



Current Evaluation Procedures for Fertilizers and Soil Conditioners Used in Organic Agriculture

Proceedings of a workshop
held April 29 – 30, 2004 at Emerson College, Great Britain



*Edited by Stefano Canali, Christopher Stopes, Otto Schmid
and Bernhard Speiser*



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Participants of the workshop held April 29 – 30, 2004

Stefano Canali, Christopher Stopes, Otto Schmid and Bernhard Speiser (editors)

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List of abbreviations

Annex II	If not specified further, this refers to Annex II of EC 2092/91
EC 2092/91	European Council Regulation 2092/91 on organic agriculture, including all subsequent amendments
F&SC	fertilizers and soil conditioners
I&C	inspection and certification
Inputs	In this volume: PPP and F&SC
LU	livestock units
OA	organic agriculture
OF	organic farming
PPP	plant protection product(s)
UAA	useful agricultural area

Foreword

This volume contains a number of articles on evaluation procedures for fertilizers and soil conditioners used in organic agriculture. They describe the current situation in different European countries, the USA and third countries. These articles are based on presentations made at the workshop “Inventory of existing procedures for evaluation of fertilizers and soil conditioners used in organic agriculture”, held on April 29–30, 2004 at Emerson College, Great Britain. The aim of the workshop was to give an overview of different evaluation systems, and of their interaction with general (i.e. non-organic) legislation. The workshop was part of the European Union (EU) Concerted Action project ‘ORGANIC INPUTS EVALUATION’, described at the end of this volume. A similar volume describing the evaluation procedures for plant protection products has been published previously. That volume also contains a summary of the evaluation procedures in the guidelines for organic food in Codex Alimentarius and in the Basic Standards of the International Federation of Organic Agriculture Movements (Speiser and Schmid 2004; download from www.organicinputs.org).

The range of available plant protection products, fertilizers and soil conditioners (referred to in this volume as ‘inputs’) strongly affects quantitative yield, yield security, quality of produce and profitability of crops. It may also affect the environment and the public perception of organic and non-organic farming systems. Thus, the use or non-use of inputs is an important element of agricultural production systems from the point of view of farmers, consumers and policymakers. Organic farming is characterized by a strict regulation of plant protection products, fertilizers and soil conditioners, which precludes the use of the vast majority of all available compounds.

At European level, Council Regulation 2092/91 lists all inputs allowed in organic farming. However, the particular inputs allowed on a national level can vary considerably from country to country, because inputs and their use also have to comply with national legislation, and because certain aspects of EC 2092/91 are interpreted or implemented in different ways in the EU Member States. In the case of fertilizers and soil conditioners, heterogeneity is mainly observed in the following areas: (i) quantitative restrictions on the amounts of fertilizers to be used; (ii) definitions of ‘factory farming’ for the purpose of excluding manure or slurry of such origin; (iii) restrictions on the use of materials originating from household waste; (iv) restrictions on the use of slaughterhouse wastes; (v) limits applying to the heavy metal content of composts or other fertilizers; (vi) conditions for use of micronutrient fertilizers; (vii) limits applying to the use of peat; (viii) concern about and risk of contamination of fertilizers and soil conditioners with GMOs.

The collection of country reports in this volume allows a comparison of the situation in a number of countries, mostly in Europe (in alphabetical order). This shows the degree of equivalence between countries, and indicates the causes of the heterogeneity found. The aim of this collection was not to give a complete picture of all similarities and dissimilarities for the whole of Europe, but to highlight the general patterns, and to identify the reasons for the major differences between countries. Finally, it should be kept in mind that input evaluation takes place in a constantly changing environment of regulations and private standards. The articles therefore describe the situation at the time when the workshop was held. In particular, the reports for the Czech Republic, Poland and Slovenia describe the situation before these countries joined the EU.

The present collection of reports, all written to a common structure, is unique, and we would like to thank all authors for their contributions, and the Commission of the European Communities for financial support. We hope that this volume will further efforts to create a more level playing field regarding the selection of inputs that European organic farmers are permitted to use.

Frick, Switzerland, January 2005

Bernhard Speiser and Otto Schmid

Summary

Stefano Canali¹ and Bernhard Speiser²

Scope of this collection of reports

The reports collected in this volume give an overview of the regulatory framework and the procedures and criteria for evaluating fertilizers and soil conditioners (F&SC) in organic agricultural systems. In addition, they describe the different strategies for fertility supply adopted in different regions and under different conditions. The reports were written in early 2004 and describe the situation in the following Member States: Austria (AT), Denmark (DK), France (FR), Germany (DE), Italy (IT), The Netherlands (NL), Portugal (PT), Spain (SP) and the United Kingdom (UK). In addition, the volume covers Poland (PO), Slovenia (SLO) and the Czech Republic – EU Accession Countries when the reports were written – Switzerland (CH, recognized as a Third Country) and the United States of America (USA).

Methods of fertility supply in organic systems and use of F&SC in different countries

Europe has a wide range of climates and soils, and consequently the approaches to fertility supply vary greatly, this is true both between and within countries.

Animal dominated farming systems

In regions where animal production predominates, soil fertility management is based on the use of animal excreta (mainly manure), which represent the main source of organic matter and nutrients to be recycled in the soil in order to ensure plant production (mainly permanent grassland and pasture). In these systems, the main issue is to ensure efficient use of excreta for soil fertility management, avoiding damage to the environment. For this reason, limits are imposed on the application of slurry or manure (see below). In these regions, animal excreta of organic origin are usually available in sufficient quantities, and restrictions can be imposed on the use of excreta from non-organic sources without generating severe constraints for soil fertility management.

As described in the country reports, this kind of fertility management is widespread in large areas of Europe: i.e. Austria, Slovenia, Denmark, Czech Republic, large parts of Switzerland and the Netherlands, and in northern Italy and parts of the UK. In these areas, the use of external inputs for soil fertility management is very low and the issues related to the allowed F&SC are of minor importance. Inputs may include lime (pH regulation), P and K sources and micronutrients, depending on the soil status. Some key micronutrients may be in short supply, limiting forage production.

Mixed farming systems

In regions where animal production is balanced with plant production (mixed agroecosystems, mixed farms), the use of animal excreta still plays a fundamental role for soil fertility management, but addi-

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tional agronomic strategies such as rotations, use of legumes and green manuring also become relevant. To ensure the optimum fertility supply in these systems, the design of appropriate rotations and/or optimization of the use of legume crops and green manuring is an important issue. These concepts are evident from the reports covering the United Kingdom and Germany, countries in which mixed farming systems are widespread.

Farming systems with low stocking rate

In organic systems/farms with low stocking rates, there is an imperative need to import organic matter and nutritive elements, and farmers use animal excreta (mainly manure) originating from other farms in their local vicinity. If materials of organic origin are available, these are preferred. Otherwise, excreta from non-industrial animal husbandry are utilized.

In these organic systems, the use of external F&SC – and the attention paid to their properties and their quality – generally increases. Organic agro-ecosystems in which soil fertility supply is based on a balanced use of internal resources and external F&SC can be identified in almost all countries. According to the reports in this collection, mixed systems are present in Portugal, Spain, United Kingdom, Germany, Switzerland, Slovenia and Italy, but their importance in terms of market relevance and total land area varies greatly.

Stockless farming systems

The main problem for organic stockless systems/farms is reintegration of organic matter and nutritive elements. These farms cultivate field crops or, more often, are highly specialized farms geared towards fruit, grape or vegetable production. In the latter case, agronomic strategies (i.e. rotation) for increasing soil fertility are difficult to implement or too expensive, or they are perceived as such by farmers. Consequently, external resources for fertility supply are of great importance for these farms.

Stockless, specialized farms located in, or close to, animal production areas generally find animal excreta of organic or conventional (but not industrial) origin to be a valuable option, and use commercial F&SC as complementary inputs in fertility supply. This scenario is described in the reports for The Netherlands and Denmark, which describe the Northern European specialized organic production systems for fruits and vegetables (open-field and greenhouse).

In Mediterranean countries (see reports for Italy and Spain), where animal husbandry is more scarce, often highly specialized, industrialized and concentrated in small areas, sufficient quantities of good quality animal excreta are frequently unavailable. The need for external inputs for fertility supply for specialized production of fruits and vegetables is almost completely met by means of commercial F&SC. In these areas, raw materials utilized for production of organic F&SC are collected from agroindustry (i.e. the olive oil, wine and citrus industries, and slaughterhouses), other industry (e.g. the leather industry) or other human activities (municipal waste from separate collection). Because organic and extensive animal husbandry are virtually absent in Mediterranean areas, stockless farms cannot use animal excreta from organic or extensive farms. Thus, the issue of sourcing animal excreta for fertility supply from organically managed systems is discussed in a completely different way here than it is in regions dominated by animal production.

Regulatory framework for F&SC

The description of the regulatory framework in this collection takes into account the legislation concerning F&SC for organic farming at European and at national level. Private organic standards have also been considered and their main peculiarities are highlighted. In addition, nearly all the reports introduce the issue of commercial products, the regulation of which is often identified as a hot issue.

The reports also briefly consider the regulatory framework concerning conventional farming (European and national level) and its impact on the organic sector. According to Article 6.1, letter b), of Regulation (EEC) no. 2092/91, F&SC listed in Annex II, part A, of the same Regulation can be used only if their use is authorized in conventional farming in the Member States under the relevant Community or national provision.

Regulatory framework for conventional agriculture

European Level

The relevant regulation for conventional farming is EC Regulation no. 03/2003 of the European Parliament and of the Council of 13 October 2003 (O.J. of the European Union of 21 November 2003 – L304/1). This Regulation relates only to mineral and synthetic fertilizers and replaces, among other acts, Council Directive no. 76/116/EEC and its amendments and updates – i.e. Directive no. 89/530/EEC and Directive 89/284/CEE, which are mentioned in Annex IIA of Regulation no. 91/2092/EEC. The Regulation covers the fertilizers based on primary nutrients (N, P, K), secondary nutrients (S, Mg, Ca, Na) and micro-nutrients (Fe, Zn, Mn, Cu, Co, B, Mo).

No Regulation or Directive concerning organic fertilizers and soil conditioners is in force at the moment, although a Directive about compost has been discussed for many years by DG Environment in the context of the activities concerning the sustainable development strategy.

A number of other Acts have impacts on the trade and use of F&SC; they deal with sanitary (i.e. EC Regulation 02/1774 concerning animal by products not for human consumption) or environmental issues (i.e. EEC Directive no. 91/676 concerning the protection of waters from nitrate pollution from agricultural sources) or with waste management (i.e. EEC Directive no. 86/278 for Sludge). All these Acts have different implications for the conventional and the organic fertility supply systems in the different countries, and their relevance is discussed in each specific case.

National Level

In almost all European countries, national regulations dealing with F&SC are in force. In some countries (i.e. Austria, Germany, Spain, France, Italy, Switzerland), the national provisions cover organic fertilizers, organomineral fertilizers and soil conditioners, which are not taken into account in the European Regulation. In several of the countries considered, regulations for substrate production and trade do not exist (e.g. Italy and Switzerland).

At national level, in addition to the norms specifically set up for F&SC, there are also a number of related Acts which can interfere with F&SC. Examples are the rules on organic fertilizers based on meat, blood and bone meals, in force in Germany, France and Switzerland, or those which regulate the use of animal excreta (slurry and manure) in a stricter way than the Nitrate Directive (in force in Denmark and Slovenia).

The situation is different in the Accession Countries. In Slovenia for instance, specific norms concerning F&SC have not been developed; on the other hand, a complex legislative framework for inputs has been

developed in Poland. In any case, it should be emphasized that, from May 2004, a (large) part of the Accession Countries' legislative framework has been replaced by European legislation.

Finally, the reports confirm that regulation of F&SC is generally the responsibility of the Ministries or Federal Offices of Agriculture (e.g. France, Spain, Italy, Switzerland, Austria) and/or of Industry (e.g. Poland). Furthermore, due to the relevance of environmental and sanitary issues within the complementary legislative framework, the Ministries of Environment and of Health are also often involved.

Regulatory framework for organic agriculture

European Level

The reference document for fertilizers and soil conditioners allowed in organic farming is Regulation no. 91/2092/EEC (Annex I – for the section dealing with plant production – and Annex II A). Annex II A provides the list of permitted inputs, including products of different origin (i.e. biological/mineral) and use (fertilizers/soil conditioners), each of which is specifically characterized and identified.

Some of the permitted inputs are clearly fertilizers, as defined in the EU Regulation concerning fertilizers for conventional farming, and consequently these are readily identifiable in almost all countries. Others are defined as fertilizers and soil improvers under national legislation, in certain instances, making it less easy to identify these products in every country. In addition, Annex II A also includes raw materials which can be used for the production of fertilizers and/or soil conditioners, but which are themselves neither fertilizers nor soil conditioners. The range of these materials is wide (i.e. products and by-products of plant origin, stone meal) and their characteristics are not defined. Many of the country reports demonstrate the problem of the heterogeneity of the definitions in Annex II A in relation to the existing European and national regulatory framework, and identify this as a major difficulty for operators in the organic sector. It is also clearly a barrier to harmonization of organic farming standards among the different countries. This fact is often identified as a hot issue.

An additional hot issue identified is that of the impact of the Nitrate Directive on organic agroecosystem management strategies. The Nitrate Directive (EEC Directive no. 91/676) for the protection of vulnerable agricultural areas limits the application of fertilizers deriving from animal excreta in “vulnerable zones” to 170 kg N ha⁻¹ year⁻¹ in order to prevent nitrate pollution. This limitation has been interpreted as being relevant and appropriate for all organically managed land, which led to the definition of the maximum permitted stocking rate in Regulation 2092/91. Consequently, all organic farms (whether situated within vulnerable zones or not) avoid excessive stocking rates and thus meet the highest environmental standards from the point of view of nitrate pollution. The limit of 170 kg N ha⁻¹ year⁻¹ is still relevant in agricultural areas characterized by high stocking rates, where it ensures that organic production is an environmentally friendly and sustainable agricultural system with a balance between animal and plant production. However, in low-stocking-rate or stockless systems, the limit of 170 kg N ha⁻¹ year⁻¹ from animal excreta is not relevant, unless there is a reliance on imported material derived from animal excreta. This can be the case in those stockless systems where the inclusion of legumes in the rotation is not feasible (for economic or climatic reasons). In any case, a nutrient balance sheet which keeps an account of inputs and outputs of N helps to optimize the use of nutrients from any source and contributes to reducing environmental risks.

National Level

In the EU countries, the regulatory framework for F&SC for organic farming at the national level is mainly based on private standards, many of which were in force before the publication of EC Regulation no. 91/2092. These standards are often still in force, as they have either been reviewed and harmonized with the Regulation or, in the view of the bodies which have developed them (i.e. organic farming associations or control bodies), they are even more stringent. This is the case, as one example among many, with the Soil Association (UK) standards which do not allow the use of guano or of fertilizers based on slaughterhouse by-products.

Italy and Spain are the only European Member States where national (state) legislation specifically dedicated to F&SC for organic farming is in force. Specific national legislation in force in Slovenia, Poland and Czech Republic (all Accession Countries before May 2004) has been replaced by the European Regulation. However, these national provisions were largely equivalent to the EC Regulation, and the shift to the new regulatory framework is unlikely to generate difficulties for the organic sector. In addition, in some of these countries, private (and stricter) standards have remained into force. (i.e. USOFA in Slovenia).

In addition to the regulatory framework defining the typology and characteristics of F&SC on the basis of the active ingredients, in many countries systems to identify, evaluate and list commercial (branded) products for organic farming are also in force. Associations devoted to the promotion of organic farming and/or authorized control bodies often carry out these activities. Rarely, the state authority has assumed responsibility for these tasks, this being the case in Italy (for instance), where the ‘official list’ of branded F&SC is managed by a research institute on behalf of the Federal Office (Ministry) for Agriculture.

The presence of well-managed and trusted input lists is always positively viewed by the organic sector in all countries and, where this tool is absent, the need for its introduction is clearly stated (e.g. in the Portuguese action plan for organic farming). Actions to facilitate the sharing of know-how and to improve and harmonize procedures of management of the lists for commercial inputs should be specifically promoted.

Additional relevant points

In addition to the hot issues discussed above, which have been cited in almost all national country reports, a number of other relevant points have been highlighted. Among these are:

Source of animal excreta and definition of factory farming

As detailed above, it is generally agreed that excreta sourced from organic farms are preferable, whereas those originating from factory farming are prohibited. However, there is less agreement concerning the acceptability of intermediate sources. In regions where organic animal husbandry is rare, organic farms have no choice but to use animal excreta from non-organic sources.

Concerning material originating from “factory farming”, stricter or broader definitions of this kind of animal husbandry are applied in different countries, depending on the prevalent type of livestock production and on the need for nutrients and organic matter for soil fertility management. At the moment, the debate is considering whether a common, widely accepted definition of factory farming can be reached, or whether national and regional solutions should coexist.

GMO contamination

Raw materials used for producing off-farm fertilizers and soil conditioners could potentially contain GMO residues. The question should be addressed as to whether this fact represents a risk for the organic sector or not. Studies to evaluate this risk and identify the potentially risky F&SCs should be carried out in the near future.

Substrates and greenhouse organic production

At the moment, there are no standards at European level concerning the production and utilization of substrates, but there appears to be a need for such a norm in several countries. In the past, the European Commission has proposed a project on a Regulation concerning this topic, but it was not approved. That project could be the starting point for addressing the issues again. In addition, a new debate should be opened concerning soil management strategies in greenhouse organic production.

Fertilizers and soil conditioners in organic farming in Austria

Alexandra Hozzank¹ and Wilfried Hartl²

History, structure and trends of organic farming in Austria

History

The organic movement in Austria originated in 1980, when 200 farmers decided to cultivate their farms according to organic methods. The largest growth in this development took place up to the end of the nineties and reached its peak in 1999, with 19 733 farms. The most important factors in this enormous increase had been the early addition of guidelines for organic crop production and animal husbandry to the Austrian Codex Alimentarius (not to be confused with the international Codex Alimentarius of FAO/WHO), government support for organic farms during and after conversion through compensatory payments, favourable market conditions through the entry of supermarket chains and an active policy of the organic associations (mainly BIO ERNTE AUSTRIA, with nearly a 65 % share of all organic farmers). After this peak, numbers decreased again until 2001. In 2002, 17 891 farmers were cultivating 12 % of Austria's agricultural land area (BMLFUW, 2003a).

Structure and trends

Austria is characterized by small-structured agriculture, the average farm size is between 10 and 20 ha.

Cereal production is of highest importance, followed by feed production – 43 % cereal production, 31 % feed crop production, 7 % legumes, 5 % maize, about 2 % potatoes and 2 % oil seed (Eder *et al.*, 2002). In animal husbandry, the distribution is as follows: 18 % of the cattle, 1 % of pigs, 2 % of chickens, 24 % of sheep and 14 % of horses are kept according to organic standards (Freyer *et al.*, 2001). In 2001, an “Action Plan for Organic Agriculture in Austria” was developed. This plan is scheduled to increase the organically managed area to 50 % until 2006 (BMLFUW, 2003b).

Support

Financial support for organic agriculture by the state started in 1989. Since 1995, one year after Austria entered the European Union, organic agriculture has been funded through the framework of the ÖPUL national agri-environmental programme (BMLFUW, 2000).

Inspection

There are seven accredited certification bodies operating in Austria, which are either private non-profit or for-profit organizations. The supervision of the control and certification process is characterized by a tripartite approach (Federal Ministry of Social Security; Federal Ministry for Economic Affairs and Labour; Federal Ministry for Agriculture, Environment and Water Management), where each Ministry focuses on a specific agenda (Darnhofer *et al.* 2003).

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Fertility supply in organic systems, major fertilizers and soil conditioner inputs used

The majority of organic farms in Austria are based in the Alpine region. In some alpine districts, for example in the Salzburg province, up to 50 % of the farms are organic. Although there is an increase of cropland in the eastern areas of Austria, the percentage of organic farms in regions dominated by cropland seldom exceed 5 % (Vogl and Darnhofer, 2004).

Therefore the input of fertilizers and soil conditioners in relation to the ratio of certified farms is rather low. The *major inputs* in organic agriculture in Austria are the following:

Field crops

In field cropping the main nutrient supply is through farm manure, compost (partly from the own farm, partly compost from separated household waste from controlled collecting systems), slurry from biogas production, organic fertilizers, mainly mycelium products (e.g. Agrobiosol and Biosol), potassium oxide mainly for the cultivation of potatoes, phosphate and calcium carbonate.

As an example of a private guideline for the use of F&SC, BIO ERNTE Austria has adopted its own guideline for the use of fertilizers of conventional origin. In the case of arable land normally the nutrient needs (e.g. for C and N) should be balanced within the crop rotation. In the case of specific needs, the following rules must be fulfilled:

- At least 20 % legumes have to be cultivated in the main crop rotation (based on the total arable land).
- The maximum amount of 170 kg N is reduced by the nitrogen input of the existing livestock.
- The difference in amount of nitrogen is multiplied by a factor depending on the speed of nutrient release of the specific organic fertilizers:
- In the case of organic fertilizers with slow release of nutrients (e.g. farmyard manure, compost or fertilizers with a C/N ratio of more than 25:1) the factor is 0.7.
- In the case of organic fertilizers with high speed of nutrient release (e.g. poultry manure, liquid animal excreta or fertilizers with a C/N ratio less than 25:1) the factor is 0.25.

Grassland

The fertility supply in grassland is preliminarily guaranteed through farm manure, also calcium carbonate is applied. According to BIO ERNTE AUSTRIA guidelines, in grassland areas only the application of organic fertilizers is allowed; there are few exceptional authorizations for skiing-slopes. Special requirements are prescribed by BIO ERNTE AUSTRIA for the additional purchase of organic fertilizers originating from conventional sources (e.g. mycelium products are forbidden; limitation of nutrient amounts, similar to the calculation example given above).

Speciality crops

Speciality crops are mainly supplied through organic fertilizers; here primarily fertilizers with high nitrogen contents, such as vinasse and oil cakes, are used. Mycelium products are also applied.

There are no nutrient plans drawn up before undergoing the certification procedure. In the case of an application of organic fertilizer, the farmer has to inform his inspection body in advance. There, the

possible nitrogen input is calculated, taking consideration of the existing livestock. The requirements for composting are identical with these demanded in the EU Organic Regulation.

The term “extensive animal production” is interpreted according to BIO ERNTE AUSTRIA guidelines in Austria as follows: in the case of poultry farming: dark housing and keeping animals on the floor without an open yard are forbidden; in the case of cattle and pig farming: slatted concrete floors are forbidden.

The restriction “need recognized by inspection body or authority” is annotated as indicated in Table 1.

Table 1: Restrictions on inputs with the remark “need recognized by inspection body or authority”.

Component	Restriction	Notes
Farmyard manure	licence before use *	
Dried farmyard manure and dehydrated poultry manure	licence before use *	
Composted animal excreta	licence before use *	
Liquid animal excreta	licence before use *	
Guano	licence before use *	
Products or by-products of animal origin	licence before use *	
Composted or fermented household waste	licence before use *	analysis required
Composted or fermented mixture of vegetable matter	licence before use *	
Seaweed and seaweed products	licence before use *	
Products and by-products of plant origin	no restriction; except for <i>mycelium</i> , for which licence before use *	
Basic slag	licence during inspection **	forbidden according to the BIO ERNTE AUSTRIA guidelines
Crude potassium salt	licence before use *	forbidden according to national incentive measures (ÖPUL)
Potassium sulphate	licence during inspection **	
Magnesium and calcium carbonate	in German version without restrictions	
Calcium chloride	licence before use *	
Industrial lime from sugar production	licence from the inspection body during inspection	
Elemental sulphur	licence during inspection **	
Trace elements	licence during inspection **	a protocol of consultation or documented deficiency symptoms are also accepted. In this case, the inspection body has to be contacted before application
Sodium chloride	licence before use *	forbidden according to national incentive measures (ÖPUL)

* written licence from the inspection body necessary before use

** licence from the inspection body during inspection, soil investigation (no older than four years) is necessary

There are no threshold values for heavy metals or plant protectants except in the case of household waste; here the limits of the EU Organic Regulation are considered as well as the values laid down in the Austrian regulation for composting. If limits on the contents of such substances as heavy metals etc. are included in the EU Regulation, as for compost, there must be a standardized determination of the sampling procedure, sampling preparation and analytical methods.

