

ANIMAL MANURES.

The nutrient content of animal manure varies with the dilution. The recommendations in the Code of Good Practice relate to well stored animal manure.

Covered slatted stored cattle slurry would have 7% to 8% dry matter.

Note - 11m^3 per hectare = 1,000 gallons per acre.

4.5 tonnes (4,572 Kgs) of dungstead manure are the equivalent weight of 1,000 gallons of slurry.

Guide values for the nutrient content of a range of farm slurries and manures is given below.

Nutrient	Kg./tonne (units/1000 gls).		Kg./tonne (units/tonne)	
	Cattle Slurry	Pig Slurry	Dungstead Manure	Farmyard Manure
N.*	5.0 (45)	4.3 (39)	3.5(7)	4.5 (9)
P.	0.7 (6)	1.4 (13)	0.9 (2)	1.2 (2)
K.	5.0 (45)	2.2 (20)	4.0 (8)	6.0 (12)

Source: Department of Agriculture and Food

*Note all the nitrogen is not available for plant growth. Its availability can vary from 0 to 50% depending on type of manure, time and method of application. Only 25% of the nitrogen is available for Spring applications. Assume no nitrogen contribution from slurry or manure applied at other times of year

SUMMARY

The steps which must be taken may be summarised as follows:-

1. Apply the correct amounts of fertilizer at the right times and at the right rates in suitable conditions.
2. Care must be taken at all stages in the collection, storage and application of animal manures. It must also be applied in the correct amounts at the right times, in the right places, and in suitable conditions.
3. Determine crop requirements by soil testing and cropping history. Correct Nutrient Management Planning means using organic manures efficiently and making up the balance with inorganic fertilizers to meet requirements.
4. Avoid leaving soil bare in winter wherever possible.

Issued by The Fertilizer Association of Ireland,
151 Thomas Street, Dublin 8.



ACKNOWLEDGEMENTS:

The Fertilizer Association of Ireland would like to thank the following for assistance in the preparation of the "Code of Good Practice".

Teagasc.
Department of Agriculture and Food.
Irish Farmers Association.
Irish Creamery Milk Suppliers Association.
Irish Fertiliser Manufacturers Association.

First Edition 1991
Second Edition 1999