Branded products are evaluated in Austria through the association InfoXgen in cooperation with BIO ERNTE AUSTRIA. For the verification of fertilizers and soil conditioners, the following documents have to be made available: composition (all components have to be offered), evidence that no GMOs are used, production process and government authorization.

Regulatory framework

Organic agriculture in Austria is mainly regulated through the EU Regulation 2092/91. In addition to that, requirements regarding fertilizers and soil conditioners are implemented in the guidelines of the organic association BIO ERNTE AUSTRIA.

EU-Regulation

- Regulation (EC) No. 2003/2003 of the European Parliament and of the Council of 13 October 2003 relating to fertilisers (Official Journal of the European Union L304/1 of 21.11.2003) – only for mineral fertilizers

National legislation

- *Düngemittelgesetz* (Fertilizer Act) 1994
- *Bundesgesetz über den Verkehr mit Düngemitteln, Bodenhilfsstoffen, Kultursubstraten und Pflanzenhilfsmitteln* (Düngemittelgesetz 1994 – DMG 1994 (Fertilizer Act), BGBl. Nr. 513/1994 idF BGBl. Nr. 419/1996, BGBl. I Nr. 72/1997, BGBl. I Nr. 117/1998, BGBl. I Nr. 23/2001, BGBl. I Nr. 108/2001, BGBl. I Nr. 109/2001 und BGBl. I Nr. 110/2002
- *Düngemittelverordnung* 2004 (100. Verordnung vom 21. Dezember 1994 (Fertilizer Ordinance))
- *Düngemittel-Einfuhrverordnung* (101. Verordnung vom 21. Dezember 1994 (Fertilizer Import Ordinance))
- Verordnung des Bundesministers für Land- und Fortswirtschaft, Umwelt und Wasserwirtschaft über Qualitätsanforderungen an Komposte aus Abfällen (Kompostverordnung (Compost Ordinance))

Private Standards

- Production Guidelines of BIO ERNTE AUSTRIA (published annually)

Hot issues

- Inadequate regard for the composition of products (no obligation to maintain secrecy, lack of official support)
- No analysis of branded products
- Lack of lists for problematic inerts

- GMO problem
- Plant strengtheners are treated as soil or plant conditioners. Because of mutual recognition with Germany, all plant strengtheners published on the BBA homepage can be used automatically as plant conditioners without previous evaluation.
- No verification of necessity (except the private guidelines of BIO ERNTE AUSTRIA) and effectiveness
- Inadequate collaboration with authorities

Decision-making

Fertilizers and soil conditioners have to be evaluated on two different levels in Austria; governmental authorization (AGES – Agency for Health and Nutrition Security) for the one part, verification according to the EU Organic Regulation and the guidelines of BIO ERNTE AUSTRIA (InfoXgen) for the other part. As soon as branded products are put on market, it has to be guaranteed that the product satisfies the legislative requirements; this is checked through samples taken from the authority. The requirements referring to organic agriculture are evaluated by private associations (BIO ERNTE AUSTRIA and InfoXgen). The evaluated products are published online on the InfoXgen homepage (www.infoxgen.com); this is updated once a week. In addition the products are published in the Austrian input list, which is printed annually.

The guidelines of BIO ERNTE AUSTRIA are drawn up following a strict defined procedure: amendments are prepared through one of the special departments of the association, and then the proposals have to pass the committee. The committee consists of organic farmers (one delegate per one hundred members) and meets once a year.

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Fertilizers and soil conditioners in organic farming in the Czech Republic

*Anamarija Slabe*¹

The history and context of organic farming

Organic agriculture started in 1989 with two organic farmers. The Ministry of Agriculture of the Czech Republic introduced payments for organic production; from 1989 to 2000, there was exponential growth in the number of hectares farmed organically, climbing to 167 000 hectares. Four organic farmers' associations were founded in 1990. The Ministry of Agriculture supported all new organic farmers through direct subsidies per hectare. Seventy-five organic farmers in their second year of conversion were registered in 1991, and state subsidies for new farmers continued until 1992. In 1992 there were around 15 hectares of organic farmland. For a few years, support for organic farming stopped, and was then reintroduced.

Table 1: Development of organic farming in the Czech Republic (from Prazan *et al.*, 2004). n.d. = not determined.

	1997	1998	1999	2000	2001	2002
Total number of agricultural holdings	n.d.	36 300	36 600	36 600	38 210	38 420
Total number of organic holdings	211	348	473	563	614	717
Share of organic holdings in total	n.d.	1.0 %	1.3 %	1.5 %	1.6 %	1.9 %
Average size of agricultural holdings (ha)	n.d.	118	117	117	112	111
Average size of organic holdings (ha)	96	206	234	294	355	328
Total area fully converted to organic farming (ha)	n.d.	n.d.	n.d.	99 800	152 500	157 400
Total area in conversion (ha)	n.d.	n.d.	n.d.	65 900	65 600	77 800
Total organic area (ha)	20 239	71 600	110 800	165 700	218 100	235 200
Organic area as a share of total UAA	0.5 %	1.7 %	2.6 %	3.9 %	5.1 %	5.5 %

Agri-environmental payments amount to 70 EUR/ha for arable land, grain, potatoes, herbs and leguminous plants, 35 EUR/ha for grassland and 120 EUR/ha for permanent cultures and vegetables (2002).

The inspection of organic farming is carried out under a mixture of state and private systems. The Ministry of Agriculture / Department of Structural Policy and Rural Development represents the state, whereas a private inspection body called *Kontrola Ekologickeho Zemedelstvi* (KEZ) represents the private sector. The Ministry signed an exclusive agreement with KEZ and transferred to KEZ many of the administrative provisions. KEZ inspects and certifies in accordance with state production standards and additionally private standards of KEZ. The latter are developed to give producers the right to use the logo "KEZ IFOAM accredited", which may be of interest for those producing for non-European markets. State accreditation from the Czech inspection body is based on CSN EN 45 011. The accreditation is performed by the Czech Accreditation Institution. Additionally, KEZ is accredited by IFOAM.

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For many years, there were no private standards in the Czech Republic as everything, including standards, was initiated or at least introduced by the state. The Czech organic farming movement with the leading association PRO-BIO started in 1990, and created its logo as a promotion tool. PRO-BIO is preparing its own private standards now.

According to the Czech marketing company “Green Marketing”, sales of organic food in the Czech Republic have been growing at 25-30 % annually over the last three years. Last year, turnover on the organic food market ranged between EUR 5 – 6.5 million, of which exports accounted for around one fifth. The majority of organic food (55 %) is sold in supermarkets, but organic food can also be purchased in speciality shops (25 %), from independent food retailers (10 %) or directly from the farm (8 %).

Description of fertility supply in organic systems and major fertilizers and soil conditioners used

In the Czech Republic, the majority of organic farms are grassland farms with animal husbandry (predominantly cattle), that produce their own fodder on meadows and pastures and grow fodder on fields. Farms with arable crops are encouraged by the law, the inspection body, farmers’ organizations and advisors to maintain fertility within their own organic system (crop rotation with growing of leguminous plants, proper tillage of soil etc.). Thus, 90–95 % of all organic farms do not use any commercial F&SC products, and soil fertility is maintained by the use of animal manure from the farm and the growing of leguminous plants.

The Decree (see below) demands that in the planting pattern, there are preferably included clover plantations, legumes or mixed crops containing clover plants or legumes, and that a cultivation plan has to facilitate the use of green manure, undersowings and interim crops, maintain or improve soil fertility (content of humus in the soil), vegetation cover for the longest possible period – possibly over winter, and it has to provide measures against erosion. In addition, there is a requirement that grass biomass, if not grazed, is harvested for production of hay or feeding-stuff, or is processed to be used in compost.

There are only few farms (mainly in fruit and vegetable production) that buy commercial F&SC. Some farmers use calcium carbonate and stone meal to condition the soil. In more intensive organic plant production (fruit growing, vegetables, vineyards) also other organic fertilizers are being used according to the specific needs of the plants and soil (P, K, Mg).

Existing legislative/regulatory framework relevant for use of fertilizers and soil conditioners in organic and conventional farming

In the Czech Republic, the supreme law on organic farming is Parliamentary Act no. 242 of 29 July 2000 on organic farming and on the amendment of the Act No. 368/1992 of the Col. on administrative fees, as last amended. The Act defines organic farming and introduces general rules of the sector. The Czech state organic farming regulation was one of the first in the Central and Eastern European candidate countries (CEEC). The first Czech state organic regulation was published in 1992, and was then amended in the year 2000. The executive regulation is the Decree of the Ministry of Agriculture no. 53 of 12 February 2001 explaining Act no. 242/2000 Col. and on the amendment of the Act No. 368/1992 Col. The Decree was proclaimed on 12th February 2001, and came into force on the day of its publication. The Czech state organic regulations are based on EC Regulation No 2092/91.

Many of the off-farm inputs which are mentioned in Annex II of EC 2092/91 are not listed in the Czech Decree, making the Czech standards stricter than the EU standards. The Czech organic law is equivalent to EC 2092/91, and the Czech Republic is on the EU list of third countries.

Allowed mineral fertilizers should be used only when soil analyses prove a low level of nutrients. Fertilizing with trace nutrients can be used only in case of deficiencies, which can be proven either by the symptomatic method or as a result of testing. In the present legislation on organic farming, there is no "need recognized" restriction attached to the use of F&SC. This will change as from 1 May 2004, when EC 2092/91 enters into force.

One of the requirements for organic farmers is elaboration and presentation of the fertilization plan to the control and certification body. There are specific limits for the N/ha to be used on organic farms. It is prohibited to use farmyard manure accounting for more than 150 kg nitrogen per ha /year on arable land and perennial grasslands. On non-renewed meadows and pastures, the limit is 85 kg of nitrogen per ha/year. This is controlled on the basis of book-keeping, the fertilization plan, the number of animals, the area, the crop rotation etc. The question on the definition of extensive animal production does not seem to be relevant, as organic farmers do not buy organic fertilizer from other farms. However, the Act states that "...All farmyard manure that does not originate from an organic farm or from the conversion period has to be composted or fermented". Furthermore, it is prohibited to use farmyard manure that originates from poultry or rabbits kept in cages or from farm animals continuously kept on concrete strip floors.

For organic farming, there is a general prohibition on the use of products or by-products of animal origin such as *blood-, hoof-, horn-, bone- and meat-meal*. Furthermore, it is prohibited to use sludge from purification plants and waste waters, with the exception of sludge and waste water from the organic farm itself, if they comply with the special legal requirements.

As there is also no list of branded products, but only a very short list of allowed inputs (Annex to the Decree), for the practice this means that every single commercial product that the farmer uses has to be approved by the inspector. This is done by checking whether the ingredients of the product comply with the list of allowed inputs. Similar lists exist for feedstuffs and seeds. These lists are produced by the control and certification body KEZ.

Fertilizers and soil conditioners: issues and trends

Use of fertilizers and soil conditioners does not seem to be a significant discussion topic, due to a large self-sufficiency in soil fertility on Czech organic farms and a very limited use of commercial products.

Discussion and decision-making on fertilizers and soil conditioners

The Ministry of Agriculture is responsible for legislation and defining the list of allowed inputs. There is a group of advisors (experts) who help (have helped) in this procedure.

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Fertilizers and soil conditioners in organic farming in Denmark

Rasmus Ørnberg Eriksen¹ and Erik Steen Kristensen²

Fertility supply and major fertilizers

In organic farming, the primary input for fertility comes from grass, clover and other plants, which are ploughed into the soil (green manure) and from farmyard manure. Only a minor part comes from such fertilizers as composted or fermented household waste, stillage and industrial lime.

Most organic farmers have livestock to cover the need for fertilizers. Approximately 2/3 parts of the total Danish organic area, corresponding to 130 000 ha in 2003 have livestock. Approximately 40 000 ha are managed organically on farms without livestock. Farmers without livestock normally have easy access to farmyard manure from neighbouring organic or non-organic farms. In some regions, farms with a large amount of livestock (especially pig farms) even have to pay other farms to accept their farmyard manure.

The number of farms without livestock (stockless farms) has been increasing over the last few years, due among other things to the surplus of organic milk in Denmark and increased subsidies for conversion of non-ruminant production systems. These farms often receive quite large amounts of fertilizers from non-organic farmyard manure.

Especially in stockless arable production with cereals and vegetable crops, the need for inputs of animal manure from other farms can be quite large, because of the relatively high export of nutrients.

In non-organic farming, the use of fertilizers (N) allowed depends on the composition and areas of each crop type on the farm's total production area (see *Lov om jordbrugets anvendelse af gødning og om plantedække. Lov nr. 472 af 1. juli 1998, jf. Bekendtgørelse om jordbrugets anvendelse af gødning og om plantedække i planperioden 2003/2004*).

The use of chemically produced fertilizers (NPK) in non-organic farming is declining year by year. One reason is that this type of fertilizer is more expensive than before due to taxes on these fertilizers. Other reasons may be the increasing amounts of farmyard manure available and the recognition that biological manure improves soil fertility and quality.

Soil conditioners

The use of soil conditioners is minimal, as the EU Regulation states, that other fertilizers may exceptionally be used, if the normal soil improvement measures are not sufficient. Therefore, the need for soil conditioners has to be documented before the use can be authorized (see EC 2092/91, Annex I, 2.2. and 2.4). Advantages of soil conditioners are normally stressed to be increased microbial activity, creating a higher metabolic activity in the soil and increased nutrient availability. This is very difficult to prove, as the impact of the soil conditioners are often hard to prove. This is partly due to low concentrations and small amounts of the products used on the soil.

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Control of overall fertilizer use in organic production

EC 2092/91, Annex I, B (7) sets an overall limit of 170 kg N/ha production area from farmyard manure and other fertilizers. In Denmark, the limit is lower. On organic farms, the maximum level of manure and fertilizers is an average of 140 kg N/ha production area. Of these 140 kg, at least 70 kg N/ha must come from organic production. Correspondingly, a maximum of 70 kg N can originate from non-organic farmyard manure, composted plant material or other fertilizers mentioned in EC 2092/91, Annex II A.

In Denmark, the overall use of fertilizers on all organic farms is controlled firstly via documentation about import and export of fertilizers, which must be available on the farm from the day it comes in/goes out. Secondly, a nutrient budget for the total production area has to be made every spring. Thirdly, the total use of fertilizers on all farms in Denmark (organic and non-organic) must be registered at the Plant Directorate every year. Information on import and export of fertilizers from/to other farms are cross-checked in order to ensure that all fertilizers and animal manure are registered correctly. Finally, on the yearly control on the farm of the organic production rules, the written documentation mentioned above is reviewed and a physical control (of number of animals, animal manure not yet used, etc.) is carried out.

Fertilizers originating from non-organic farms have to come from extensive animal husbandry. All farms upholding the 170 kg N/ha limit from animal husbandry are considered as farms with extensive animal production. The inspectors do not check whether the animal manure is composted, fermented or diluted in a proper way, as there is always a certain amount of composting going on when the manure is kept for several months in cement tanks before the fertilizer is spread on the fields.

The Plant Directorate has generally recognized the need for non-organic animal manure, in particular on stockless arable farms. Therefore, up to 70 kg N/ha from non-organic production can be imported under a general allowance. The remaining fertilizers up to the total maximum of 140 kg N/ha/year, must come from organic farming

As the EC 2092/91 does not describe how fertilizers should be administered in greenhouses, additional regulations have been set up on a national level. As greenhouse production is very often based on high input of fertilizers due to a fast growing, intensive production, it is impossible to use the limit of 140 kg N/ha for this type of production. In greenhouse production, the amount of fertilizer allowed depends on the crop type and on the length of the production period. This is the same system as in non-organic farming. The difference is that only up to 25 % of the norm for the crop can be non-organic manure or other products from non-organic farming origin. Additionally, it goes for prepacked growth media (for plants in pots) that none of the fertilizers can be from non-organic farming.

The use of animal manure after separation into different fractions is possible only with a written derogation from the Plant Directorate. The Plant Directorate finds it very important to look at applications individually, as the manure can be separated by a wide variety of methods. This can result in liquid N-fractions with very high N concentration and almost all soluble N (not bound organically). This type of fertilizer is not considered to be in accordance with the rules for organic farming set out in EC 2092/91, Annex II A, as the fertilizer described here must come from organic material.

Non-organic fertilizers which are residues, for instance from milk or sugar production, can only be used on organic fields if the primary product has not been treated with preservatives or additional chemical substances.

Existing legislative/regulatory framework

The use of fertilizers in Danish agricultural production is administered by the Plant Directorate. The legislative principles are described in the Law on Fertilizers (*Lov om jordbrugets anvendelse af gødning og om plantedække. Lov nr. 472 af 1. juli 1998*). The law gives information on requirements for registration of primary producers (farms), production and/or use of fertilizers. Depending on the crop types produced, each farm has a maximum of N they can use on the fields. If they have more livestock than their fields can carry, they have to make agreements with other farms to receive the surplus fertilizers. Further description of the maximum use in all known crop types (N-norms) is described in the Administrative Order on Fertilizers (*Bekendtgørelse om jordbrugets anvendelse af gødning og om plantedække i planperioden 2003/2004*). The crop norms are listed in the annexes to the Administrative Order (*Bilag 1, 2 og 3 i Bekendtgørelse om jordbrugets anvendelse af gødning og om plantedække i planperioden 2003/2004*).

In organic farming, the rules mentioned above are the same, and there are additional rules for organic farming. Here, EC 2092/91 (EC 2092/91, Article 6. 1. a and b, Annex I, 2.1., 2.2., 2.3. and 2.4, Annex II a) is the basic regulation. The control of these rules is described in the Administrative Order on Organic Farming (*Bekendtgørelse om økologisk jordbrugsproduktion nr. 697 af 16. juli 2000, jf. Bekendtgørelse om ændring af bekendtgørelse om økologisk jordbrugsproduktion, nr. 821 af 31. august 2000, Bilag 1, nr. 13 og 14*) and in Guidance on Organic Farming (*Vejledning om økologisk jordbrugsproduktion, August 2000, part 3.4. and Table 3.3*).

Hot issues

- It is a hot issue of discussion between consumers, farmers and agricultural organizations whether non-organic animal manure or other non-organic sources should be prohibited. The EU legislation states that non-organic fertilizer (biological material) can be used if the need can not be covered by fertilizers from organic production. However, import of non-organic pig slurry up to 70 kg N/ha is very common in Denmark, in particular on stockless organic farms. Import of non-organic straw used for deep bedding of dairy cattle is also quite common, in particular because deep bedding is good for animal welfare. A third example is covering of organically grown carrots in the field with non-organic straw, in order to prevent freezing. A fourth example is the extensive import of vinasse as a source of potassium, which can be an important limiting factor in particular on sandy soil. Some interested parties find that this widely used import of non-organic resources might compromise the integrity of organic farming. On the other hand, research has made it evident that in particular on the sandy soils in the western part of Denmark, it is almost impossible to make stockless arable organic farming without import of nutrients corresponding to the export of e.g. phosphorous and potassium.
- EC 2092/91 states that animal manure from factory farming (intensive farming) is forbidden. How is factory farming defined?
- The use of fertilizers from biogas fermented animal manure or waste materials are another hot issue of great interest at the moment. Recent research results have shown that in particular biogas can have a great potential in reallocating nutrients within stockless farms and from highly stocked organic farms to stockless farms, and thereby increasing the utilization of nutrients due to more appropriate allocation. At the same time, energy is produced and pollution in terms of leaching of nitrate and emission of greenhouse gases is decreased as a result of the biogas fermentation. Biogas fermentation does, however, change the composition of the nutrients so less is bound organically, leading to some scepticism among organic organizations. In the production of biogas from animal manure and plants, products of animal origin are often added. What should be allowed, particularly when considering the BSE situation?

- There is a growing interest in using the waste from biogas production and normal animal slurry after separation into solid and liquid fractions. Depending on the separation method, the liquid fractions can be highly soluble and achieve very high nutrient concentrations. It is still under consideration how this should be dealt with.
- Another hot issue is fertilizer supply in greenhouses. For example, in tomato or cucumber production, very high loads of fertilizer per unit area are required. This has raised a debate on the origin of fertilizers and the possibilities to grow in containers, because organically bound nitrogen fertilizer is difficult to manage and there is a high risk of leaching (if there is no recycling of the nutrients). Recent research has shown promising results for compost from organic grass-clover and animal manure supplemented in containers with or without access to soil. As described above, there is still no common EU-legislation about organic production in greenhouses, bags or small containers. At the moment, the Commission is not working with the draft produced in 2001-2002, due among other things to the big discrepancies between south and north in terms of the available products and growing systems, which has led to difficulties in reaching a consensus among the Member States. In some countries, the growth medium can therefore still be made solely from products of non-organic origin. Whereas in other countries, only organic material from organic farms and products untouched by agricultural production are allowed. So soil, animal manure and fertilizers produced on organic farms, and peat, clay (from subsoil), limestone and stone meal are the only products allowed.
- The potential spread of GM seed through animal manure from non-organic production (fed with non-organic fodder crops) may be a problem that needs to be addressed.
- In Denmark, the limit on fertilizers is 140 kg N/ha in organic farming. Does the EC-limit of 170 kg N/ha in organic farming need reconsideration?
- Some products allowed as fertilizers have very obvious effects as plant protection products. Are some of the products allowed as fertilizers, but actually used as plant protection products (e.g. copper)? Is this a problem?

Organizations participating in the discussion and decision-making

When the possible use of new products in organic farming is discussed, the decision-maker, the Ministry of Foods, Agriculture and Fisheries (and the Ministry of Environment) takes advice from the Organic Food and Farming Advisory Council. This council includes the consumer organization *Forbrugerrådet*, and the workers unions LO and SID. Environmental organizations and other interested parties are also involved in the discussions together with the farmer's organizations, including *Landbrugsraadet*, *Dansk Familielandbrug*, *Dansk Landbrugsrådgivning*, and *Økologisk Landsforening*.

All fertilizers and soil conditioners must be registered at the Plant Directorate (under the Ministry of Foods, Agriculture and Fisheries). The needs for animal manure, plant products and other fertilizers originating from non-organic farming to be used in organic farming is considered in the Plant Directorate. The decisions are taken in the Plant Directorate, but the farmers and the producers of fertilizers have a right to appeal directly to the central administration at the Ministry of Foods, Agriculture and Fisheries.

Fertilizers and soil conditioners in organic farming in France

Marie-Christine Monnier¹

History, structure and trends of organic farming in France

History and structure

Organic farming and organic movement began to grow in France in the 1960s, by 2 different ways:

- ‘Nature approach’ with a consumers’ and organic producers’ organization (Nature & Progrès)
- ‘Agronomy and business’, through the diffusion of the LEMAIRE-BOUCHER method, based on the use of maerl (a calcified seaweed), compost and magnesium amendments.

The 1970s favoured the growth of organic agriculture, because of increasing criticism against intensive, modern agriculture and the chemical industry, responsible for major ecological catastrophes. Organic farming was at this time one expression of the rebellious youth movement. Private standards (*‘cahiers des charges’*) were linked to organizations and labels.

The 1980s context was in favour of organic farming, which was in line with a new orientation in policy towards quality products, initiated by the Ministry of Agriculture. Facing important problems of fraud, the organic movement took this opportunity to get official recognition for organic farming. An organic section (*‘Section Bio’*) was created in the new national commission for labels and certification (CNLC), and assigned responsibility for agreeing standards. At this time, private standards (mostly global, such as Nature & Progrès, Demeter) coexisted with public standards for production of plants and animals.

With the adoption of EC 2092/91 in 1991, the national standards for vegetable products became outdated. The French control system for organic farming was reorganized on the basis of independent certification bodies, which have to be accredited by the authority COFRAC (as do all certification bodies operating in France) and authorized by the CNLC. Nature & Progrès chooses to stay out of this system. ECOCERT was created by a group of agronomists and advisers and became the first certifier dedicated to organic farming which was independent from a consumers’ or producers’ organization.

After publication of the EC Regulation 1804/1999 on organic animal husbandry in 2000, France chose to adopt a complementary national regulation (known as CC-REPAB F).

A specific national logo (AB; *‘agriculture biologique’*), owned by the Ministry of Agriculture, is free for all stakeholders to use in respect of the current regulation for organic farming.

Today, private standards have little influence on the consumers, except in the case of labels for bio-dynamic farming, and for some products non covered by EC 2092/91, such as wine or salt. At national level, the EC 2092/91 is complemented by specific standards for production of fish and pet food.

In order to guarantee the same interpretation of the current regulation on organic agriculture by certifiers and stakeholders, the Section Bio edited two ‘reading guides’ concerning vegetable productions and animal husbandry.

Six certification bodies were recognized by the French authorities for organic farming control in 2004: ACLAVE, AGROCERT, CERTIPAQ, ECOCERT, QUALITE FRANCE and ULASE.

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Support

A *National Plan* for organic farming was produced by the Ministry of Agriculture for the period 1997-2002, with the aim of better integration of all kinds of support for agricultural development: *financial aids* for conversion of the farms, economic assistance for the sector, including processors, *training and advice*, *research* in organic agriculture, and *statistics*.

In this context, several conventional organizations are involved in organic agriculture in their fields of competence: the national agronomic research institute (INRA), the Chambers of Agriculture (APCA), the national network of agricultural schools (with FORMABIO), in partnership with other organic structures, such as ITAB for research, organizations of producers (FNAB) and processors.

During this period, the *1999 Agricultural Policy Law* laid the foundation both for helping organic farming as the main pattern of sustainable agriculture and giving it the structure to develop the sector. Help for conversion to organic farming was given through specific contracts with farmers involved in less intensive and environmentally friendly practices. These contracts have been reduced in 2003, but are still applicable to conversion. The Ministry of Agriculture published a new plan *in January 2004*, the details of which have yet to be completed.

A new national body ('*Agence Bio*'), created in 2001 under the Ministry of Agriculture's authority, is in charge of collecting and publishing appropriate data and coordinating public communication on organic agriculture. See www.agencebio.org and www.printempsbio.com.

Trends

In 2003, organic farming represented a total area of 555 000 ha with 11 377 certified farms (growth rate: 6 %). The conversion area was depressed (-20 %) as a consequence of the changed financial support system. Organic animal husbandry increased at a rate of 5 to 6 %, depending on the species, and poultry production continues to grow. The total number of processing units was reduced from 5 252 in 2002 to 4 861 in 2003 (-8 %).

Fertility supply in organic systems and major fertilizer and soil conditioner inputs used

- *Official approach to fertility supply (EC 2092/92 Reg., Annex 1):* The reading guide for organic vegetable production indicates that the control body must ensure the reality of a pluri-annual rotation, including appropriate species, and that it is necessary to make sure that the use of complementary inputs is the exception and not the rule. However, there is no specific regulatory approach for these good practices in organic farming. The practice of *Rhizobium* inoculation for legumes is well developed, as is that of fertility plans.
- *Control of the 170 kg N/ha limit level:* This is calculated for manure and animal excreta (mean values given by CORPEN base for non-considered species). Other sources of N would have to be considered in an appropriate agronomic approach.
- *Definition of compost:* Compost is produced by aerobic decomposition of organic matter from vegetable and/or animal origin, which is used with the aim to improve the humus level.
- *Products of animal origin:* meat and blood meal (but not feather meal) are forbidden, because of the BSE risk.
- *Private standards ECOFERT:* standards for fertilizers usable in organic agriculture. This is a certification of industrial products, which aims to give a quality label to the branded products which conform to EC

2092/91. The restrictions are largely the same as those of the national interpretation of EC 2092/91. The main difference concerns the quality control of the raw materials.

Regulatory framework relevant for use of fertilizers and soil conditioners in organic and conventional farming

The branded products used in accordance with EC 2092/91 must comply with the national regulation for fertilizers and soil conditioners. Their trade is overseen by the Ministry of Economics, fraud control service and consumer protection directorate (DGCCRF). The main statute is '*homologation*' (registration): the product has to prove its efficiency and non-toxicity. By derogation, some kinds of products can be sold without homologation:

- chemical fertilizers under European norms (directive 76/116/CEE and amendments): see Annex, part A
- those considered under a French 'norm' (mandatory standard): see Annex, part B. These comprise the groups 'engrais', 'compost' and 'amendements'.
- organic matter or natural soil conditioners coming from a farm.
- The Ministry of Agriculture is responsible for the entire process, which is the same as for plant protection products, but with lower requirements for the non-toxicity aspect (see below).

Hot issues

Improvement of fertility supplies in organic farming is a hot issue, in particular:

- *N supply* for cereals is a great problem, because of the relatively specialized character of French agriculture. Animal meals are forbidden (except feather meal), This forces farmers to use poultry manure, which is sometimes not sufficiently composted.
- *P supply* is a problem, because of the cadmium the content of many phosphate sources (exceeds the norm of 90 mg/kg P₂O₅).
- *Organic matter* content of the soils. The national 'homologation' procedure for fertilizers and soil conditioners is made to protect the users and consumers. It concerns products which can be analytically defined. Non-allowed products are forbidden. Organic farming experiences difficulties especially when using traditional inputs, such as plant preparations, which cannot be analytically defined.

Additional hot issues:

- *Minor uses*: Minor uses concern products or sectors of little economic importance. The whole sector of organic farming is a case of minor uses, for which a simplified homologation procedure would be suitable.
- *Traditional uses* and crop production aids are problematic.
- *Definition of efficiency*: a new guide for stakeholders is almost ready and will be presented to the Homologation Committee soon.

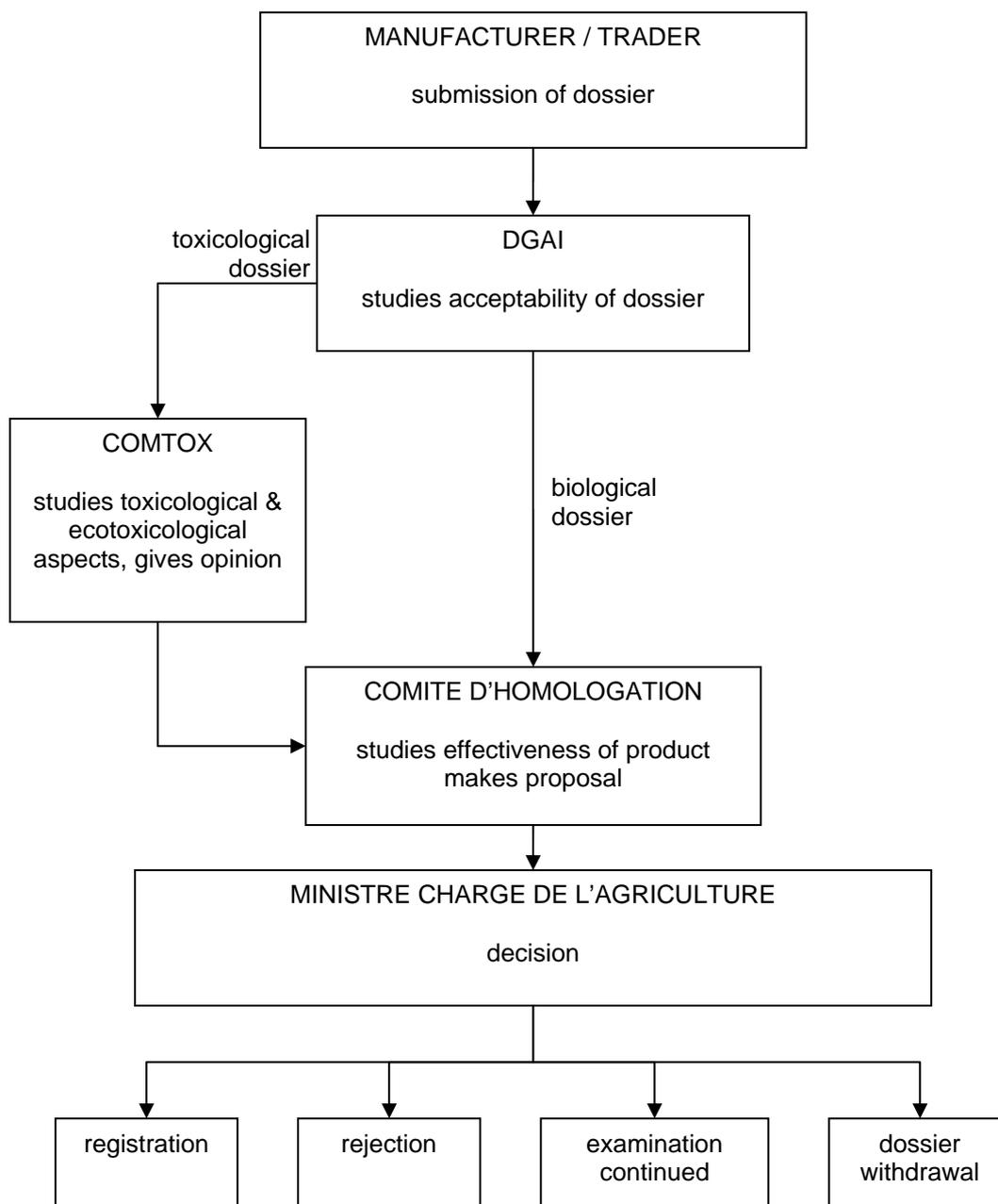


Figure 1: Flow-chart illustrating the registration process for France.

Discussion and decision making

The following institutions are involved in discussion and decision-making within the Ministry of Agriculture (see Figure 1):

- Homologation Committee ('commission d'homologation des matières fertilisantes et des supports de culture')
- The committee's "efficiency" working group
- The toxicity standing group COMTOX, which is the same as for PPP, but with lighter procedures.
- Ministry of Finances, DGCCRF: in charge of control for labelling and market information.

- Experts from the public and private sector are associated with the process.
- The French association for plant protection AFPP is deeply involved in the definition of testing methods, especially biological ones (CEB). See www.anpp.asso.fr
- Members of the organic sector are involved in the working groups.

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Annex: Current regulation for fertilizers used in France.

A) Regulations at EU level

Directive	Title (résumé)	Date	Published in official Journal of the European Communities	Corresponding French decree	Date	Published *
76/116/CEE	Rapprochement législations engrais	18-12-75	L 24 du 30-01-76 p. 21	80-478	16-06-80	29-06-80
80/876/CEE	NO ₃ et NH ₄	15-07-80	L 250 du 23-09-80 p. 7	90-192	28-02-90	4-03-90
88/183/CEE	Engrais fluides	22-03-88	L 83 du 29-03-88 p. 33			
89/284/CEE	Ca, Mg, Na, S	13-04-89	L 111 du 22-04-89 p. 34	91-390	24-04-91	26-04-91
89/530/CEE	Oligo-éléments	18-09-89	L 281 du 30-09-89 p.116			
93/69/CEE	Procédure d'homologation et d'A.P.V.	23-07-93	L 185 du 28-07-93 p. 30	99-366	12-05-99	13-05-99
96/28/CE	Adaptation au progrès techn. de 76/116	10-05-96	L 140 du 13-06-96 p. 30			
97/63/CE	Engrais «CE»	24-11-97	L 335 du 6-12-97 p. 15			
98/3/CE	Adaptation au progrès techn. de 76/116	15-01-98	L 18 du 23-01-98 p. 25			

* Published in 'Journal officiel' on ...

B) French norms (see text)

Norm	Title (in French)	Date [amendments]	Arrêté du	Journal officiel du
NF U 42-001	Engrais	December 1981 [June 1984: additif 2); March 1987: additif 4); May 1989: modificatif 1; February 1991: additif 1; July 1991: additifs 5 et 6 ; May 1992: modificatif 2]	28-02-89 04-08-89 18-10-91 23-12-91 22-06-92	11-03-89 12-09-89 01-11-91 03-01-92 01-07-92
NF U 42-002	Engrais à teneur(s) déclarée(s) en oligo-élément(s) destinés à être apportés au sol	November 1990 [May 1992]	18-01-91 22-06-92	01-11-91 01-07-92
NF U 42-003	Engrais à teneur(s) déclarée(s) en oligo-élément(s) pour pulvérisation foliaire	November 1990 [May 1992]	18-01-91 22-06-92	01-11-91 01-07-92
NF U 42-004	Engrais pour solutions nutritives minérales	August 1996	17-10-97	01-11-97
NF U 42-005	Acides minéraux pour ajustement du pH des solutions nutritives minérales répondant à la norme NF U 42-004	October 1994	17-10-97	01-11-97
NF U 42-006	Produits alcalinisants pour ajustement du pH des solutions nutritives minérales répondant à la norme NF U 42-004	October 1994	17-10-97	01-11-97
NF U 44-001	Amendements minéraux basiques	February 2001	05-09-03	10-10-03
NF U 44-001 Additif A-1	Amendements calciques et/ou magnésiens	April 1998	05-09-03	10-10-03
NF U 44-051	Amendements organiques	December 1981	27-12-82	25-01-83
NF U 44-071	Amendements organiques avec engrais	December 1981	04-08-89	12-09-89
NF U 44-203	Amendements calciques et/ou magnésiens – Engrais	September 1988	18-10-91	01-11-91
NF U 44-551	Supports de culture	May 2002	05-09-03	10-10-03

Fertilizers and soil conditioners in organic farming in Germany

Peter von Fragstein¹

The history and context of organic farming in Germany

First Growth Phase (1968-1988)

Towards the end of the 1960s, the negative environmental effects of industrialized farming and pollution in general were becoming obvious and the first growth phase of organic farming started, although bio-dynamic agriculture had been initiated already in the year 1924. Certification for bio-dynamic agriculture is conducted by the "Demeter-Bund" ("Demeter Association"), founded in 1954. The producer organization "Bioland" was founded in 1971. During the 1960s, it was important to show that organic farming could be practised successfully. More producer organizations were founded later (see Table 1).

Second Growth Phase (1988 to 2000)

Organic agriculture spread very quickly in the following years. This development was encouraged by state funding through the EU extensification programme from 1989 onwards, and later by EU-Regulations 2078/92 and 1957/1999.

The "Arbeitsgemeinschaft Oekologischer Landbau" (AGÖL) (Federation for Organic Farming) was founded in 1988 as an umbrella association for the six producer organizations (Demeter, Bioland, ANOG, Biokreis, Naturland and Ecovin, see Table 1). Common basic standards ("Rahmenrichtlinien") had already been developed in 1984, and they were further developed up to the year 2002. These standards set the framework within which the standards of the individual organizations operated. AGÖL ceased its activities in 2002. Organic agriculture also spread quickly in former East Germany after German reunification in 1990.

Third expansion phase starting from 2001

In order to reach the ambitious government goal of 20 % organic land until 2010, a set of measures was introduced in 2001, including improved *support for organic agriculture*, the implementation of the *Federal Programme for Organic Agriculture* as well as the introduction of a national *organic seal* (label).

As the Federal Ministry of Consumer Protection, Food and Agriculture announced, the number of organic enterprises had increased by 15.4 % in 2001 compared to the previous year. The statistics show that on December 31, 2001 there were 14 703 organic producers with around 632 000 hectares under organic management. Compared to the previous year, the number of farms had increased by 1 900, and the surface managed according to EU regulation on organic farming by 86 000 hectares (increase of 15.8 %). The proportion of organic farms amounted to 3.1 %, and the proportion of organically managed land came to 3.7 %.

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Table 1: Organic producer organizations in Germany.

Name	Founded	UAA [ha]	Number of farms
Demeter	1924	51 592	1 336
Bioland	1971	167 865	4 363
Biokreis	1979	13 109	523
Naturland	1982	75 071	1 772
Ecovin	1985	870	196
Ökosiegel	1988	900	19
Gää	1989	45 821	449
Biopark	1991	136 678	729

Regional distribution of organic farms in Germany

Most organic farms, as well as the highest ratio of organic farms and organically managed land area, are found in former eastern Germany. Many organic farms are also found in southern Germany, where organic farming was originally concentrated. These differences are due to:

- the major changes in eastern German agriculture after the reunification of Germany in 1990;
- the designation of large conservation areas with restrictions for agriculture that are easily complied with by organic farmers; and
- the fact that many regions in eastern Germany are classified as disadvantaged areas – often with special incentives for organic farmers.

Regulations supporting the conversion to organic farming (e.g. the extensification programme in 1989 and the later agri-environment programmes under Council Regulation (EC) 2078/92 and 1957/1999) and the EU Regulation on organic farming 2092/91/EEC have greatly helped to make organic agriculture generally accepted, and nowadays there is dialogue and peaceful co-existence throughout Germany.

Standards and Inspection

Generally, the sovereignty over standards, i.e. the right to decide on which standards are to be accepted or modified, lies with the Assembly of Delegates of the different organic producer organizations and their standards committees. The mission of the standards committees is to draft the standards and to keep them updated. The standards of the organic producer organizations are in several respects stricter than the EC 2092/91. For instance, they prescribe the conversion of the whole farm. With respect to processing, the positive lists of these standards are more restrictive, e.g. by limiting the use of enzymes for certain purposes.

Both private and state standards are inspected according to the inspection system as described in EC 2092/91. Private inspection bodies, which are approved and supervised by the state authorities, often inspect according to both standards.

After EC 2092/91 came into force in 1993, a number of farmers and processors began to produce organically without joining one of the existing producer organizations. Currently about 60 % of the organic farms are organized on one of the producer associations.

The organic producer organizations as well as processors and traders are represented since June 2002 by the Union of the Organic Food Industry (*Bund Ökologische Lebensmittelwirtschaft – BÖLW*) i.e. the

central association of the organic food sector. On the international level, organic producer organizations agreed on the international IFOAM basic norms.

Land use and animal husbandry

Grassland, legume-based leys, the production of vegetables and fruit as well as sheep and goats are of greater importance in organic farming compared to conventional farming. On the other hand, comparatively little pig and poultry meat is produced. More information is available under http://www.soel.de/oekolandbau/international_deutschland_ueber.html.

Fertility supply and major fertilizers

Site-adopted rotational management with a special emphasis on cover crops and the regular use of manure and/or composts are the main components for the improvement and maintenance of soil fertility and nutrient provision. This is best achieved on mixed farms, mainly those with ruminants as an essential part of the animal husbandry system. Standards of German organizations permit animal raising systems that do not exceed a level of 2.0 livestock units ha⁻¹, which is equivalent to 1.4 manure units ha⁻¹. That means the even distribution of on-farm manure sources should not be higher than 110 kg N ha⁻¹ year⁻¹. The same is true if off-farm manure is included; its proportion is not allowed to be higher than 0.5 manure units (= 40 kg N ha⁻¹).

Whereas manure and composts are mainly acting as soil conditioners for the substitution of degraded organic matter, the use of other organic fertilizers is more nutrient oriented. Their need is mainly given in organic arable systems, especially in highly intensive horticultural systems. Although the limitation of N import ha⁻¹ year⁻¹ is similar for organic farming and market gardening, levels up to 330 kg N ha⁻¹ year⁻¹ are permitted in organic greenhouse production (BIOLAND). There is a common rejection of any synthetic N fertilizer or Chilean nitrate among all organizations in Germany.

Organic farming in Germany can rely on two (types of) lists for fertilizers or soil and plant conditioners, in which the authorization of specific trade products can be looked up (in contrast to positive lists of standards that refer to permitted components: (A) The state governments of Bavaria and Brandenburg are providing (*state lists of fertilizers*) in accordance to Annex II A of EC 2092/91, (B) the Conference of control bodies (*Konferenz der Kontrollstellen; KdK*) – an umbrella organization of all inspecting institutions – has edited a (*KdK catalogue of all permitted inputs for organic agriculture*); a similar document was edited by Alicon (now: AbCert) as guideline for the control of BIOLAND farms. Due to the fact that German organic organizations do not agree to all components of the EU Annexes, these lists differ substantially from each other. In consequence, so-called ‘EU farmers’ – organic farmers which are not members of accredited organic producer organizations, but inspected on an annual basis; meanwhile approximately 30 % of all organic farmers – can exploit the range of all state-listed fertilizers, whereas members of the organic producer organizations are restricted to the KdK listed inputs, or to their own organization’s list.

The *catalogue of permitted inputs for organic agriculture*¹ can be understood as the official document of the German control bodies for organic agriculture. Currently, 64 products are listed as fertilizers or soil conditioners, categorized into seven groups (see Table 2). Unfortunately an update of the catalogue is not planned so far.

¹ see http://www.gfrs.de/download/bm_katalog_vollversion.pdf

The products are either of microbial, plant, animal or mineral origin. A special case exists in the field of K fertilizers: all of them consist of K_2SO_4 , mainly manufactured by crystallization from chloride to sulphate salts, the preferred form for the potassium uptake by most crops.

Table 2: Fertilizer groups in the German inputs catalogue (KdK 2002).

Type	Number of products listed
N fertilizer	8
P fertilizer	4
K fertilizer	5
Ca fertilizer	6
Special fertilizer	3
Multi-nutrient fertilizer	23
Soil conditioner	15

Soil conditioners

Stockless farms and those with low stocking rates have an urgent need for the import of organic matter. Valuable sources are imports from other organic farms (rather improbable due to restricted stocking rate), from non-organic farms with extensive rearing systems or from off-farm sources e.g. green waste compost or household waste compost. Besides their immense importance for the improvement of soil fertility, they are valuable substitutes for non-renewable mineral sources (soft ground rock phosphates and potassium salts) as P (and K) fertilizers.

Stone meal and clay powder are typical soil conditioners, but their common use is defined more for feeding and bedding material in animal husbandry, as an additive in compost or slurry management, and as a physical treatment for pests and diseases in crop growing. Therefore, the quantities in which they are applied are negligible.

Control of overall fertilizer use in organic production

A careful use of purchased fertilizers is explicitly demanded in various standards (“Basically organic farms should reach self sufficiency with regard to own fertilizers”). The use of fertilizers and soil conditioners has to be done in accordance to legal regulations, especially to regulation 2092/91/EEC. If one of the listed fertilizers has to be purchased, its demand has to be proved to the inspection body. The influence upon product quality has to be taken into account carefully. If necessary, analyses of unwanted contaminants have to be submitted (e.g. Biokreis 2002). As general rule, the recommendation should be followed that purchased fertilizers should only be used as supplement to other on-farm sources, e.g. crop residues and manures. Fertility plans have to be agreed by the inspecting bodies. Nutrient balances and documents of soil analyses are essential tools for demanded needs of specific fertilizer inputs.

Existing legislative/regulatory framework

German farmers have to consider several Acts if they plan to apply fertilizers or soil conditioners:

- *Kreislaufwirtschaftsgesetz* 1996 (Waste Avoidance and Management Act),
- *Düngemittelgesetz* 1996 (Fertilizer Act),
- *Düngeverordnung* 1996 (Fertilizing Regulation)
- *Bodenschutzgesetz* 1998 (Soil Protection Act)
- *Ökolandbaugesetz* 2002 (Organic Farming Act)

The latter Act is only relevant for organic agriculture and defines the organization and control of inspection bodies, whereas the other Acts are applicable to all farming systems. The Fertilizing Regulation in particular requires comprehensive and conclusive data about soil nutrient status and nutrient balances to be made with a prescribed frequency and kept available for at least 9 years.

Hot issues

- GMO contamination of plant based fertilizers, e.g. sugar beet vinasse and rape cake, is currently the major issue. Due to the probable increase of GMO-derived cultivars of both species, these two organic fertilizers can be expected to be banned in the near future. A similar situation has to be faced with regard to source separated composts (household waste composts) or composted food processing by-products. In consequence an optimization of composting processes at compost plants has to be achieved in order to secure a complete breakdown of alien genome and to keep these sources as permitted soil conditioners for the organic farmers.
- Due to the BSE crisis, most slaughterhouse by-products were banned as organic nitrogenous fertilizers. Whether the same will happen to horn and hoof products, cannot be foreseen, but there is an urgent need for these slow-release organic N sources for plantlet growing substrates.

References and further reading

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BMVEL *Ökolandbaugesetz* 2002: <http://217.160.60.235/BGBL/bgbl1f/BGBL102047s2558.pdf>

Demeter standards 2003: <http://www.demeter.net/>

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http://www.gfrs.de/download/bm_katalog_vollversion.pdf

Naturland standards 2002: http://www.naturland.de/englisch/n2/Naturland_standards_July2002.pdf

STMLF-Liste 2004: <http://www.stmlf.bayern.de/lfe/oeko/mineral.pdf>

Fertilizers and soil conditioners in organic farming in Italy

Stefano Canali¹

History, structure and trends

In Italy, organic agriculture started its development quite late compared to the other EU countries: in the late 1980s, the number of organic farms was just a thousand. During the 1990s, a huge number of farms converted to organic agriculture: in 2001, the total number of organic farms was 56 440 (total operators including processors, handlers and importers: 60 509, cultivating about 1 237 640 ha). This mass conversion was due essentially to two factors:

- Market opportunity (especially for vegetables, citrus and specialities such as pasta or Parmesan cheese) in northern European markets;
- Regional subsidies, direct and indirect: through EC 82/2078/EC to start with, then through Rural Development Plans, grants awarded to converting farms. But there were also several regions giving priority to organic farms when requesting structural intervention funding. So, for example, if requesting funds for stable reconstruction, an organic farm has priority over others.

Organic animal husbandry showed some development a few years ago, but it never had a significant presence. This is due to extremely reduced and intensified animal husbandry in Italy and to high competition from Northern countries.

In the last 10 years, organic product consumption and interest started to grow as well, driving many supermarket chains to establish their own organic brands, although the range offered by speciality shops was more important.

Control and certification bodies

The competent authority for organic agriculture is the Ministry for Agriculture. It has authorized 13 certification bodies to perform their activity in the organic sector (plus three German ones for the province of South Tyrol). All of them are private organizations. They are overseen by the Ministry of Agriculture, together with regional authorities.

Present situation in production

A few years ago, Italy had the highest proportion of organic agriculture in Europe. But in 2002, statistics started to highlight a change in trends: a decrease of about 1 % in the number of organic operators. By the end of 2002 organic farmers numbered 49 489 (55 902 including processors and importers) cultivating 1 168 212 ha (-70 000 ha compared to 2001), which represents about 8 % of the total agricultural area.

Main areas of production: in terms of hectares, the most important crops are cereals and pulses (272 000 ha), fodder (289 009 ha) and pasture (261 263 ha). In terms of market relevance, vegetables

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(12 210 ha), fruit (47 220 ha), olive trees (102 055 ha) and vineyards (37 380 ha) are the leaders. Animal husbandry products have a very low importance and are often imported.

Consumption

Organic agriculture products follow the same trend as conventional ones: strong export to the USA, Japan and northern Europe. In the last five years, however, national consumption of organic products (Italian and imported) has increased considerably. Organic products have a considerable presence in school canteens and catering. In a few regions they are supported and subsidized by law.

Future developments

In the coming years, a further decline in organic farms is fairly probable, but it will mainly affect organic farms which are unable to sell on the organic market (and are compelled to offer their products on the conventional market). At the same time, an increase in national consumption may support local organic farms and allow them to withstand strong competition coming from Northern Africa and the new EU Member States.

Description of fertility supply in organic system and major fertilizers and soil conditioner inputs used.

The main problem for Italian organically managed farms is *organic matter* re-integration. Animal husbandry (organic and conventional) is reduced, specialized and extremely localized in Italy. Therefore, organic matter needs to be collected from other sectors (e.g. the food industries) or provided by other methods (i.e. green manure). However, both options are difficult to organize and implement, and are often too expensive, or perceived as such by farmers. Only few farms are self-sufficient in terms of organic matter and nutrients.

The use of legumes for fertility supply is not widespread in organic farming and, besides the requirements of Annex I of Regulation no 91/2092/EEC, further provisions at national level have not been set up. Although, in some production systems as fruit and olive orchards, arable crops and not specialized vegetable production, legumes can often be found as main crop, intercrop or consociate crop.

Off-farm inputs are needed in nearly all production system, even if they are only utilized in high quantities for vegetable and fruit production. The most widespread fertilizers are poultry manure, blood meal, leather meal, hydrolyzed proteins of animal origin deriving from slaughter houses and/or tannery industries and, less important, molasses. In the last 5 years, due to the full implementation of specific rules at national level, production and use of compost in agriculture have increased. Circular no. 99/8 of the Ministry of Agriculture (see below) contributes to the legal framework for compost utilization in organic farming, setting up further specific limitations (i.e. prohibition of sewage sludge utilization) for the organic sector. The most widespread raw materials for compost production are green wastes, residues from food industry (i.e. residues of processing of tomatoes, citrus, olives, fruit, grapes and cereals) and animal excreta. These materials generally have a low content of heavy metals and the animal excreta utilized must comply with a specific Circular issued by the Ministry of Agriculture (Circular no. 95/9594661, see below). Furthermore, the composts produced and marketed must comply with the National Law concerning fertilizers and soil conditioners, which provides limits for heavy metals and organic matter quality.

The off-farm inputs for soil fertility management utilized in Italian organic farms are those included in the official Register of Fertilizers and Soil Conditioners (*Registro dei fertilizzanti per agricoltura biologica*) managed by the *Istituto Sperimentale per la Nutrizione delle Piante* of Rome (see "Existing legislative/regulatory framework" section). The Register is the reference list of inputs for the entire sector and is widely utilized by farmers, advisors, inspectors from control bodies and local public authorities (i.e. regions).

Almost all control bodies require a nutrient budget or a plan to verify and evaluate soil management strategies carried out at farm level. Sometimes, the documents are very detailed and contain information about the type of input utilized, the amount spread, the technique of application and the date/crop phenological phase of distribution. In the absence of this plan, organic certification cannot be issued.

These documents are checked during inspections (about 1.5/year) and the inspectors have the task of verifying that provisions have been respected (i.e. the limit of 170 kg N/ha).

The need for using a specific fertilizer and/or soil conditioner is usually recognized by the inspectors of control bodies by the evaluation of the characteristics of the farms (i.e. small versus big farms; specialized versus non-specialized farms) and the crops. The evidence of necessity can be also proved by soil analyses (i.e. soils poor of available P and/or micronutrients). In addition, a specific fertilizer and/or soil conditioner can be authorized, if alternatives are not available on the market.

Regional authorities can recognize the need for using an input in a specific area according to a peculiar characteristic of the farms, or specific climatic conditions, or a particular trend in the market (e.g. shortage of organic products).

Existing legislative/regulatory framework

Conventional farming

European level

The relevant regulation for conventional farming is EC Regulation no. 2003/2003 of the European Parliament and of the Council of 13 October 2003 (O.J. of the European Union of 21 November 2003 – L304/1). This Regulation relates only to *mineral and synthetic fertilizers* and replaces, among other acts, Council Directive no. 76/116/EEC and its amendments and updates – i.e. Directive no. 89/530/EEC and Directive 89/284/CEE, which are mentioned by the Annex II A of Regulation no. 91/2092/EEC. The Regulation covers the fertilizers based on primary nutrients (N, P, K), secondary nutrients (S, Mg, Ca, Na) and micronutrients (Fe, Zn, Mn, Cu, Co, B, Mo).

No Regulation or Directive concerning organic fertilizers and soil conditioners is in force at the moment, although a Directive about compost has been discussed for many years at the DG Environment in the context of activities concerning the sustainable development strategy.

National level

Law no. 84/748 "*Nuove norme per la disciplina dei fertilizzanti*" of 19 October 1984 (and its amendments and updates) is the Act of reference for fertilizers and soil conditioners in Italy. The law concerns mineral fertilizers, organic fertilizers, organomineral fertilizers and soil conditioners.

It should be underlined that the English term of "fertilizer" is translated into Italian as "*concime*", while the Italian term "*fertilizzante*" includes inputs belonging to both the groups of fertilizers and soil conditioners. These differences are not well known and, consequently, often misunderstood or mistranslated.

Mineral and synthetic fertilizers: The Italian Law no. 84/748 totally complies with EC Regulation no. 2003/2003 for this category of fertilizers since it has been set up acknowledging the Directive no. 76/116/EEC and then, when replaced, the above mentioned Regulation;

Organic fertilizers: Italian Law no. 84/748 defines the organic fertilizers as fertilizers constituted by materials of biological origin (animal or vegetable) in which organic C is covalently linked to N and P. Organic fertilizers are classified into two main groups: (i) organic N fertilizers, containing mainly organic N, and (ii) organic NP fertilizers, containing N and P in similar proportion. In both groups, fertilizers of animal origin (animal tissues or dejections) and vegetable origin are included;

Organomineral (OM) fertilizers: OM fertilizers are manufactured by combining one (or more) mineral/synthetic fertilizer(s) with one (or more) organic N or NP fertilizer(s). Fertilizers belonging to this group are widely used in Italy and their consumption has increased in the last years;

Soil conditioners: according to Italian law, soil conditioners are classified into two main groups (i) soil conditioners used to change (correct) the soil pH (i.e. lime and gypsum) and (ii) organic soil conditioners of natural origin. Composted soil conditioners (or, more simply, *composts*) are included in the latter group. Raw materials allowed for compost production and chemical characteristics of final products are established. Law no. 84/748 regulates only compost to be used in agriculture. If compost is produced and utilized for different purpose, others Acts have to be considered.

Organic farming

European level

The reference document for fertilizers and soil improvers allowed in organic farming is Regulation no. 91/2092/EEC (Annex I and II A).

Annex II A, the list of allowed inputs, includes items of different origin (i.e. biological/mineral) and use (fertilizers/soil conditioners), characterized by a different feasible identification since some of them are fertilizers included in EU Regulation, while others are fertilizers and soil improvers more or less known in the different countries (even if not included in the EU Regulation) sometimes regulated by national Acts (i.e. blood meal, composts). In addition, Annex II A includes also raw materials, which could actually be used for production of fertilizers and/or soil conditioners, but which are not themselves fertilizers or soil improvers. The range of these materials is wide (i.e. products and by-products of plant origin, stone meal) and their characteristics are not defined at all.

The Annex II A should be amended and reviewed in order to give a classification to the inputs, in the aim of providing a "key" for reading and better understanding of the document.

National level

In Italy, fertilizers and soil conditioners allowed in organic farming are regulated by the Circular no. 8 of 13 September 1999, issued by the *Ministero per le Politiche Agricole e Forestali* (Italian Agricultural Ministry) in the Official Journal of the Italian Republic no. 258 of 3 November 1999. The Circular has been issued to define a reference framework for the use of fertilizers and soil conditioners taking into account the relevant Acts at national and European level.

In fact, as known, Article 6.1, letter b), of Regulation no. 91/2092/EEC envisages that the fertilizers and soil conditioners listed in Annex II A, of the same Regulation can be used only, if their use is authorized in conventional farming in the Member State concerned under the relevant Community provision or

according to the national provision complying with Community law. Consequently, the above mentioned Italian Law no. 84/748 was taken into account.

The Circular no. 99/8, comparing the fertilizers and soil improvers mentioned and described in the two relevant Acts (the EU Regulation on organic production and the Italian Law for conventional agriculture) indicates which inputs envisaged by the Italian legislation for conventional farming can be utilized in organic farming. In addition, Circular no. 99/8 defines, whenever necessary – for specific inputs – further requisites and limitations to the requirements of Law no. 84/748, deriving from Annex II A of Regulation no. 91/2092/EEC or other national provisions passed in accordance with European legislation (i.e. Circular no. 95/9594661, see below).

Fertilizers and soil improvers produced and marketed according to the provisions of Circular no. 99/8 can be labelled with the wording "*Consentito in agricoltura biologica*" (allowed in organic farming).

Furthermore, the Circular institutes the list of fertilizers and soil conditioners (trade products) allowed in organic farming according to Circular no. 99/8 and marketed with the wording 'allowed in organic farming'. The list was named "*Registro dei fertilizzanti per agricoltura biologica*" (Organic farming fertilizers and soil conditioners register), and the *Istituto Sperimentale per la Nutrizione delle Piante* (ISNP) of Rome, which is a State Research Institute under the Italian Ministry of Agriculture, was asked to manage it.

Companies responsible for producing and/or distributing fertilizers and soil conditioners for organic farming are requested to deposit at the ISNP a specific notification and the product label facsimile. The notification should conform with a guideline expressly laid down. Once the necessary tests have been carried out, the ISNP updates the list of companies and fertilizers and soil conditioners, for which the above-mentioned documentation has been presented. The English versions of Circular no. 99/8 and the Register for fertilizers and soil conditioners are available at the website of ISNP, under the section dedicated to organic farming (http://www.isnp.it/fertab_eng/index.htm).

In 1995, Circular no. 9594661 of 10 October was issued by the Ministry of Agriculture with the aim of setting out a guideline for adapting, to the specific Italian conditions, the provisions of the Annex II A of Regulation no. 91/2092/EEC concerning the utilization of residues from intensive, extensive or industrial animal production (fresh and dried animal dejections, slurry, manure) in organic farming. The Circular pointed out that in organic farming the only residues permitted for use as such or as basic raw materials for fertilizer and soil conditioner production are those from livestock management (i) having a link to the land, (ii) where animals are reared according to welfare legislation and (iii) if bedding is utilized. Furthermore, all material must be composted before its application to organically managed soils.

Besides respecting every requirement of Annex I of Regulation no. 91/2092/EEC, no further limitations have been set for residues deriving from organic animal production.

Hot issues

Hydrolyzed proteins of animal origin

In Italy, hydrolyzed proteins of animal origin have been included among the fertilizers and soil conditioners allowed in organic farming by the Circular no. 99/8. The Ministry of Agriculture decided to accept the requests of organic farmers Associations and input manufacturers Associations who asked for the inclusion of hydrolyzed proteins, since these materials had been utilized for many years in organic farming and are widely used for fruit and vegetable production.

The decision was taken after thorough discussion carried out among the stakeholders, inside the *Gruppo di lavoro per la fertilizzazione in agricoltura biologica* (GLFertAB, see the section on stakeholders), in order to establish whether hydrolyzed proteins could or could not be included in the group of materials of animal origin mentioned in Annex II A of Regulation no. 91/2092/EEC. In its final document concerning this issue, the GLFertAB advised the Ministry to include hydrolyzed proteins in the Circular no. 99/8. After the inclusion of hydrolyzed proteins in Circular no. 99/8, many manufacturers have been asking for the inclusion of fertilizers and soil conditioners constituted from or containing hydrolyzed proteins in the ISNP *Registro dei fertilizzanti per Agricoltura Biologica*, in which more than 500 trade products belonging to this category are now included.

Meanwhile, the Ministry of Agriculture decided to ask the European Commission to clarify its position about this issue. The Commission answered that hydrolyzed proteins should not be considered as included in the Annex II A, and Italy was asked to apply for the inclusion of this category of materials in the European Regulation. Following the Commission request, GLFertAB was charged with the task of preparing a technical *dossier* concerning hydrolyzed proteins to be used in the next updating session of Annex II A, and the dossier has been submitted.

Micronutrient fertilizers

Micronutrient fertilizers are included in Circular no. 99/8 of the Ministry of Agriculture and allowed in organic farming. The Circular states that fertilizers containing micronutrient chelates with synthetic chelating agents (i.e. EDTA, DTPA, EDDHA) are also allowed. The latter type of fertilizers have been included in the Circular as Annex II A, which mentions the Directive no. 89/530/CEE (now substituted by the Regulation no. 2003/2003/CE), was broadly interpreted and therefore all the typologies of fertilizers, included in the above Directive, were considered allowed in organic farming.

During the last years, however, the need to reconsider this decision has arisen and, according to a request of the Chairman of the GLFertAB, the topic of the use of synthetic chelating agents has been included in the "hot issues" to be discussed by the Group in 2004.

The debate about the role of the 'Registro dei fertilizzanti per agricoltura biologica'

The operators of the Italian organic farming sector have recognized the '*Registro*' as a particularly useful tool, having contributed to clarifying the delicate question of the admissibility of inputs for fertilization and soil conditioning in organic farming, overcoming the regulatory and technical uncertainty which was a feature of the subject in the years prior to its introduction. The desire for the Register to continue was practically unanimous, but improvements should be made, where possible, to the quality of the service offered, in order to overcome its limitations. The following improvements were requested:

- making the procedure for evaluating the notifications from companies wishing to include new trade products on the list clearer and stricter;
- reducing evaluation times and providing fixed timescales for sending/receiving, response to and insertion of inputs;
- making sure that the verification of notification content is not to be seen exclusively as a review of conformity to regulatory acts, but in a broader sense, as an overall technical evaluation of what has been communicated by companies;
- clarifying in greater detail the actions which have to be undertaken by the ISNP in the case of those notifications received which are not technically credible, or even fallacious.

The last point is linked to another important argument: control. The representatives of the farmers' Associations and the authorized control bodies pointed out that the strongest limitation to the creation of a system for prevention of abuse, is the weak link between information gathering activities (which are then published in the Register) and analysis of notifications by the ISNP and the anti-fraud checks carried out by the *Ispettorato Centrale per la Repressione delle Frodi- ICRF* (the Official Central Fraud Repression Inspectorate) of the Ministry of Agriculture.

The reason for the weak link between the Register and ICRF activity was individuated in the absence of a regulatory set-up with the power to confer the ICRF with a mandate to operate, taking into account the role of the Organic Farming Fertilizer and Soil Conditioner (F+SC) Register and of ISNP. To search for a better definition of this delicate aspect, it was proposed to 'transfer' the contents of Circular no. 8 into a Ministerial Decree.

Many stakeholder groups also believe that to improve the reliability of a system of protection against abuse, the involvement of all the other operators in the sector (i.e. farmers' associations, F&SC manufacturing associations and authorized control bodies), excluded from this process until now, should be considered.

Stakeholders and decision-making processes

According to Regulation no. 91/2092/EEC, the Italian control authority for organic farming is the *Ministero per le Politiche Agricole e Forestali* (Italian Agricultural Ministry). Under the General Directorate for food quality and consumers protection of the Ministry, the Organic Farming Office steers the sector according to the European and national provisions and policies.

Since the activities of the Organic Farming Office deal, among others, also with the issues of soil management and fertilization, the above Office, to be advised about these topics, has set up in 1997 an official advisory working group made up of representatives of the Organizations of stakeholders for organic farming.

The working group, named *GLFertAB – Gruppo di lavoro per la fertilizzazione in agricoltura biologica* (Working Group for soil management and fertilization in organic farming) has been chaired and steered by the *Istituto Sperimentale per la Nutrizione delle Piante (ISNP)* since it was established. The GLFertAB is composed of representatives of the following groups and organizations:

- one representative of IFOAM (International Federation of Organic Agriculture Movements) – Italian Branch Office;
- one representative of FIAO – the Italian Federation of Control Bodies;
- one representative of the Conference of the Consumers' Associations;
- three representatives of Farmers' Associations;
- four representatives of fertilizer and soil conditioner manufacturers – namely:
 - Assofertilizzanti: the biggest fertilizer and soil conditioner manufacturers' Association
 - Unionchimica: the association of small industries producing fertilizers
 - Assometab: producers of inputs dedicated to organic farming
 - Consorzio Italiano Compostatori: the association of compost manufacturers
- three representatives of the Italian Regions;
- one representative of the Organic Farming Office of the Ministry of Agriculture;

- the Chairman of the GLFertAB (the Director of ISNP);
- the Secretary of the GLFertAB (a researcher of ISNP, expert in organic farming).

According to the requests coming from the Ministry, the group has produced several official documents (i.e. the document which was converted by the Ministry in the above mentioned Circular no. 99/8). In addition, the group can, in autonomy, decide to start a study or to open the debate on a specific topic linked to the issues of soil management and fertilization in organic farming and, in that case, transmit to the Ministry the results and the documents approved.

Acknowledgments

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Fertilizers and soil conditioners in organic farming in the Netherlands

Chris Koopmans and Jan Bokhorst¹

History and context of organic farming in the Netherlands

Organic farming in the Netherlands started as long ago as the 1920s. Up to the seventies, its development was very slow: around 1970, the organically farmed area was merely 450 ha. With the coming into existence of critical movements (students, environmentalists) and the first report of the Club of Rome, its development accelerated. At the moment, the total organically cultivated area is about 42 600 ha, that is 2.2 % of Dutch farmland (Table 1).

Table 1. Cultivated organic areas in the Netherlands (adapted from Anonymous, 2003).

Arable farming, fodder crops	5 100 ha
Arable farming, food crops	6 900 ha
Horticulture, outdoors (of which fruit growing ca 300 ha)	3 400 ha
Horticulture, glasshouse	75 ha
Grassland (animal husbandry)	19 100 ha
Rest (especially land in nature reserves for grass and fodder crops)	8 000 ha

Dutch soil and climate are ideal for grassland and for root crops; there are 1.2 million ha of grassland in 2 million ha of agricultural land in total. Because of high prices for agricultural land and for labour, both conventional and organic farmers grow economically high yielding crops like potatoes, sugar beet, carrots, onions and other vegetables. Except for fodder maize and some other fodder grains, cereal crops are of minor importance (compared with other countries). Imported grain is cheaper and baking quality sometimes better.

From the seventies, there was a growing interest in organic farming from conventional research and farm advisory institutions and the Ministry of Agriculture as well (*Commissie Onderzoek Biologische Landbouwmethoden*, 1977; Anonymous, 1977). The Louis Bolk Institute took up research on organic agriculture in 1978 (see www.louisbolk.nl). The real acceleration took place in the beginning of the nineties, when the Ministry published its first policy document (Anonymous, 1992) and the ministerial department on science and technology its action plan on research (Anonymous, 1993). At the moment, most of the research is carried out by the private Louis Bolk Institute and by Wageningen University and Research Centre (WUR). The Ministry is aiming for 10 % of the market to be organic by the year 2010 (Anonymous, 2000) and spends about EUR 10 million on research projects into organic farming, which corresponds to about 8 % of all the ministerial, i.e. public, money for agricultural research.

The organization *Biologica* (*het Platform voor biologische landbouw en voeding*; see www.platformbiologica.nl) is the platform of the organic farming and marketing organizations. It is

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supported by organizations of consumers, environmentalists and nature and landscape management. It co-operates with the platform for conventional agriculture (*LTO-Nederland*). As mouthpiece for organic farming, it gets financial support from the Ministry of Agriculture. It participates, together with the inspection body (*SKAL*), the Ministry, LTO and several other organizations, in *OBR*, a consultative body for legislation on organic agriculture, especially on EC 2092/91 (*OBR: Overlegorgaan Biologische Regelgeving*; contact: Joost Guijt, guijt@platformbiologica.nl).

Biologica has *working groups* composed of farmers, farm advisers, researchers and employees of the National Reference Centre for Agriculture, Nature and Food Quality (EC-LNV), an 'expertise centre' of the Ministry of Agriculture. Their tasks are (see www.platformbiologica.nl):

- Analyzing problems in the cultivation of crops and animal husbandry respectively, and the marketing of produce;
- Advising about, and following research projects;
- Producing views on (desirable) developments in organic farming, e.g. how to deal with intensive, heated glasshouse culture.

There are working groups for:

- Arable farming and outdoor vegetables;
- Arboriculture and herbaceous perennials;
- Fruit growing and vine culture;
- Glasshouse cultures (vegetables, floriculture);
- Dairy cattle husbandry;
- Pig husbandry;
- Poultry husbandry;
- Soil and manure management, environment.

Fertility supply and major fertilizers and soil conditioner inputs, in relation to organic standards

In organic farming, soil fertility needs to be maintained at current levels or increased by using legumes, green manures crops or deep-rooting crops as formulated in EC 2092/91 (*SKAL* documents, see references). In the Netherlands, a crop rotation of at least 2 years needs to be in place except for grassland, fruit, arboriculture and greenhouses (1:2 in one year allowed). The use of legumes is not a prerequisite for maintaining soil fertility in organic certification, but for Demeter certification, a maximum of 50 % of root crops and at least 16 % of legumes are required (*Vereniging voor Biologisch-dynamische Landbouw en Voeding*, 2003).

Major fertilizers used by organic farmers in the Netherlands are solid dairy manure and cattle slurry. In the last couple of years, more and more organic farmers have moved towards slurry as their major source of nutrients. Fertilizers need to come from organic sources, but exceptions are accepted by the certifying body *SKAL*, if availability is a problem and the conventional sources are from extensive animal production (*SKAL* documents). At least 20 % of all animal manure applied should come from organic sources (in 2004). On certified Demeter farms, at least 60 % of animal manure should come from organic sources (*Vereniging voor Biologisch-dynamische Landbouw en Voeding*, 2003). Especially in organic greenhouse

production, plant-based compost is a common source of fertility, often combined with solid dairy or goat manure.

Inputs of fertilizers and soil conditioners are controlled by SKAL for the Ministry of Agriculture based on (i) individual contracts between participants in a fertilizer chain and (ii) a general description of the fertilizer chain including a description of all links in the chain (SKAL documents). Manure contracts are part of the national legislation (MINAS system and manure contracts), but include more detailed information especially on organic production practices like contracting period, dealer and customer. A complete nutrient budget of farm inputs and outputs is obligatory for all farmers under the MINAS system and more extensive for organic production.

The organic limit of 170 kg N per ha from animal based manure is controlled through inspection of SKAL and based on stocking rate, manure sale contracts and inspection of realized inputs and outputs of organic manures (manure analysis). For this purpose, evidence of manure delivery and the MINAS- and fiscal book-keeping are inspected (SKAL documents).

In addition to Annex II, all liquid animal based fertilizers may only be used after controlled fermentation, appropriate dilution or with low-emission application equipment.

In the distinction between extensive and intensive animal production, *extensive animal production* is defined by (SKAL documents):

- A maximum stocking rate of 2 animals per ha (2 GVE/ha)
- Poultry manure needs to come from farms that have recognized outside areas for their animals
- A maximum of 10 sows or 17 porkers per ha.

Intensive animal production is defined by

- Intensive housing systems without land,
- Animals on slatted floors,
- A maximum radius for animals of 160 degrees, or
- Animals kept largely in the dark.

In addition, no manure may be used which comes from:

- Laying batteries
- Tied sows
- Stables with more than 12 broilers per m² or more than 25 kg poultry per m²
- Calves held in separation

A separate list of “need recognized fertilizers” is maintained. In practice, a user needs to show a soil analysis and advice document before fertilizers from this list will be allowed for use. In addition, information on the animal housing system is required. A certificate about the origin of manure is necessary for annual inspection and granting of certification. Separate sampling and analysis is required for all batches of off-farm inputs of manures and fertilizers. No other general prohibitions are in place.

Limits on heavy metal contents are based on Annex II. However, national legislation for the use of compost has lower limits for Zn. No additives are allowed in fertilizers and soil conditioners, unless mentioned in Annex II.

Legislative framework

Inputs of animal-based fertilizers are regulated in the Netherlands through the Fertilizer Law (see www.minlnv.nl/mestbeleid). There is a mineral registration system (MINAS, *MINeralen Aangifte Systeem*). MINAS regulates nitrogen inputs from animal-based and artificial fertilizers for all farming practices in the Netherlands. To date, nitrogen and phosphate have been included in the system, but input restrictions for phosphate are limited to animal fertilizers only. Although this regulation is identical for conventional and organic agriculture, its consequences are more pronounced for organic agriculture, since at these farms organic fertilizers are the only source of nutrients.

Table 2 summarizes the MINAS system for input and output of nutrients from the farm on a hectare basis. A distinction is made between applications of nitrogen and phosphate. Under the system, a farmer can either calculate with a 'fine tuned' system in which higher nutrient losses are accepted but manure analysis etc. are required, or he can base calculations within MINAS on standard values in which the type of manure counts rather than the exact composition. In 2003, a total application rate of 85 kg P₂O₅ on cropland was accepted within the system. Exact amounts, however, vary somewhat from year to year.

For soil conditioners, BOOM (*Besluit kwaliteit en gebruik Overige Organische Meststoffen*) regulates the maximum application rates of for instance compost (Bokhorst and ter Berg, 2001; see also www.minlnv.nl/mestbeleid). The use of compost is limited to 6 tons dry matter per year or 12 t/ha every second year. If the compost is considered 'very clean', its use is regulated through MINAS, which limits its application to 85 kg P₂O₅ per year.

The use of compost and manure is further affected by the Soil Protection Law (*Wet Bodembescherming*) and the Environmental Protection Law (*Wet milieubeheer*). Some provinces have their own additional rules for the use and preparation of compost based on provincial environmental standards. This limits composting in practice considerably. Composting at arable farms is generally forbidden.

Table 2. Accepted nutrient loss, according to environmental regulations about manure application rates in the Netherlands in 2004 (see www.agriholland.nl/dossiers/minas). For N fertilizers, the figures apply to animal-based and artificial fertilizers, For phosphate fertilizers, the figures apply to animal-based fertilizers only (all figures in k per ha and year). Standard & fine-tuned: explanation in text.

Crop	Soil	N	P ₂ O ₅
Pasture	Clay/peat/sand	180	20
	dry sand	140	20
Crop land	Clay/peat/sand	100	25
	dry sand	60	25
Nature reserves	Clay/peat/sand	50	10
Crop withdrawal	standard	125	50
	Fine-tuned	165	60

Table 3 Maximum heavy metal content of compost under Dutch BOOM regulations and organic standards (Bokhorst and ter Berg, 2001). For explanations see text.

Heavy metal	BOOM regulations		Organic standards
	Compost	Very clean	
Cd	<1	<0.7	<0.7
Cr	<50	<50	<70
Cu	<60	<25	<70
Hg	<0.3	<0.2	<0.4
Ni	<20	<10	<25
Pb	<100	<65	<45
Zn	<200	<75	<200
Ar	<15	<5	

Organic legislation and standards

For organic farmers, in addition to this national legislation, the EU regulations limit the use of animal based nitrogen to a total input of 170 kg N/ha/yr. For organic greenhouse production in the Netherlands, this 170 kg N restriction is not workable in practice, where N outputs from the house range from 600 up to 1600 kg N per ha, and national legislation limits the use of plant based composts considerably. National legislation will limit total nitrogen inputs to greenhouses to 1400 – 1800 kg N per ha by 2010, and phosphorus inputs to 300 to 416 kg P₂O₅/ ha for crops like cucumber, pepper and tomato.

Organic standards allow only the use of ‘very clean’ compost. Due to Zn content, this is a type of compost hard to find in practice. In cases where large amounts of compost are required, the use of sand enriched compost (black earth) instead of compost offers an opportunity for farmers to add necessary amounts of organic matter.

Issues and current state of public discussion

At present, the MINAS system is in the middle of the public discussion. EU regulations on nitrate leaching require adaptation of the current MINAS system. A new approach is expected to be in place by the beginning of 2006. Major changes will occur in the use of artificial fertilizers. It is expected that all phosphate and nitrogen inputs, also from compost, will count in the new input regulations. Nitrogen inputs allowed will depend on the mineralization potentials for manure and compost, and differences will probably be made depending on soil type.

For organic farmers, it is expected that phosphate inputs need to be reduced further in coming years. For organic farmers, this is most likely to mean constraints concerning N inputs. It is expected that all legumes grown by (organic) farmers will start counting for N inputs, which could mean a push towards the use of more additional fertilizers like by-products.

Another issue is the requirement for farms to have at least 20 % of their manure from certified organic farms (based on N). The intention is to increase this percentage in coming years. In a recent lawsuit, however, the whole 20 % organic manure requirement was declared unlawful. Therefore the Ministry of Agriculture has to return to EU legislation for further interpretation on the issue.

For organic greenhouses, the limit of 170 kg N per ha is an ongoing point of discussion, especially in combination with the limit on the use of plant-based composts (national legislation). The combination

forces growers in practice towards the use of more additional fertilizers and by-products including liquid based fertilizers.

Another issue is the potential EU restriction of the use of compost made from household waste. Compost preparation and its composition have improved dramatically in The Netherlands in the past. The current product is quite 'clean', especially if compared to its composition in the past and the composition of household waste in other EU countries. The discussion at the EU level is limited to 'contaminated' compost, but might affect the use of 'clean' compost as well.

The discussion about potential GMO contamination of fertilizers and soil conditioners is an ongoing one.

Involvement in the discussion

The Ministry of Agriculture, Nature and Food Quality decides on regulations concerning fertilizers and soil conditioners in the Netherlands. *Biologica* participates, together with the inspection body (SKAL), the Ministry, LTO and several other organizations in a consultative body for legislation on organic agriculture (*Overlegorgaan Biologische Regelgeving; OBR*), especially on Directive EC 2092/91. In the discussion, the *Biologica working groups* composed of farmers, farm advisers and researchers play an important advisory role.

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Fertilizers and soil conditioners in organic farming in Poland

Anamarija Slabe¹

The history and context of organic farming

In Poland, the organic agriculture movement started in the 1980s due to growing public ecological awareness. Early seminars given by ‘revolutionary’ scientists and German experts led to the establishment of the first organic farmers’ association, called EKOLAND (full name: Association of Organic Food Producers EKOLAND), in 1989. In 2002, nine organizations were members of IFOAM. In 1989, there were 27 certified organic farms. The rapid early growth slowed down when the certification system was changed, and farms could only get the certificates after a conversion period of two years. Per area support for organic farms was introduced in 1999 (see Table 1).

Table 1: Level of area payments for organic farming in Poland (EURO/ha). C: conversion period; R: maintenance (Prazan *et al.*, 2004).

Crops	1999		2000		2001		2002	
	C	R	C	R	C	R	C	R
Arable crops	36	28	112	90	123	98	52	26
Meadows/pastures	18	12	37	30	41	33	21	13
Permanent crops	52	43	165	135	180	147	143	117
Vegetables	47	36	150	112	164	123	130	104
Berries	54	47	172	150	188	164	143	130

Table 2: Development of organic farming in Poland. n.d. = not determined.

	1997	1998	1999	2000	2001	2002
Total number of agricultural holdings	n.d.	n.d.	n.d.	n.d.	n.d.	2 284 600
Total number of organic holdings	207	185	513	949	1 787	1 977
Share of organic holdings in total (%)	n.d.	n.d.	n.d.	n.d.	n.d.	0.09 %
Average size of agricultural holdings (ha)	n.d.	n.d.	n.d.	n.d.	n.d.	8
Average size of organic holdings (ha)	29	30	14	12	20	21
Total area fully converted to organic farming (ha)	n.d.	n.d.	n.d.	n.d.	11 500	19 717
Total area in conversion (ha)	n.d.	n.d.	n.d.	n.d.	23 598	21 004
Total organic area (ha)	6 010	5 553	6 990	11 661	35 098	40 721
Share of organic area in the total UAA (%)	n.d.	n.d.	0.04 %	0.06 %	0.19 %	0.22 %

The Polish inspection system is open to operators which fulfil certain conditions, one of which is that they have to be accredited by the Polish Accreditation Centre in accordance with PN-EN 45 011 standard. At

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the moment, six private inspection bodies operate. All of them perform inspection and certification in accordance with the state standards. Additionally, AgroBioTest and Bioekspert work in accordance with EKOLAND's association standards at the request of EKOLAND's members. In Poland, there is currently no nationwide state label, but there are two private labels on the Polish organic market. The oldest, well-known and with a good reputation, is the EKOLAND label; the other is the PTRE label (PTRE = Polish Association of Organic Farmers).

Description of fertility supply in organic systems and major fertilizer and soil conditioner inputs used

The most important fertilizers on Polish organic farms are farmyard manure and legumes (such as white clover) grown in the crop rotation or as green cover, green manure or undersowing. On the Polish market, there are no commercial fertilizers and soil conditioners approved for use in organic farming.

Only some farmers buy fertilizers, but these are in the form of animal manure from other (neighbouring) organic farms or from farms with extensive animal husbandry. The farmer who wants to buy manure from a farm that is not organic has to provide information on this farm (number of animals reared, farm area etc.) to the control body, in order to enable it to decide whether this is an extensive farm; so the decision is taken on a case-by-case basis.

The limit of 170 kg N/ha yearly is checked by calculating the amount of N produced by animals on the farm per ha.

The majority of organic farms have extensive animal husbandry or a mixed system (livestock and plant production), so there is not much need for external inputs of fertilizers and soil conditioners. Also, the vast majority of vegetable production is not very intensive. In fruit production, older meadow-type orchards prevail.

Existing legislative/regulatory framework relevant for use of fertilizers and soil conditioners in organic and conventional farming

The first organic standards in Poland were those of EKOLAND, and were based on the IFOAM Basic Standards.

In Poland, the supreme law on organic farming is a parliamentary act called *Act on Organic Farming* of March 16, 2001. The Act defines organic farming and introduces general rules. The Act came into force six months after its publication. Secondary legal bases are four executive regulations of the Ministry of Agriculture and Rural Development on: (1) Acceptable levels of heavy metal concentration in soils in the case of organic farming (of 12.04.2002); (2) Detailed conditions for producing organic farming products (of 14.05.2002); (3) List of additional substances, other supporting ingredients and ingredients of agricultural origin made by methods other than organic and approved for use in processing of organic farming products (of 15.05.2002); (4) Conditions which should be fulfilled by inspection bodies and set by the Minister of Agriculture pertaining to controlling, certifying and de-certifying (of 21.05.2002).

Polish state organic regulations, both the parliamentary act and the executive regulations, were based on the EC Regulation No 2092/91. The regulation of the use of F&SC in the Polish legislation for organic farming is a transposition (equivalent) of EC 2092/91, both with regard to the justification of the use of F&SC and by an annex listing the F&SC allowed in organic farming, which is the same as in EC 2092/91. The Polish Act on Organic Farming and Polish executive regulations related to organic farming are scheduled to be cancelled and replaced by the EC Regulation when Poland joins the EU.

The biggest problem for farmers, but also for certifiers, is the absence of any practical guidelines for the use of F&SC in organic production, such as a list of branded products. However, the responsibility for detailed regulation on the use of inputs in organic farming, including F&SC, lies exclusively within the responsibility of the Ministry of Agriculture, so all the actors are waiting for actions by the Ministry.

Fertilizers and soil conditioners: issues and trends

The absence of detailed instructions for the use of inputs in organic farming, including F&SC, is causing problems to the producers so this has already become a hot issue. The problem is also that organic farmers are not well informed on the current situation and possible developments. The demand for such instructions and for a list of branded products is growing. In practice, there are many open questions, such as the use of effective microorganisms, for example, but there is no official information related to this.

The control organizations expect that the 1st year after joining EU will be very difficult. A lot will depend on the ability of the responsible ministry to prepare the necessary practical solutions.

Discussion and decision-making on fertilizers and soil conditioners

In the existing legislation on organic farming, there is no specification on the procedure regarding approval of F&SC. However, The Ministry of Agriculture plans to issue an implementing regulation for the implementation of the EU Regulation 2092/91 that will enter into force on May 1st 2004, and appoint three new state institutions (for organic farming only), which will be responsible for issuing the list of plant protection products, the list of F&SC and the list of seeds to be used in organic farming.

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Fertilizers and soil conditioners in organic farming in Portugal

Alexandra Maurer da Costa¹

History and context of organic farming in Portugal

History and trends

The first articles published in Portugal about organic farming date from 1976. But only in 1985, following the first course on organic farming, did a number of interested people gather to found AGROBIO – The Portuguese Association for Organic Farming. This association has, ever since it began, contributed to the promotion and development of organic farming, by organizing fairs and conferences, by certifying according to private standards, and by providing training and technical support to farmers. Presently, the organic movement has spread at the regional level, through the development of regional associations (now 17, including the continental territory and the islands of Azores and Madeira), which are also providing technical support to organic farmers (mandatory for those farmers who apply for subsidies).

Certification

In 1995 certification was transferred from AGROBIO to SOCERT, and more recently four other private control bodies (SATIVA, since the year 2000, and CERTIPLANET, AGRICERT and CERTIALENTEJO since 2003) also began to certify organic farming. These control bodies are supervised by the national authority, IDRHa (Institute for Rural Development and Hydraulics).

Development and structure

The advent of subsidies for organic farming, among the Agro-Environmental measures, in 1994, led to a large increase in the number of organic farmers. In December 2003, there were 1 196 farmers (0.3 % of the total number of farmers) and 120 729 ha (3.1 % of the total agricultural area). Extensive production is dominant; altogether, pastureland and cereals represent 66 % of the total area under organic farming. Olive groves represent 26 %, whereas dry fruits, fruits, vegetables and vineyards together account for mere 5 % of the total area under organic farming.

Major technical challenges

The major challenges in plant nutrition concern the lack of organic matter in the soils and the lack of sources of nitrogen. The available organic fertilizers with a high nitrogen content are imported and very expensive. Composting of agro-industrial residues and of source selected household residues could be part of the answer to this problem. The recovery of traditional practices, such as the composting of seaweeds and small crab in the coastal areas, as well as the composting of forestry materials, including brushwood, could also play an important role.

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Major inputs used

Fertilizers and soil conditioners

Producers who apply for subsidies for organic agriculture are controlled and certified. They must attend a 68-hour course on organic agriculture, and they must have technical support provided by an association for organic agriculture. Within their practice, they have to respect a farm plan, which includes soil analysis, a description of the different crops / crop systems, fertilization practices (green manures, rotation, recycling of organic materials), soil conservation practices, preventive protection methods and animal / grassland management. At present, a nutrient budget or plan (for N/P/K) is not a requirement for organic certification.

Legumes are especially required for arable crops, as part of the rotation, as green manure or in association with cereals, for grassland and for horticulture. On fruit, olive and vine, both annual (e.g. *Vicia sativa*) and permanent (e.g. *Trifolium subterraneum*) legumes are frequently used between the rows. Soil and local climatic conditions are considered when choosing the species to grow.

The main products used are: organic fertilizers (manure, compost), natural phosphates (grassland and olive groves), limestone and dolomite.

The inputs of fertilizers and soil conditioners from outside the organic farm are checked by verifying stocks and invoice registers, and, when necessary, by successive soil analysis.

The 170 kg N/ha limit is verified by the number of livestock units (*Cabeça Normal*) per hectare of grassland (globally), and also by observing any signs of soil compaction or damaged pastures.

There is no defined requirement for composting. Compost is mainly used for horticulture and fruit trees. On vine, olive and fruit, the trituration of wood from cutting, incorporated to the soil with the green manure, is advised and practised.

Extensive animal production is defined as a production system where the number of livestock units does not exceed 2 per hectare. The only manure sources for compost not allowed for organic agriculture are those coming from factory farming, that is, systems where animals are confined, tethered, and cannot turn 360°, or are kept predominantly in the dark, or predominantly without beds, and/or animal husbandry systems separated from agricultural activity, with no forage production. However, since Regulation (EC) 2092/91 does not restrict the sources of materials for vermicomposting, it is generally interpreted that manure from the latter sources could be used when vermicomposted.

'Need Recognized' is implemented through record-keeping, including technical recommendations from the advisors, based on soil analysis, or visual observation (in case of known deficiencies).

Because of BSE, most by-products of animal origin (blood, meat, bone, hoof, horn and feather meal) are presently not available, since their incineration has become mandatory (Decree no.º 76/2003, 19 April).

Soil conditioners providing organic matter are, through a national Norm (NP 1048), subject to maximum levels of heavy metals (40 mg/kg Cd, 1200 mg/kg Pb, 1750 mg/kg Cu, 1750 mg/kg Cr, 25 mg/kg Hg, 400 mg/kg Ni, 4000 mg/kg Zn).

There is, at present, no official evaluation for branded products for organic agriculture, besides the general (conventional) evaluation for all branded fertilizers and soil conditioners, under the authority of the Ministry of Industry. Some private control bodies provide declarations on the conformity of some branded products to Reg. (EC) 2092/91, by request of the manufacturers, on the basis of dossiers, analyses, inspection and other relevant data. Additives in fertilizers and soil conditioners (e.g. extractants, pH regulators, preservatives in liquid fertilizers) are considered within product evaluation.

Legislative and regulatory framework

Organic legislation

In Portugal, Regulation EC 2092/91, with amendments, is the only regulatory framework for organic farming. It is available in Portuguese at the site of the Institute for Rural Development and Hydraulics (<http://www.idrha.min-agricultura.pt/agribiologica/dossier/dossier.htm>).

The following national legislation is relevant for fertilizers and soil conditioners:

a) F&SC – Norms for branded products

- DL 184/99, 26 May (Transposing the Directives 97/63/EC EP and Council 24/11 and Directive 98/3/EC Com. 15/1)
- DIRECT. 10-BJ/99-31/7
- DL 256/90, 7/8
- P 909-A/90
- P 909-B/90, 27/9
- P 194/94, 16/3
- P 770/94, 25/8
- P 24/98, 10/1

b) Norms for water protection against nitrate pollution from agricultural sources

- DL 235/97, 3 Sep. (Transposing Dir. 91/676/EEC, Council 12/12); DL 68/99, 11/3
- DL 68/99, 11 Mar.; DL 235/97, 3/9
- P 258/03, 19 Mar.; P 1037/97, 1/1 (Vulnerable zones to nitrate pollution).

There is no specific national regulation for fertilizers and soil conditioners used in organic agriculture. Only Reg. EC 2092/91 applies.

There are no private standards in use at present. The attribution of subsidies within Agro-environmental measures, which includes measure 14 – Organic Farming, is regulated by decree no.º 475/2001 D.R. no.º 108, I-B Series, 10 May 2001, amended. The homologation of organic farmers' organizations and organic farming technicians is regulated by decree no.º 180/2002, 28 February.

Input lists

The book “*Manual de Agricultura Biológica*” (Manual for Organic Farming; Ferreira *et al.*, 2003) contains chapters with lists of commercial products (F&SC and PPP). The first Portuguese Guide to inputs for organic farming “*Guia de factores de produção para a Agricultura Biológica*” was published in 2003 (Ferreira and Falamin, 2003). AGROBIO has recently produced a CD database for organic inputs.

Hot issues

- The major problem is currently the very short list of registered products available for organic farming, as well as the lack of organic certification for F&SC and for PPP (ingredients).

- The Portuguese Action Plan for organic farming, made public on 20 May 2004, envisages the mandatory certification of all commercial inputs for organic farming. It also recommends the creation of a national database for organic farming inputs, the prohibition of burning crop residues (exceptions made for wood diseases), and 50 % support within the AGRO and AGRIS financing programmes for equipment used in composting / wood recycling, among other measures.

The rapid growth of the Portuguese organic sector has its inherent risks, and means that the need for clear criteria, harmonized interpretation, improved communication, and official evaluation / certification of F&SC for organic agriculture are urgent and important issues.

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Fertilizers and soil conditioners in organic farming in Slovenia

Anamarija Slabe¹

The history and context of organic farming

In the 1980s, organic farming in Slovenia started as a civil society movement with a very limited outreach. In 1996, the first standards for organic farming and processing were elaborated. The first two organic farmers' organizations were founded in 1997. In 1998, two inspection and certification (I&C) systems were established. 41 farms were certified in 1998. The basis for I&C were organic farmers' organizations' standards and Regulation EC 2092/91. In 1999, I&C was taken over by the Unit for the Control of Organic Farming at the Institute for Agriculture and Forestry in Maribor, which is the only state-approved I&C body for organic farming. In 1999, five regional organic farmers' associations founded the Union of Slovenian Organic Farmers' Associations (USOFA). In 2004, USOFA had eight members (associations) with a total of some 1 000 individual members (organic farmers). USOFA members share same standards and the 'BIODAR' organic label. The second organization is the biodynamic farmers' association Ajda with some 60 certified farms in 2004.

In 1999, the Ministry of Agriculture, Forestry and Farming (MAFF) introduced direct payments for organic farming and besides NGOs, the agricultural advisory service also started to organize introductory courses in organic farming. The total number of organic farms (including those in conversion) has risen to approximately 1 400 in 2003 (ca. 4 % of all farms). In April 2001, MAFF issued "Rules on the Organic Production and Processing of Agricultural and Food Products", in accordance with the obligations to transpose EU legislation. Support for organic farming has become part of a substantial national agri-environmental programme. However, besides direct payments, only very limited other support measures are in place at the state level. There is also some support from some municipalities.

In comparison with other EU accession countries, the macroeconomic importance of agriculture in Slovenia is relatively low: agricultural employment accounts for 5 %, and the share of agriculture in gross domestic product is 1.6 % (2003). In spite of that, agriculture is an important developmental, social and political factor.

Over 85 % of farms are smaller than 20 ha, and an average conventional farm measures 5.5 ha (organic: 17 ha)

Diversity of production is enabled by three different climatic and pedogeographic areas: alpine, continental and Mediterranean. Ca. 55 % of the total surface is covered by forest, and over 90 % of the farmland is classified as less favoured area. The majority is grassland and the share of arable land is relatively low. On the other hand, the level of biodiversity is high and nature is well preserved. For all these reasons including accession to the EU, organic farming has a certain place in the agricultural policy. For 90 % of the organic farms, the main activity is animal production (predominantly cattle), followed by grain production, vegetables, fruits and some wine. Products are sold on domestic market.

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The major challenges in plant nutrition and protection are a lack of proper (advanced) training and advice, and overcoming general structural and other problems (size of farms, lack of affordable investments etc.).

Description of fertility supply in organic systems and major fertilizer and soil conditioner inputs used

The majority of Slovenian organic farms are involved in animal husbandry (predominantly cattle – suckler and dairy cows, also sheep) which is largely based on own fodder (permanent grassland – meadows and pastures, some fodder production on fields). Thus, availability of fertilizers and soil conditioners is not a key issue for the majority of farms. However, the aspect of storage and appropriate handling of animal manure, slurry etc. is very important. Many farms would have to improve the handling of these substances, both for environmental reasons as well as from the aspect of quality of organic fertilizers (loss of nutrients due to improper storage and handling etc.). The same is true for farms with mixed animal and crop production (arable crops, field vegetables or vegetables).

There is only a relatively small number of farms with no animal husbandry at all, or with a strong orientation towards plant production. These farms have a rotation system where legumes are more strongly present. In some cases, farmers buy animal manure from other organic farms or extensive farms. In horticulture, the preparation and use of compost is the rule, and both in vegetable production and permanent crops (fruit growing) on farms with few animals, the use of commercial fertilizers and soil conditioners is characteristic.

Thus, animal manure and less frequently slurry remain the most important source of soil fertility on Slovenian organic farms. The other important source is legumes in the crop rotation, followed by plant and mixed plant/manure compost.

With respect to soil conditioners, calcium carbonate and stone meal are the most frequently used products. In more intensive organic plant production (fruit growing, vegetables, vineyards) also other organic fertilizers are being used according to the specific needs of the plants/soil (P, K, Mg).

Biodynamic farmers and also some other organic farmers use traditional biodynamic preparations.

The use of growth stimulators (foliar fertilizers) is also allowed under specific conditions: soil or plant analyses showing the lack of nutrient(s); introduction of control (untreated) plots; observations on the effect on the plants on treated and untreated plots. The list of commercial preparations with these substances currently contains 27 (+ 4) items, but they are mostly used for research purposes.

The regulations on organic farming demand that on organic farms all the available measures for increasing soil fertility are in place (crop rotation, growing of legumes, intercropping for green manuring, appropriate tillage, etc). Import of commercial fertilizers should only be allowed as an exception, in the event that the lack of nutrients is shown by soil analysis, and after all the previously mentioned measures have been exhausted.

The use of some F&SC requires the approval of the control body, sometimes in writing. Also, buying animal manure requires written permission of the control body; the farmer has to fill in a special form to prove that the manure does not originate from intensive (industrial) animal husbandry. The form requires data on several characteristics of animal production (animals per area, feeding, housing etc.).

There is a general prohibition in organic farming on the use of products or by-products of animal origin such as blood, hoof, horn, bone and meat meal. The disrespect of this prohibition is sanctioned in the same way as the use of other prohibited substances.

"Need recognized": in his yearly application for organic control and certification, the farmer has to present his fertilization plan and should already foresee which external inputs will be necessary, and these are then handled at regular control visits. For eventual new needs that appear during the year, the farmer has to ask for permission, where necessary.

On the basis of this fertilization plan and data on the number of animals, area and current crop rotation, compliance with the limit of 170 kg N/ha is also verified.

There are limits for heavy metals in composted household waste (commercial product – source separated waste collected in a closed and controlled collection system).

Branded products are evaluated by the control and certification body, which issues a catalogue of allowed inputs in organic farming which also lists branded products. The products are put forward for consideration by the producers. The evaluation is based on checking the products' ingredients from the viewpoint of organic farming legislation. The list of branded products currently contains 2 phosphate fertilizers, 10 K- and Mg-fertilizers, 9 Ca-fertilizers, 4 stone meals, 15 composts and complex organic fertilizers, 17 soil conditioners and additives to compost/manure/slurry preparation, 1 supplementary plant additive (seed treatment), as well as 5 peats / peat products and 5 soil conditioners – both for use in plant production.

In addition to the control body, USOFA (the organic farmers' umbrella organization) also evaluates the branded products that have been already accepted by the control body and excludes for its members those products that are rather on the verge of acceptance for organic systems.

Existing legislative/regulatory framework relevant for use of fertilizers and soil conditioners in organic and conventional farming

Organic farming is regulated by the "Rules on the Organic Production and Processing of Agricultural and Food Products" (MAFF, 2001) and its amendment from April 2003. Inspection is regulated by "Rules on technical and organizational conditions that must be fulfilled by organizations for inspection of organic agricultural produce and/or foods", OGRS, May 2001. These rules are ministerial decrees based on Art. 41, 43 and 44 of the Agriculture Act (OGRS 54/2000, 16.06.2000) which has introduced the concept of organic farming and provided for its detailed definition and regulation in (previously mentioned) separate acts.

The use of fertilizers and soil conditioners is regulated by the "Rules on the Organic Production..." in the same way as in EC 2092/91. Both justification of the use of F&SC and the annex listing the F&SC allowed in organic farming follow EC Regulation 2092/91 and its Annex II.

The Rules forbid the use of certain products or by-products of animal origin in organic farming: blood, hoof, horn, bone and meat meal. This decision was taken after the occurrence of BSE.

There is also the "Catalogue of allowed inputs for organic farming" (prepared by the inspection and certification body) which lists commercial F&SC available on the Slovenian market, that can be used by organic farmers. In the Catalogue, the restrictions for farmers of USOFA (label BIODAR) are also specified; it clearly indicates which products cannot be used by farmers who wish to use the label BIODAR. These restrictions are set by USOFA.

There is no special law regulating the use of F&SC in farming in general (including conventional farming), but there are a few pieces of legislation dealing with the use of F&SC. The *Regulation on the input of dangerous substances and plant nutrients into the soil* regulates the use of animal manure and slurry from the environmental perspective (in what periods and conditions and on which specific areas the use of these substances is not allowed); the use of compost (from source separated collection) and

mud from water purification plants in agriculture (specifies the criteria for limited, unlimited and prohibited use of these products in agriculture), etc. The *Rules concerning good agricultural practice in fertilizing* and the *Decree on detailed criteria for assessing whether the grower acts with due care and attention* give some basic principles for dealing with both mineral and organic fertilizers (animal manure, slurry, compost), such as use of fertilizers according to the needs of the plants and to the yearly fertilization plan, based on soil analysis, minimum capacities for storage of animal fertilizers and slurry to avoid use in inappropriate periods, etc. This legislation should be respected in organic farming too, where applicable.

Fertilizers and soil conditioners: issues and trends

- As mentioned above, on the majority of organic farms the problem area is not so much the availability of animal fertilizers, but their treatment. There is a lack of appropriate and sufficiently large storage for animal manure and slurry. This is a general problem, not limited to organic farms. Because of that, a new measure has been introduced in the Rural Development Program in 2004: investment in the arrangement of appropriate storage for animal manure and slurry on farms. Besides that, there is a general need to improve the handling of animal manure and slurry to maximize their quality. This could be done by appropriate training and advice for farmers.
- As it is the case for all inputs for organic farming, the issue of F&SC in organic farming has not been widely debated in public, not even among the farmers in the organic farmers' associations. There are few experts in the control and certification body, advisory organizations and organic farmer' organizations that deal with F&SC, mostly in relation to the needs for a list of branded products ("Catalogue of allowed inputs for organic farming").
- In Slovenia, only few F&SC for organic farming are produced in the country, while the majority are imported. The reference for their use is EU and national legislation on organic farming; USOFA refers also to organic farmers' standards in other EU countries (Austria – BIOERNTE; Germany).
- There are a few commercial products, for which the use in organic farming is questionable for some producers. This can be due to the nature of their production, or to unclear or risk-related origins of the substances used (i.e. by-products from the manufacture of antibiotics). In these cases, USOFA has excluded their use for its members.

Discussion and decision-making on fertilizers and soil conditioners

Slovenian legislation on organic farming does not mention any decision-making procedure for F&SC. The "Rules on the Organic Production..." merely state that only the use of products listed in the Annex to the "Rules..." is allowed. This can be seen as a deficiency that will need improvement in the near future, as the organic sector and interest from other organizations (consumers, environmentalists etc.) is developing and growing constantly.

The Ministry of Agriculture is thus responsible for preparation of the list and the minister takes the final decision. Up to now, the "Rules..." and their annexes have been prepared by the Ministry and then, at a relatively late stage, sent to farmers' organizations, the inspection body, the advisory service and certain others for comments. So far, there has not been a lot of discussion on the F&SC, as there has been more emphasis on several other, more basic issues.

The "Catalogue of allowed inputs for organic farming" of the I&C body is submitted to the organic farmers' organizations (USOFA) for comments. In the Catalogue, a specific reference is then made to

F&SC products that are not allowed for the members of USOFA (label BIODAR), but may potentially be used by other organic farmers. USOFA does not publish its own list but cooperates with the I&C body in the preparation of the organic inputs catalogue.

The I&C body therefore has a substantial responsibility for the determination of suitable F&SC. In addition, the "Rules on organic production..." also foresee the decisive role of I&C in the approval of the use of certain F&SC in individual cases. The I&C is using the experiences and state of affairs in EU countries, especially Austria (ABG – *Austria Bio Garantie*).

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Fertilizers and soil conditioners in organic farming in Spain

Victor González¹

The history and context of organic farming

Agronomic background

Spain has a wide diversity of climates and soils, and consequently a wide range of agroecosystems. Agricultural production ranges from subtropical fruit in the Canary Islands and some southern regions, to olives, citric fruit, cereals (particularly in the Central Plateau) and finally dairy and meat products from pastures in the Atlantic north and northwest. Some areas of Spain have very intensive agricultural systems, but there are also vast areas of well-preserved semi-natural land, where traditional agricultural systems have survived (Sevilla *et al.*, 2000) and which are very suitable for organic production (Gonzalez, 2001). In the South, mainly in Andalusia and Extremadura, there is a peculiar Mediterranean agroecosystem called the 'dehesa'. This is a savanna-like grassland with spaced trees, usually cork or holm oaks, where native breeds of livestock graze freely and feed on the acorns. In some parts of the 'dehesa', cereals and legumes, rotating with the grassland, are cultivated.

Currently, many hectares of 'dehesa' and other traditional agroecosystem lands are certified organic. Organic wine and olive oil production is very important throughout the country, and there are different varieties adapted to all the climates.

Development of organic farming in Spain

Organic farming was started in Spain by a few pioneers in the 1970s (Gonzalez, 2002). During the last decade, the area dedicated to organic production and the number of certified producers has increased considerably: in 1991 there were 346 producers, 50 processors and 4 235 ha of registered organic land; by 2002, this had risen to 17 028 producers, 1 439 processors and 725 254 43 ha of land. Spain now has the third largest area of registered organic land in Europe, with an estimated total turnover of EUR 235.65 million. Among them, there are 1 756 cattle farmers and 222 processors of animal products. Organic farming is at very different stages of development in the diverse regions of Spain (MAPA, 2003). In addition, there are huge variations in the average farm size and average yields obtained. In general, organic production predominates over organic processing.

The region of Andalusia has the largest area of organic land (283 219 76 ha), followed by Extremadura (131 752 ha), Aragón (74 169 ha), Cataluña (56 214 ha) and Castilla-La Mancha (47 638 ha). The highest number of producers are located in Extremadura (33 %), followed by Andalusia (28 %) and Castilla-La Mancha (7 %). Most processors are located in Andalusia (21.7 %) and Cataluña (19.2 %).

About 55 % of the organic land is covered by pastures and forest; the rest is distributed between cereals and legumes (14 %), olive plants, (12.5 %), dry fruits (5 %), vineyards (2.2 %), fruits, citrus (0.6 %) and vegetables and potatoes (0.5 %), and set-aside land ('barbecho') linked to arable crops (8 %).

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Crops production is distributed as follows (source: MAPA, 2003):

Cereals and leys:	Aragón, Castilla-La Mancha, Extremadura Andaluca, Navarra
Fresh vegetables:	Andaluca, Murcia, Aragón, Valencia
Cítrus:	Andaluca, Valencia
Fruit:	Extremadura, Valencia, Murcia, Andaluca
Olives:	Extremadura, Andaluca, Castilla La Mancha
Viticulture:	Castilla La Mancha, Murcia, Extremadura
Dry fruits (almond):	Andaluca, Murcia, Castilla La Mancha, Extremadura, Baleares
Subtropicals fruits:	Canarias
Aromatic plants:	Andaluca, Valencia
Forest and wild harvest:	Andaluca, Cataluña, Baleares
Pastures and feed:	Extremadura, Cataluña, Andaluca, Valencia

Animal production is distributed as follows:

Cattle for meat:	Extremadura, Cataluña, Andaluca
Cattle for milk:	Galicia, Asturias
Sheep and goats:	Extremadura, Andaluca
Poultry for meat:	Cataluña
Poultry for eggs:	Baleares, Andaluca
Pig production:	Extremadura, Baleares, Andaluca

Market for organic products

The first 'organic' products appeared in 1975 in Barcelona, as a small assortment of dietary products. In 1978, rice from Calasparra (Murcia) was first exported (Gonzalez, 2001).

Spain exports around 85 % of its organic produce, mainly to other EU countries, but also to Japan and the USA. Local consumption is growing, but is still low. In fact, the majority of consumers still do not appreciate the meaning of the organic labels, and are more likely to respond to labels like 'home-made', 'traditionally produced' and 'natural'. There are very few registered importers of organic products from third countries. Currently, the domestic market is strongly influenced by health food products, and the majority of health food shops (approx 2 500) offer organic products. It is difficult to find organic products in the conventional distribution network, although some supermarkets promote organic foods (Eroski, Mercadona, Carrefour, El Corte Ingles, etc.). Recently, some specialized organic supermarkets have opened in Barcelona and Madrid. Direct sales from farms play a subordinate role, but there are some examples of successful weekly fairs.

Organic farming organizations

The most important organic producers' associations in Spain are the '*Asociación de Agricultura Biodinámica de España*', 'Friends of the Agricultural School of Manresa' (AEAM) and '*Vida Sana*' in Barcelona, '*Biolur*' in Navarra, '*Ekonekazaritza*' (Basque Provinces or *Euskadi*), '*Aula de Agricultura Ecológica*' in Sevilla, '*Asociación de Agroecología Alberto Rodríguez P*' in Galicia and the 'Spanish Society of Organic Farming' (SEAE) at national level. Currently, 12 Spanish organic organizations (*Aleco-consult S.L.*; *Natureco S. L.*; *Centro Las Torcas-Granada*; *Comité Andaluz de Agricultura Ecológica* (CAAE); *Asociación para el Desarrollo de la Agricultura y Ganadería Ecológica* (ADGE); CAFAI; FA-BIO; *Biocop*; SEAE; *Escola Agraria de Vilasantar* (A Coruña); *Ecoliva*; *Comité Catalá d'Agricultura Ecológica* (CCPAE); *Vida Sana*) are members of the International Federation of Organic Farming Movements (IFOAM). Until the establishment of the semi-public certification and inspection system in 1991, the main activity of the associations was inspection of the associated farms.

Some conventional farmers' organizations, like the *Coordinadora de Organizaciones de Agricultores y Ganaderos* (COAG), *Asociación de Jóvenes Agricultores* (ASAJA), *Unión de Pequeños Agricultores* (UPA) or ENHE in Baskenland, have an internal organic section. Especially the organic section of COAG is strongly involved in the COPA Organic Group work on standards and other issues at European level. For the most part, Spanish organic producers are organized within the conventional farmers' organizations. The majority of processors have joined the association of organic processors (FA-BIO). Organic consumers have a national federation involving 11 different organizations.

Financial support for organic production

In 1995, the EU Regulation 2078/92 was integrated into Spanish legislation, opening up the possibility for promoting environmentally friendly production methods. Financial support for organic farmers started in 1995 and has influenced the development of the organic sector in Spain (Alonso, 2002a; 2002b; 2002c). Nevertheless, support was more restricted than in other European countries. In 1997, less than 3 % of all funds from European agroenvironmental and organic farming programmes (more than 2 300 million ECUS) were distributed to Spain (compared with 23 % for Austria, 17 % for Germany & Italy, and 13 % for France). In addition, the percentage of national funds was lower in Spain (30 %) than in many other countries (Germany 76 %, Austria 48 %, France 50 %). Currently, organic farmers receive a fixed payment per crop and year, fixed by each regional government. In most cases, this payment is lower than in other European Member States.

Policy

Andalusia has started an 'action plan for organic farming', and Castilla-La Mancha and the Balearic Islands are drafting regional action plans. Recently, the Ministry for Agriculture, Fisheries and Food (MAPA) has drafted a national action plan, motivated by the European discussion.

On the other hand, MAPA has published a national Decree in 2001, liberalizing the term '*biológico*' and '*bio*' for non-organic products (26 May 2001, BOE n° 126, pg. 18.609, Royal Decree 506/2001, of 11 May, modifying the R D 1852/1993, of 22 October, on organic production and the labelling of agricultural products and foods). This Royal decree (RD) was issued due to pressure by the drinks and processed products industry. This RD was rejected by the entire organic sector in Spain, who have made several public protest actions and asked the IFOAM-EU Group for support. Two members of the Spanish organic sector, COAG and CAAE, have made legal claims at regional, national and the European Court. Currently, the Basque Provinces' Court has resolved this claim in favour of the organic sector. At

European level, the European Commission has sent two letters to the Spanish government, asking for revocation of this RD. The Spanish government has given no answer, and therefore the EC has brought proceedings against the Spanish government in the European Court. Several companies, like Danone, are taking advantage of the present legal situation by advertising '*Bio-Joghourt*' on television, but they are obliged to add "not from organic farming" in small print. Export products are not affected, because, they must have the legal organic label. For the Spanish organic sector, the greatest impact is the confusion among Spanish consumers about the meaning of '*bio*' (COAG, 2003).

Advice, information and training

There is no official support for advisory work in organic farming (Gonzalvez and Altés, 2002). Small producer groups or associations, which are frequently organized in cooperatives, often employ private advisors. There are several magazines on organic farming, the best known are '*La Fertilidad de la Tierra*' and '*Revista Humus*'. The regional offices of the agricultural administration, and recently the organic sector of the conventional farmers organizations, organize advanced training events for organic farmers. There are several courses for college graduates, and other training courses for practitioners offered by private institutions like Vida Sana and SEAE. Some universities (like Córdoba, Tenerife, Sevilla, Valencia, Barcelona) offer seminars or have included organic farming on their curricula.

Major inputs used

Mixed farming or integration of crops and animal husbandry is not a common issue in Spanish organic farming, especially in vegetables and fruit production. This means an additional difficulty during the conversion period. The major problems in plant nutrition and soils are:

- *Poor levels of organic matter* in the soil. To increase the organic matter content of the soil, some organic farmers are using manure, cover crops and several compost types from animal manure.
- *High calcium content*, obstructing the availability of some micronutrients (e.g. iron) to the plants. Therefore, natural iron sulphate is added to manure, compost or humic acids from composted products.
- *Scarcity of good quality organic manure*.

Most frequently used fertilizers and soil conditioners

Manure is the most frequently used fertilizer product in Spain. To overcome the scarcity of good quality manure, an internal Directive is being developed. This would allow, in some cases and under the authorization of the control body, the use of manure coming from special, intensive husbandry, if it is composted appropriately.

Other frequently used fertilizers are:

- Mineral oligoelements with Fe and Mg
- Amino acids and humic acid products
- Seaweed products

Description of the existing legislative/regulatory framework

Legal framework of organic farming in Spain

Organic farming was first regulated by the private Standards of Vida Sana (Vida Sana, 1982; 1984) and the Organic Farming Coordination, CAE (CAE, 1984; 1985). In 1989, it was regulated by national law on Origin Denomination and Regulation Council for Organic Farming (RD 759/1988 and Order of 4 October 1989). For the implementation of the EC 2092/91, the Spanish Ministry of Agriculture and Fisheries (MAPA) created a Central Council for Organic Farming Regulation (CRAE). CRAE was the only institution authorized for inspections and certification. It developed a common label for organic Farming in Spain. In 1993, MAPA transferred the competence for controlling organic production to the 17 Spanish 'Autonomous Regions' (ACs). The transfer occurred progressively between 1994 and 1997. In some ACs, the certification, inspection and control of organic farming, was assumed directly, by the Regional Administration governments, on a provisional basis, until the specific council or committee was created by law. In 3 of the ACs (La Rioja, Baskenland and Castilla La Mancha), the Regional Administration itself has undertaken this task, without creating any stakeholders' structure. In most of the ACs, Regulation Councils for Organic Farming (Andalusia, Asturias, Balearic Islands, Canary Islands, Cantabria, Castilla-León, Cataluña, Galicia, Murcia and Navarra; also Extremadura for organic processed and imported products) or Organic Farming Committees (Aragón, Madrid and Valencia; also Extremadura for organic production), were created. In Extremadura AC, there are two separate structures: one for organic production and the other one for processed and imported organic products (Extremadura Committee for organic agriculture production (CEPAE) and Regulatory Council of Extremadura for organic agrofood (CRAEE), respectively). Councils and Committees have a broader stakeholder representation, and are obliged to reserve some seats for the Regional Authorities, without voting rights. The president must be elected by the stakeholders representation, and also elected every four years by the registered operators. The public funding from the Regional Authorities is different in each AC, ranging from 60 to 90 % of the total budget. The legal function of the Councils/Committees is to organize and supervise the certification system for organic farming, to promote organic farming products and to advise the regional government in policy actions. The difference between Councils and Committees is only their legal framework and name, but in practice, both are acting with similar rules. Councils and Committees have a special professional team for inspection, control and certification of organic products, separated from the promotion activities. Currently, MAPA assumes responsibility for the control of imports from third countries, and represents Spain in the EU Commission.

The national CRAE, is now converted to a stakeholders' Advisory Council for the MAPA, including representatives of the control bodies of every region, public regional administrations and several stakeholders of all food channels involved in organic production and consumption. SEAE and Vida Sana, both IFOAM members, and also one organic consumers' organization have representatives on this Council. However, the work of this Council is depending of the MAPA Budget and in the most recent period, this council was holding sessions only once a year. CRAE has also structured different working groups (WGs). One of the most active is called 'Rules, Monitoring and Inspection'. This WG has set six standards in addition to EC 2092/91 in the last five years, which are implemented voluntarily at regional level:

- Standards for rabbit production
- Standards for processing of compounded feed for livestock
- Standards for milk and processing of dairy products
- Standards for traceability of meat and meat products in slaughter houses
- Standards for deer (*Cervus elaphus*) production

- Standards for aquaculture

The ACs can also develop and implement their own standards in some specific subjects, as it was the case for the CAAE aquaculture standards in Andalusia. Catalonia is currently reviewing the general technical standards for organic farming.

The public certification system in Spain

Spain has adopted the Regulatory Boards or Committees system for controlling and promoting organic farming. This model was chosen when national regulation started, and has been maintained ever since. It is based on the old Wine Regulation (1972) and the Origin Denomination, which define regional specialities such as wine, cheese and others. This model is a strongly democratic based system, having sectoral elections every four years to elect in a proportional way the representatives of each branch (farmers, livestock producers, processors, importers and marketers). The elected persons elect the President of the Council or Committee, who is legally responsible for the overall inspection and certification system, with support from a professional staff, partly subsidized by the regional administration. Currently, many public certification bodies are applying to the National Accreditation Company (ENAC), in order to gain international credibility. To obtain this private accreditation, they are modifying their own rules to allow representation of consumers and environment organizations. ENAC is accrediting certification and inspection bodies in Spain, according to the Multilateral Agreement (MLA) on EN-45011 norms. To achieve this aim, some of them have changed their legal statutes and are now *Public Right Corporations*, which allows to complain the EN-45011 accreditation criteria for certifications bodies (this is the case for the Cataluña Council of Organic Agriculture Production).

Private certification in Spain

There are currently six private certification bodies in Spain: *Comité Andaluz de Agricultura Ecológica* (CAAEE), the former public body from Andalusia; *Sohiscert SA* (linked to ECOCERT); *BCS-Oekogarantie*; *IMO*; *Agrocolor* and *Ecal* (two new Spanish private certification bodies, coming from the conventional sector). Only Andalusia has a totally private certification system. In Castilla La Mancha and Aragon, there is a mixed system. Some international certifications bodies (e.g. *Bio-inspecta* from Switzerland), are also operating in Spain, in collaboration with local private certifications bodies, which are making the local inspection, additionally to the public certification Spanish bodies, for certain private standards, like those from DELINAT for organic wine.

Certification of fertilizers and soil conditioners in organic farming

Registration

In Spain, any product used in agriculture as a fertilizer or pesticide must be registered by MAPA (see <http://www.mapya.es/agricultura/pags/fitos/registro/introregistro.htm>). However, the MAPA Order on fertilizers and related products (12731 Order of 28 May 1998 on fertilizers, modified by Order of 2 November 1999) makes no distinction between products used in organic or conventional agriculture. This general legislation stated a list of fertilizers and related products allowed for agriculture use, establishing the minimal and maximal content of the nutrients and composition and the instructions for their normal utilization, storage, management and labelling. This regulation also established the maximum levels of heavy metal content in mineral fertilizers, and pathogenic agents in products coming from animal or vegetal residues. Materials to be used as substrates for ornamental plants are included in a separate

register (project supported by the Interministerial Commission of Sciences and Technology (CYCYT), Ref. AGF95-1698-E).

This legislation also states the need for a previous registration of products before they can be marketed, in the corresponding Annex III or IV, under 4 different categories: a) organic fertilizers; b) organominerals; c) soil conditioners and d) other related fertilizers. In relation to urine fertilizers, there is regulation according to EU Council Directive 12/12/91 regarding water protection and water contamination.

Certification of active substances and branded products

Certification of organic inputs is still voluntary in Spain. Most applications are for fertilizers. Until recently, neither public nor private inspection and certification bodies in any region had a system in place for certifying inputs, and there were no evaluation procedures or criteria. At the farm level, it can be quite confusing to find out what active ingredients a commercial product actually contains, and hence whether it is permitted or not. As a consequence, inspection and certification bodies have to answer many queries from licensees about what products they can or cannot use.

Currently, inputs for organic farming need a certificate extended by each public certification body, after reviewing whether the active material is included in EC 2091/92, Annex II or VI. This system of having an input certificate from the official certification structure is now widespread in Spain. The Regional Competent Authority for Extremadura and some members of SEAE have published a 'Guide to products useable in organic production' (Labrador and Reyes, 1999), based on a voluntary declaration of the ingredients. A Working Group of SEAE, is preparing an updated new edition for 2004. This unofficial guide is used as a consultancy book by farmers and technicians in all Spanish regions.

Intereco certification

Recently, 12 public regional certification bodies have founded the non-profit organization 'Intereco' (2000), to develop an input certification system for their operators (Alonso, 2002b). The aim is to allow easy recognition of inputs which are acceptable for organic production. Certification by Intereco is voluntary at present, but it has been agreed that in the future, their associated members will make it compulsory for all inputs used by the operators of these certification bodies.

Intereco, a non-profit organization without any support from the government (Intereco, 2003), has established a certification system (SICI) for organic agriculture, starting with fertilizers and soil conditioners (Gutiérrez, 2001). At present, they have 20 certified products from four different companies, located in four different ACs (Aragon, Valencia, Andalusia and Cataluña). The products certified by Intereco must be on the MAPA register and must also comply with EC 2092/91. Intereco adds its own rules regarding labelling and precautionary measures for fraud control. Intereco certification procedures are very similar to those for production and processing, with an application, initial inspection visit and concerted (once a year) or unexpected inspection, a contract, correction of possible instances of non-compliance found, certification and annual revision. At the moment, they have around one hundred applicants, ranging from farmers producing a bit of extra compost or manure that they want to put on the market, to companies specialized in the production or import of agricultural inputs. Most of the applicants, however, are factories producing fertilizers.

Another private certification body, Sohiscert SA, is giving its seal to some input products, but the criteria and the certification system are not publicly accessible. Sohiscert SA has recently published a list of 88 certified organic products on its web page (see www.sohiscert.es), of which 65 are fertilizers and soil conditioners, in 8 different places in Spain.

Also, Vida Sana Association, a non-profit organization, is recommending some fertilizers and soil conditioners through its seal, but there is no complete list of the recommended organic input products, and as in the other cases, information about the criteria and processes of the certification system is not accessible.

Finally, CAAE, has also been offering certification for organic farming inputs since last year (CAAE, 2004). Until now, CAAE has already certified 12 different products (Casero, 2004). As in the other cases, there are no publicly accessible rules for the system.

Hot issues, trends and pending matters

General issues

- RD 506/2001, liberalizing the term '*bio*': The organic sector is taking action at several levels and waiting for a court ruling at national and European level.
- Some of the producers and the regional certification bodies organized in Intereco are aiming at developing *higher, private standards* (like the IFOAM Basic Standards). More participation of the sector in these discussions is still needed.
- There is a debate about whether public or private certification bodies are the better option. Producers support the semi-public systems, with public support and improvement for this service. Some of the public inspection and certification bodies are improving their work and being accredited by EU organizations. Most of them are actually working to improve their own internal legal status to comply with the European Union Accreditation Rules for independent certification bodies.

Issues related to input certification

- Some inputs listed in Annex II do not need to be registered in Spain. However, no list has been published informing growers which they are, and it appears that MAPA prefers interested parties to check the register first and then, if the product is not included, to ask MAPA what its status is.
- A further problem for organic producers is that the items listed in EU Reg. 2092/91 Annex II are referred to by their active ingredient, while products sold to the farmers often use just a commercial name. Thus, trying to identify what a product actually contains, and hence whether it is permitted, can be quite confusing. In addition, the EC 2092/91 is written in a language style that can be difficult to understand. For instance, it states 'coming from extensive husbandry and only in the sense of Article 6 (5) of Council Regulation (EEC) 2328/91, as last amended by Reg. (EC) 3669/93 (2)', when referring to the type of manure that is permitted as fertilizer.
- At present, there are a lot of enterprises offering several fertilizers and soil conditioners in the market under the words of '*natural*' or '*biologico*', which can cause confusion among organic farmers.
- For further development of organic farming in Spain, a policy for stronger integration of animal husbandry and crop growing on the farm will be needed.

Fertilizers and soil conditioners

- Manure is considered a contamination source in the northern European countries. Therefore, the quantity per ha is limited to avoid nitrate contamination in ground waters or in the produce. In Spain, however, manure is seen as the best fertilizer and we do not have problems of excess. The limit of 170 N kg/ha/year in the EU Reg. 2091/91 was set with a cold climate (the situation in northern Europe) in

mind. Some organic intensive crops coming from warm climates could need more manure (solanaceae and Cucurbita species). The concept that organic farming means extensive farming is not valid in southern European countries. There are several examples in the Mediterranean basin, tropical America and the orient, where intensive agroecosystems have been developed in a sustainable way, feeding the population for thousands of years.

- For animal excreta, the public certification bodies in Spain have adopted the European Commission Directive for the “use of animal excreta in organic farming” (part A from Annex 11 Reg. EEC 2092/91; ‘Directrices para la utilización de excrementos de ganado en agricultura ecológica’ (ES/06/95/56840500; DG-AGRI)), to define ‘non intensive husbandry’ for the use of excrement as compost material in organic farming (J. Saura, CAERM, pers. comm.). To use these composted materials, the process must be an aerobic fermentation, according the particular materials, soil and climatic conditions in each Member State (for solid excreta) or adequately treated (in the case of liquids). In any case, the use of composted manure coming from conventional farms will require previous authorization from the certification body, given separately for every case, after analysing the practices and the materials of origin.
- Most of the organic or mineral fertilizers authorized in organic farming (Annex II A) which are listed with the sentence “if there is no sufficient availability of manure or other technical solutions or practices” (which requires additional permission of the certification bodies), are the most usual inputs in southern European countries (J. J. Triana, CRAE, pers. comm.). This is the case for manure coming from conventional husbandry, fresh manure from extensive husbandry, composted manure from intensive husbandry and composted vegetal residues. It is also the case for mineral fertilizers from rough rocks like potassium salts (kainite, silvinit, etc.), potassium sulphate with magnesium salt, magnesium sulphate (kieserite) or calcium chloride (which may be used only for apples). On the other hand, there is no requirement for any further authorization to use products which are more abundant in northern Europe, like peat, oilseed meal cake, wood materials, mild natural phosphate or calcium carbonate from natural origin.

Involvement of stakeholders

The official general registration for fertilizers and related products of MAPA is carried out by a technical office without any involvement of stakeholders. In the organic farming private inputs certifications systems (like Intereco), involvement of the different stakeholders is ensured indirectly, due to the fact that there must be an obligatory proportional representation of stakeholders in the Direction Council of the internal structure of this certification body. In some of them, there is a lack of representation of consumers and environmental organizations. Regional authorities are involved by supervising the process. In the private certification bodies, accredited according to EN-45011 norms, especially in international certification bodies (BCS-Ökogarantie, IMO, etc.) stakeholder involvement is lacking or, in other cases, happens more indirectly through sectoral representation within the certification system from just one country, generally the one where the head office is located. The costs of a meeting of the certification committee with stakeholders coming from different countries is a barrier. There are no special certification committees for inputs. In that sense, more direct involvement of stakeholders in the organic input certification is needed.

An obligatory inputs certification system, controlled by competent authorities at regional or national level, or with an appropriate accreditation ensuring more direct involvement of stakeholders (such as that of Intereco), is also needed in Spain.

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Fertilizers and soil conditioners in organic farming in Switzerland

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History, structure and trends of organic farming in Switzerland

Farming in Switzerland

Large parts of Switzerland are mountainous, and only suitable for animal husbandry. *Animal husbandry* accounts for two thirds of income (milk: 36 %; meat and other animal products: 34 %), while one third comes from *crop production* (arable crops: 11 %; fruit and vegetables: 10 %; wine: 7 %; other crops: 2 %). Most farms are relatively small (the average farm size is around 15-20 ha for organic and conventional farms alike), which is small on an international scale (Bundesamt für Landwirtschaft, 2002).

Development of organic farming practices

In 1924, Rudolf Steiner developed the principles of a new farming method, which he outlined in theory in a series of lectures called '*landwirtschaftlicher Kurs*' (agricultural course). Steiner recommended the development of these methods in practice. One major aspect of his principles was the rejection of artificial (synthetic) mineral fertilizers. In 1928, Minna Hofstetter, inspired by the 'Reform movement' and vegetarianism, started to publish on the subject of organic gardening. In the following decades, various farmers experimented along these lines, without much coordination. The ideas of Steiner evolved into the biodynamic methods of farming. In Switzerland, Hans and Marie Müller helped to found the '*Anbau- und Verwertungsgenossenschaft Heimat*' in 1946 (known since 1971 as '*Bio-Gemüse AVG Galmiz*'). This organization, a organic farmers' cooperative, had guidelines for production and marketed the products under a label, in a similar way as it is done today with organic products (although they remained separate from BIO SUISSE for a long time). By the 1970s, farming practices similar to modern organic farming had evolved (Vogt, 2000).

Development of standards and regulations

In 1980, five regional organic farmers' organizations decided to adopt common guidelines for organic production. Today, these are known as the BIO SUISSE standards, and Switzerland is the only country in Europe where all organic farmers' organizations agree on the same basic set of private standards (BIO SUISSE, 2003b). The BIO SUISSE standards are similar to the regulation EC 2092/91, but have some additional requirements:

- The entire farm must be converted to organic production.
- Minimum requirements for crop rotations
- Ecological compensation areas (to enhance biodiversity)
- Tighter restrictions on copper fungicides (1.5–4 kg/ha/year, depending on crop)

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- Nutrient balance

In 1995, 'Migros-Bio' was founded as a second major organic farming programme in Switzerland. Migros-Bio standards for production are on the same level as BIO SUISSE, but the standards for processing and for importing are less strict.

In 1998, the *Swiss Ordinance on Organic Production* entered into force ('Bio-Verordnung'; Verordnung über die biologische Landwirtschaft und die Kennzeichnung biologisch produzierter Erzeugnisse und Lebensmittel). The regulations it contains are similar to the standards of BIO SUISSE. Although Switzerland is not a member of the EU, the Swiss law is regularly adapted to the amendments of EC 2092/91 ('*Autonomer Nachvollzug*') to facilitate market harmonization and mutual recognition.

Development of production

Over the last ten years, the number of organic farms has increased almost five-fold. In 2003, there were 10.8 % organic farms in Switzerland (=6 466 farms) (BIO SUISSE, 2003a). The majority of these farms are in the mountains and hills, and produce milk and meat, while fruit, berry, vegetable and wine production are underrepresented due to the difficulties of production.

Market development

Originally, organic products were sold mainly by the farmers themselves and in health stores. The sales volume increased drastically when the two large supermarket chains Coop and Migros began to sell organic products (Coop in 1993, Migros in 1995). Today, 50 % of organic products are sold by Coop, 25 % by Migros and 16 % by health food stores. At Coop, organic products account for 7 % of food sales (12 % for milk, 20 % for carrots). In 2002, the turnover of organic products rose by 13 % and reached 1 045 million CHF (approx. EUR 750 million). High growth rates are expected for meat, cheese, fruit and convenience food in the next few years. However, the growth rates are expected to be lower than in the last few years. Some instances of market saturation are being observed in the milk and vegetable sectors (BIO SUISSE, 2003a).

Farm economy

The Swiss Federal Government has supported organic farming with additional direct payments since 1993. Subsidies are CHF 200/ha for grassland, CHF 800/ha for arable land and CHF 1 200/ha for horticultural crops. In addition, organic farms are entitled to payments which are given to all farms which have at least 7 % ecological compensation areas and animal-friendly husbandry systems.

The prices and price differentials vary greatly for different organic products, depending on production costs. Organic farmers are paid 20 to 100 % more than their conventional colleagues for their products. Together with the subsidies, the result is that incomes of organic farmers are similar to those of conventional farmers.

Farm types and fertilizer use

Most of the 6 466 farms in Switzerland are livestock farms in the Alps and the alpine foreland. These farms use their manure in liquid or solid form on fodder crops. In the lower-lying areas, there are mixed farms with fodder crops and arable land. These farms use their manure to fertilize fodder crops and arable land. In the drier and warmer regions, there are arable and vegetable farms and vegetable growers. These

farms have few if any animals. They use green waste compost and commercial organic fertilizers (which have to be listed on the FiBL inputs list).

Out of the 388 branded products of fertilizers and substrates listed in the FiBL inputs list (issue 2004), approx. one quarter are used in commercial agricultural production, and three quarters are for use by hobby gardeners. This is a lucrative market for the sale of organic inputs, where high prices can be achieved for small quantities. The FiBL inputs list contains the following categories:

- Fertilizers rich in N (nitrogen), rich in P (phosphorous) or rich in K (potassium)
- Fertilizers with several macronutrients (N, P, K)
- Liquid fertilizers
- Chalk products
- Soil amendments
- Rock powder
- Microorganisms
- Algal products
- Mulches
- Fertilizer amendments
- Plant strengtheners*
- Foliar and micronutrient fertilizers**
- Commercial substrates

* Plant strengtheners: In the FiBL inputs list, products are called '*plant strengtheners*' if their use (at recommended rate) results in an application of less than 10 kg/ha of total plant nutrients. Some of these products are claimed to have "esoteric properties" (which does not have the same implications as the usage of this word in Germany!).

** Foliar and micronutrient fertilizers may only be used if the need is documented, e.g. by soil or foliar analysis. The certification body must be notified of their use.

Regulatory framework

Non-organic regulations

Two federal regulations, the '*Eidgenössische Düngerverordnung*' (DüV) and the '*Eidgenössische Düngerbuchverordnung*' (DüBV) regulate the commercialization of fertilizers, while substrates are not regulated. The federal regulation called the '*Stoffverordnung*' (StoV) regulates the application of fertilizers and soil conditioners. The federal law for direct payments, the '*Direktzahlungsverordnung*' (DZV), regulates the conditions for subsidy payments for integrated and organic farming.

- According to the StoV, the use of *green waste compost* is limited to 25 t dry matter (DM)/ha per three-year period.
- StoV limits the level of heavy metals applied with green waste composts. The limits are 120 mg/kg Pb; 1 mg/kg Cd, 30 mg/kg Ni; 100 mg/kg Cr; 100 mg/kg Cu; 400 mg/kg Zn (relating to dry matter). In the composts which are currently used, the median values are 50 % of the limit for Ni, and 30-40 % of the limit for Pb, Cd, Cr, Cu and Zn.

- Sewage sludge is not allowed.
- DZV requires that fertilizers may only be used within the tolerance of the *nutrient balance*.
- DüV specifies that for fertilizers based on *blood, bone, meat, skin or horn meal*, each source of raw material must be examined separately by the Federal Office for Agriculture. *Horn* products are only allowed, if they do not contain bone materials. This is verified analytically by checking for the absence of phosphorus in these products.

Organic regulations

Annex 2 of the *Swiss Ordinance on Organic Production* lists the fertilizers allowed in organic agriculture. The list is similar to Annex II A of EC 2092/91.

The private BIO SUISSE label has some additional criteria:

- The maximum limit for fertilizing in best conditions is 2.5 cows/ha, decreasing with rising altitude. That means 135 kg N per hectare available to the crop in the first year.
- 20 % of the arable land has to be covered for one year with a *legume-grass mixture* or *green manure*.
- Organic farming should use *organic and local nutrient sources*, while there are restrictions on sourcing nutrients from greater distances. A maximum of 50 % of a farm's nutrient needs can be met by manure from integrated or conventional farms, and the distance has to be less than 20 km for slurry, 40 km for solid cattle manure and 80 km for chicken manure, compost and wastes from mushroom cultures.
- *Commercial fertilizers* and their components are not restricted by distance limits. However, material of Swiss origin is preferable to European and Mediterranean, and these in turn are preferable to overseas origins. For example, guano (origin: South America) is not allowed. Manure may only be dried if renewable sources of energy are used, or if the process uses minimal energy.
- Commercial substrates have special *restrictions for peat*: (i) in outdoor fields, the use of peat is not allowed; (ii) in plantlet production, a maximum of 70 % peat is allowed; (iii) for indoor potted ornamentals, a maximum of 50 % peat is allowed; (iv) for outdoor potted ornamentals, a maximum of 30 % peat is allowed.
- The BIO SUISSE and Migros-Bio labels (i.e. ca 99 % of all organic farms in Switzerland) prescribe that only the branded products from the *FiBL inputs list* can be used.

The FiBL inputs list is updated annually and published in German and French. The 2005 issue contains 449 fertilizers and substrates (Speiser *et al.*, 2005). The FiBL inputs list is prepared by the FiBL inputs list team, based on the relevant legislation and guidelines, as well as on precedent decisions by the label organizations. Each year, a draft version together with explanations on critical issues is submitted to the label organizations and the relevant authorities for comments, decisions on precedent cases and approval. Representatives of BIO SUISSE and the inputs list team meet in an event called the '*round table*' and discuss the critical issues before BIO SUISSE takes decisions. The approved version is then published by FiBL. All commercial products are evaluated on the basis of their *full composition*, and refusal to disclose the composition results in automatic rejection of the product. The criteria for evaluation are mainly based on the IFOAM Basic Standards. For fertilizers and soil conditioners, they are as follows:

- *Registration and necessity*. Fertilizers have to be registered at the federal fertilizer admission office. There is no assessment of necessity for these products, but based on the nutrient contents, the inputs list team assigns the products to different categories (see above).

- *Origin.* In general, the components of fertilizers and soil conditioners must be of natural origin. Micro-organisms and products made from soybean, maize, rape and sugar beet must be free of GMOs. There are limits on transportation distances and on maximum peat contents (see above).
- *Environment and human health.* The environmental impacts of fertilizers and soil conditioners must be as low as possible.
- *Quality, ethical and socio-economic aspects.* The use of fertilizers and soil conditioners must not affect the premium quality status of organic products. Even though they are of no toxicological concern, such residues were considered undesirable.

Hot issues

- There is a general debate on the acceptability of animal-derived fertilizers. On one hand, the recycling of these products as fertilizers is desirable. On the other hand, these products do not originate from organic farms and have a negative image. Plant-derived fertilizers (e.g. vinasse) and the use of green manures and green waste compost are discussed as alternatives. However, such products mineralize slowly (with the exception of vinasse) and therefore cannot substitute animal-derived fertilizers completely. In the case of vinasse, it will be difficult in future to exclude products originating from GMO sugar beet. This discussion was triggered by the ban of blood, bone and meat meal fertilizers, and with the registration of fertilizers based on hydrolyzed skin protein.
- There is a debate how much easily soluble N a fertilizer may contain. Chilean nitrate is not allowed, because of its high content of nitrate. Organic fertilizers based on amino acids originally derived from hydrolyzed skin protein are allowed.
- A few years ago, there was a debate about the use of peat in substrates and on substitution by materials from renewable resources. After a few years of research and experimentation by practitioners, it was concluded that peat could be substituted to variable extents, depending on the crop. This is reflected by the current BIO SUISSE limits (see above).

The decision-making process

- The FiBL inputs list is updated annually and published in January. In the preceding autumn, companies submit dossiers on novel products to the FiBL inputs list team. Applications are sorted as follows: (1) Products which are analogous to other products in the inputs list. These are included in the draft list by the inputs list team on its own authority. (2) Products which raise fundamental questions. In these cases, the inputs list team submits a short description of the fundamental question to the label organizations BIO SUISSE and Migros-Bio. Fundamental questions may relate to new compounds, to particular methods of application, or reconsideration of products which are already on the list. (3) Products which are to be rejected, because they do not comply either with legislation or with previous decisions of the label organizations. These are rejected by the inputs list team on its own authority, but applicants may ask the label organizations to reconsider the issue. Based on the above considerations, the inputs list team prepares a draft version of the inputs list.
- Representatives of BIO SUISSE and the FiBL inputs list team (and sometimes also selected experts) meet in an event called the 'round table', and discuss the critical issues.
- The relevant commissions of the label organizations take the final decisions. In reaching their decisions, they take note of the recommendations of the FiBL inputs list team and the round table. In practice,

BIO SUISSE takes precedence over Migros-Bio. The inputs list forms part of the label organizations' standards and is thus compulsory for their producers.

- The federal authorities check whether the list is in agreement with organic legislation and fertilizer registration.
- Based on the comments of the label organizations and the federal authorities, the inputs list team prepares and edits the inputs list. BIO SUISSE sends a copy of the list to each of their producers (the vast majority of all organic farmers in Switzerland).
- Because Demeter is a member organization of BIO SUISSE, its members are also bound to the FiBL inputs list. However, Demeter standards may limit the range of products which can be used (particularly in plant protection). The inputs list team does not evaluate products against separate DEMETER standards.

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Fertilizers and soil conditioners in organic farming in the United Kingdom

Francis Blake, Robert Haward¹

The development of organic food and farming in the UK 1998 to present

Since 1998 sales of organic food and drink in the UK have grown faster than any other organic market in Europe. The estimated value of organic food and drink sales increased from GBP 390 million in 1998/1999 to GBP 1.12 billion in 2003/04. This growth has been triggered by growing demand for organic food by the British public, increasingly in search of safe, healthy and traceable food. On a yearly basis between 1998 and 2001 more British households were buying more organic food more often and spending more. However in recent years (2002 and 2003) market growth has slowed as the number of UK households making purchases has levelled out. Encouraging existing organic buyers to become more committed (spend more, more regularly) has therefore been recognized as a key to future growth. To achieve greater commitment a number of key challenges face the organic sector and businesses within it, including:

- Increasing emphasis on quality, particularly taste.
- Developing awareness of the benefits of buying organic food from all categories: fruit and vegetables through to dairy
- Increasing understanding of what is and what is not organic
- Keeping organic food competitively priced, but not compromising the principles.

British farmers have responded to the demand by converting more land to organic production. The area of organically managed land in April 1998 was approximately 105 000 ha, increasing to nearly 800 000 ha by April 2003 (Anonymous, 1999; 2003). Pressure from cheaper imports has contributed to the domination of the British market by overseas products. Standards discrepancies have been identified as important factors contributing to disparities in production costs between EU Member States. In this regard, acceptance of fertilizers and pest control products and the control of their use is regarded as very important.

Fertility supply in organic systems and major fertilizer and soil conditioner inputs used

Grass and clover grow very well in the UK's maritime climate (though clover less so in the colder north), so this is generally a central part of supplying fertility on UK organic farms. Further, the Soil Association standards require that all rotations include a legume, though other standards follow the EU regulation, which is not so explicit. Referring to the specific cropping types:

- Upland conditions are less favourable for legumes, so clover is not naturally present except where the pasture has been 'improved' (though less productive legumes may be found).
- Permanent pasture will almost invariably have a high clover content unless it remains 'unimproved'.

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- Arable rotations must contain a legume (according to the Soil Association standards). This will generally be a grass clover ley, although it could also be alfalfa in the dryer east, or other legumes in the very few stockless rotations.
- In fruit growing there is no specific requirement for legumes, but the Soil Association standards expect diversity in the understorey, and this will usually include clover.
- With horticulture the requirement for a legume is usually supplied by a legume crop (peas or beans) or a legume green manure.

In general the Soil Association standards expect that more extensive arable rotations should show a balance between exploitative cropping and fertility building (grass/clover, etc.) though as production systems become more intensive, this expectation is relaxed.

Farmyard manure from the own farm produced by housed stock over winter is the main, and in many cases the only form of fertilizer or soil conditioner on the typical mixed organic farm. In more intensive and horticultural systems, such manure is likely to be brought in from neighbouring farms (conventional). Under Soil Association standards this manure must be composted, whether from extensive systems or not, and a declaration must be supplied that the stock had not been fed on GM feed. Local horse manure is a frequent source in smaller horticultural operations.

Pig and poultry manure are allowed with the definition of factory farming being the use of battery cages, broiler/deep litter poultry with stocking densities above 25kg/m², indoor tethered sow breeding units, other systems where stock are not freely allowed to turn through 360 degrees, where they are permanently in the dark, or are permanently kept without bedding.

Regarding fertilizers, these can be divided into the major nutrients:

- *Nitrogen*: little use except in horticulture; some pelleted chicken manure (not factory farmed) and some food processing waste; fish emulsion in glass houses; slaughter house waste in propagating composts.
- *Phosphorus*: rock phosphate in various forms is used fairly widely in agriculture and horticulture.
- *Potassium*: Potassium sulphate is used ('need justified' defined by the Soil Association as K index less than 2 in low clay soils); Kali vinasse is used in horticulture; rock potash is not much used.
- *Calcium*: limestone and chalk.
- *Trace elements*: liquid seaweed is used in horticulture and some agriculture; stone meals are not used so much; other specific trace elements as per 'need recognized'.

Controls on the nature and quantities of nutrient inputs from off the farm are made through evaluating submitted cropping plans and inspecting records of input purchases and use. A nutrient budget is not generally required unless problems are identified or a seemingly inappropriate nutrient request is made.

The 170 kg N/ha limit is controlled by the same process – adding up all the manurial inputs (though excluding the N supplied in fertilizers and legumes), using the appropriate nitrogen contents and dividing by the whole area of the unit (and linked units). There is an additional control in the UK standards, which sets a maximum for manurial application of 250 kg N/ha/year for any field.

'Need recognized' is implemented by the Soil Association's 'restricted' category in which products or practices require permission before use. Depending on the material concerned, permission may be given when approving the various aspects of the farm plan during the annual inspection process; others will require prior permission before use, providing justification as to need. In the case of potassium sulphate and trace elements this will be in the form of analysis demonstrating deficiency. Other standards in the UK have similar systems, though not a specific restricted category.

Prohibited in the Soil Association standards are guano and slaughterhouse waste (except in propagating compost). Other standards follow the regulation, except that there is a general UK prohibition of slaughterhouse waste being returned to land where cattle or sheep may come into contact with it.

Heavy metal limits for manures are specified only in the Soil Association standards. They are as follows (in mg/kg, on a total dry matter basis):

▪ Zinc (Zn)	1000
▪ Chromium (Cr)	1000
▪ Copper (Cu)	400
▪ Lead (Pb)	250
▪ Nickel (Ni)	100
▪ Cadmium (Cd)	10
▪ Mercury (Hg)	2

The Soil Association has two schemes for branded products, one to certify products that are the ‘outputs’ of an organic farming system and can therefore be called organic; and the other for allowed inputs (permitted or restricted) that are suitable for use in organic farming. The former is a proper certification scheme, the latter a listing system. Extractants and preservatives are considered in the certification/listing process.

Legislative/regulatory framework for organic farming and F&SC

Organic farming legislation is made under EU Regulation 2092/91 as amended, implemented through the Organic Product Regulations (2001). The competent authority is the Department of Environment, Food and Rural Affairs (Defra), with responsibility for the approval and oversight of private certification bodies and the setting of the UK organic standards. There are currently 14 approved private certification bodies in the UK of which Soil Association Certification Ltd is the largest with about a 75 % market share of all food sales (though somewhat less of farmland).

Defra is now advised by the Advisory Committee on Organic Standards (ACOS) which replaced UKROFS in the autumn of 2003. UKROFS had statutory powers, in particular setting the UKROFS standards (which could therefore be stricter than the regulation), approving the private certification bodies and providing certification in its own right. In contrast, ACOS only has an advisory function and, being still very new, it is unclear exactly how the relationship between ACOS and Defra will develop.

Regulation of F&SC is principally under Food & Environment Protection Act 1985 and the Environment Protection Act 1990, with additional more specific legislation in the Sludge (Use in Agriculture) Regulations 1989, Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991, Animal By-Products Order 1992 (as amended 1996), Control of Pollution (Special Waste) Regulations 1996, Special Waste Regulations 1996 (as amended 1996 and 1997). The Fertilizers (Mammalian Meat and Bone Meal) Regulations 1996 were brought in as a precaution against BSE and prohibit the use of mammalian meat and bone meal as or in fertilizer on agricultural land. The sale of fertilizer is regulated under The Fertilizers Regulations 1991 Statutory Instrument (1991) No. 2197 as amended by Statutory Instrument 1998 No. 2024.

Guidelines for the use of fertilizer are provided by Defra, through codes of practice and publications such as Fertilizer – Recommendations for Agriculture and Horticulture (RB209 6th edition 1994). The codes of

practice are not obligatory, but are considered as best practice and contravention of these codes may be subject to prosecution. The relevant codes are:

- Code of Practice for Agricultural Use of Sewage Sludge 1996
- Plant Health Code of Practice for Safe Disposal of Agricultural and Horticultural Waste 1998
- Code of Good Agricultural Practice for the Protection of Water 1998
- Code of Good Agricultural Practice for the Protection of Soil 1998

The use of fertilizer in nitrate vulnerable zones is governed by a set of rules which include requirements to assess the need for N fertilizer, to restrict the timing of N fertilizers and livestock manures and to keep a record of fertilizers used. The Water Resources Act (1991) gives the Environment Agency powers to step in and prosecute where there seems to be a significant pollution risk from the use of fertilizers on the land.

Hot issues and trends

Management of fertility is one of the major technical challenges facing organic producers. The difficulties associated with maintaining fertility are most marked for horticulture enterprises, particularly the intensive ones like glasshouse systems. Fertility management is less of an issue for mixed and livestock based systems. The hot issues below therefore tend to be focussed towards crop production systems. There are a number of hot issues within the UK that will have a bearing on future trends:

- *Supplementary fertility sources, particularly potassium and phosphate.* Producers are encouraged to develop an internalized system of fertility management wherever possible. However, it is recognized that the harvest of animal and crop products from the farm causes a loss of nutrients that need to be returned, if the system is to be sustainable. The best way to close this loop is being debated. Green waste compost is one alternative that fits with the principles of sustainability, but many producers are concerned at the poor quality of green composts on offer. Properly treated and clean sewage products could be another means of closing the nutrient cycle, notwithstanding its current prohibition in the regulation. In the mean time, materials such as rock phosphate, sulphate of potash and rock potash continue to be regularly used.
- *Compost vs. manure.* The majority of organic farmers and growers base their fertility management programme around a sound rotation and the input of manure. The adoption of good composting practice is a rarity. However, a handful of producers are beginning to invest heavily in active compost production with the benefits of pest and pathogen removal, disease suppression and stable nutrient provision. The production of good compost and the wider uptake of compost usage is recognized by many as being fundamental to achieving sustainable crop production. The role of the Food Standards Agency (government watchdog) and the supermarkets will also have a bearing on this issue. Both are concerned about the risk of pathogen transfer from manures to crops to humans. The requirement to compost manures before application to land for growing vegetables therefore looks set to be adopted at some stage in the future.
- *Liquid feeds.* There have been a number of requests by producers and product manufacturers to develop 'organic liquid feeds' from approved materials, e.g. fish emulsion. The 'fit' of these products and this approach with the standards is questionable. Certification bodies appear to be adopting the view that this is a non-sustainable approach in the long term and therefore liquid feeds should only be permitted for use if a problem needs to be quickly rectified.
- *The requirement for fertility/soil management plans.* The level of detail required by certification bodies from producers when they convert varies. All will require a basic management plan to demonstrate that

the producer understands the requirements of organic management. An explicit soil or fertility management plan is not required. Some certification bodies are discussing developing such a plan that may be implemented in the future.

- *Organic vs. non-organic manure.* Currently many organic producers, particularly growers, are dependent on non-organic manure as a source of fertility. It is envisaged that the regulations will gradually tighten up on the use of non-organic manure usage. This will be a major problem for many growers – particularly in the east of England, where organic livestock are scarce.
- *Development of organic glasshouse systems.* Organic glasshouse production within the UK is relatively new. The economic constraint of long season glasshouse production are immense and therefore a high return over the majority of the year is required to cover costs. How fertility is maintained within such a system has been the subject of debate in developing glasshouse standards over the last three years.
- *The extent of usage of legumes in the rotation.* The Soil Association standards require the use of legumes in a rotation to help maintain fertility and protect and improve soil structure. However, the extent of such usage is not explicitly mentioned. There has been some debate as to whether the standards should include specific requirements, for example that any one field should be planted with legumes for fertility building for a minimum of 2 years in 6.
- *Fertility management in plant raising.* On a more specific note the issue of fertility in plant raising is of concern, particularly if there is a move towards peat-free media. Plant raisers would like to move away from using animal derived feeds for transplants.
- *GM contamination.* There is concern that it will be increasingly difficult to ensure that sources of fertility brought on to the farm, like green waste compost or non organic manure, are GM free.

A general view for the future

It is perceived that fertility management will become more internalized as the use of supplementary sources of fertility is more heavily restricted. This will serve to move practice nearer to the fundamental principles of sustainability. It may also become a requirement of all organic producers to develop a rolling fertility management plan that will be monitored by their certifier. The usage of properly made compost is likely to increase, particularly in horticulture.

Decision making process

The decision making process involves a number of individuals and organizations, including:

- **Government:** following the demise of UKROFS, Defra is the competent authority and is responsible for the UK organic standards, which must now follow regulation 2092/91 (except in certain areas of live-stock husbandry).
- The new Advisory Committee on Organic Standards (ACOS) which advises Defra and is itself advised by the ACOS technical committee.
- The Organic Action Plan working group, formed in 2003 to advise Defra on the development of the UK organic action plan and now involved in monitoring its progress.
- The certification bodies, who meet with Defra/ACOS in the ACOS Forum and also meet together on their own as CBTWG (certification bodies technical working group).
- The Soil Association charity through its standards development activities.

- Organic producers, researchers and advisors – especially feeding into the Soil Association standards committees.
- The supermarkets acting to protect the requirements of the organic buying public and interacting with both Defra/ACOS and the Soil Association and their own suppliers.
- Researchers through the development of improved soil fertility management practices.

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Fertilizers and soil conditioners in organic farming in the USA

*Brian Baker*¹

Major fertilizers and soil conditioners

A national survey of over 1 000 organic farmers (Walz, 1999) showed that organic farmers follow the principle that organic farming is a management system and apply inputs to supplement cultural practices. Cover crops and compost provide the fertility and soil conditioning needs of most organic farms (Walz, 1999, summarized in Table 1). A smaller, but still significant number of farms use uncomposted manure and compost tea. Calcium in mineral form as either lime or gypsum is also applied frequently or occasionally by most organic farmers. In areas where pH is high and sulfur is low, gypsum (calcium sulfate) is commonly used. Soils that have low pH are generally treated with limestone (calcium carbonate). Animal by-products-such as fish emulsion, fishmeal, blood meal, bone meal, or meat meal are other common soil amendments. The majority of organic farmers also use kelp and mineral amendments either on occasion or frequently.

Table 1: Use and frequency of fertilization and soil conditioning inputs (in %) by USA organic farmers in 1999 (ca 1 000 to 1 100 responses per category; Source: Walz, 1999. Reprinted with permission. In descending order of frequency of use).

Input	Never (%)	Rarely or as a last resort (%)	On occasion (%)	Frequently (%)
Cover crops	7	3	18	72
Compost application	17	5	21	57
Gypsum or lime	22	10	34	34
Animal by-products (e.g. fish products, bone & blood meal, feather meal, etc.)	31	11	25	33
Kelp or seaweed	36	10	25	29
Mineral amendments (other than gypsum or lime)	27	13	34	26
Uncomposted manure applications	43	16	19	22
Compost tea applications	52	14	20	14

Existing legislative / regulatory framework

The *National Organic Program* (NOP) Rule is the regulation that governs the production, handling, and labelling of food as organic (NOP, 2003). Fertilizers and soil conditioners allowed in organic agricultural production, like all other organic production inputs, must be either non-synthetic (natural) substances, or must appear on the *National List* of allowed synthetic substances. In addition, there are a number of non-synthetic (natural) substances that appear as prohibited on the *National List*. The *National List* was

¹ Organic Materials Review Institute (OMRI), PO Box 11558, Eugene, OR 97440, USA

established and is revised by a petition process that involves review by a *Technical Advisory Panel* (TAP), recommendations from the *National Organic Standards Board* (NOSB), public comment, and publication in the official *Federal Register* before any amendment becomes official. The NOP website has complete information on the process and substances petitioned (see <http://www.ams.usda.gov/nop>).

In the United States, fertilizers are regulated on a state-by-state basis. State officials who regulate fertilizer labeling laws are organized through the Association of American Plant Food Control Officials (AAPFCO). AAPFCO's purpose is to provide a forum for North American officials charged with enforcing laws and regulations regarding the production, storage, labeling, distribution, sale, or use of fertilizers. AAPFCO publishes model legislation that has been widely adopted with modification by most states (AAPFCO, 2003).

The AAPFCO model law (AAPFCO, 2003) defines 'organic fertilizer' as: '[a] material that contains carbon and one or more elements other than hydrogen or oxygen essential for plant growth.'

AAPFCO (2003) also defines 'natural organic fertilizer' as: '[m]aterials derived from either plant or animal products containing one or more elements (other than carbon, hydrogen and oxygen) which are essential for plant growth. These materials may be subjected to biological degradation processes under normal conditions of aging, rainfall, sun-curing, air drying, composting, rotting, enzymatic, or anaerobic/aerobic bacterial action, or any combination of these. These materials shall not be mixed with synthetic materials or changed in any physical or chemical manner from their initial state except by manipulations such as drying, cooking, chopping, grinding, shredding, hydrolysis, or pelleting.'

Hot issues

The *restriction of animal manure use* remains one of the most controversial parts of the NOP Rule. The NOP Rule [CFR §205.2] defines compost in a more narrow and prescriptive way than was recommended by the NOSB (see Sligh (1997), pp. 200-201 for the NOSB's recommended definition of compost). Many composting practices that were once acceptable may no longer comply under the USDA regulation. According to the NOP Rule, organic farmers are required to have an *interval of 90 to 120 days between the application of uncomposted manure and the harvest* of any crop for human consumption sold as organic [7 CFR §205.203(c)(2)]. The minimum interval required between application of uncomposted manure and harvest of crops intended for human consumption by OFPA was 60 days [7 USC §6513(b)(2)(B)(iv)]. The NOSB recommended that the NOP Rule adopt the statutory minimum (Sligh, 1997). The NOP did not accept this recommendation, which broadly reflected the existing industry standard, establishing more stringent limits on the application of manure than existed prior to implementation.

The NOP Rule establishes a minimum initial C:N ratio, time, and temperature requirement for compost, depending on whether it is windrow or in-vessel / aerated static pile composted. Other forms of composting, such as vermicomposting, passive composting, anaerobic digestion, and compost tea are not addressed in the NOP Rule. Many growers have stated that subjecting these forms of composting to the same restrictions as manure would limit their options, particularly in regions with short growing seasons. Many growers have been put in a situation where their existing fertility management program may no longer comply, and they have either changed their practices or have been given notices of violation.

The NOSB established a Compost Task Force in response to requests from organic farmers, inspectors, and certifiers (NOSB, 2002). The NOSB has published a set of recommendations on other composting methods, such as vermicomposting, as well as methods other than composting to further reduce pathogens as guidance. The official status of these recommended guidelines are unclear at the present time.

The NOSB is also expected to review recommendations from a Task Force established specifically to address *compost tea*. Compost tea may be made many different ways and has no clear standard of identity. Because some processes for making compost teas do not appear to adequately reduce pathogen levels, particularly when a sugar source is added following the thermophilic process, compost tea is viewed by some as a food safety concern.

Labeling laws for organic fertilizers remain confusing and inconsistent for the reasons mentioned above. Both the definitions of ‘organic’ and ‘natural organic’ fertilizers allow for substances prohibited in organic production to be so labeled. Sewage sludge is one fertilizer prohibited in organic production that is often labeled as ‘organic’ and may be marketed in some states as ‘natural organic.’ Efforts are underway to be able to identify fertilizers and soil conditioners permitted for use in organic production may be labeled to make such claims. However, these efforts are opposed by the conventional fertilizer industry and by many regulators who view the word ‘organic’ as applying to organic chemistry rather than to organic farming.

Heavy metals in fertilizers have become an important issue in organic and conventional fertilizers. Many micronutrient products are made from recycled industrial wastes. Some sources are heavily contaminated with arsenic, cadmium and lead. Some mined minerals used in organic production, particularly rock phosphate, contain heavy metals. Washington State developed a set of heavy metal standards based on the Canadian Federal standards. California has heavy metal standards based on a risk assessment approach. The AAPFCO model law is in the process of being revised to include a heavy metal threshold for all fertilizers. The NOP Rule prohibits arsenic [7 CFR 205.602(b)] and lead salts [7 CFR 205.602(d)], and also prohibits contamination of crops, water, and soil with heavy metals [7 CFR 205.203(c)]. However, the NOP Rule does not establish quantitative thresholds for heavy metals.

Contamination with products of genetic engineering is also a hot issue. The NOP Rule prohibits the use of genetically modified organisms and their products by reference to them as ‘excluded methods’ [7 CFR 205.105(e)], but does not establish a threshold for contamination. Questions regarding what are defined as ‘excluded methods’ also remain. The Organic Materials Review Institute (OMRI), a private non-governmental research and education body, has developed a flow chart to help determine what is and is not the product of genetic engineering (OMRI, 2002b). To date, no standard for determining what is or is not allowed, is universally used or accepted. According to the OMRI flow chart, soil amendments that have an impact on soil organisms, such as rhizobial inoculants and crops that express the *Bacillus thuringiensis* toxin, are prohibited, while those with traits that do not have such an impact, such as soybean meal from herbicide resistant plants, are allowed.

Fortification of aquatic plant products, humic acid derivatives, and fish fertilizers, *with synthetic sources of nutrients* remains an issue. These commonly accepted natural products are stabilized or extracted by limited amounts of phosphoric acid and potassium hydroxide. Some manufacturers may use the extraction loophole to increase phosphate and potash levels above the minimum needed to achieve the desired stabilization effect. Maximum limits of potash in aquatic plant products and humic acid derivatives have not been set in the NOP Rule. The NOP has also stated in a response to one fertilizer manufacturer that phosphoric acid may be used to buffer pH in aquatic plant products (Neal, 2004).

Fish has a minimum pH that is needed to prevent spoilage, but there are no guidelines for phosphate fortification when blending fish with other buffering fertilizers. Blended fertilizers that contain these ingredients further complicate the evaluation to establish whether they are (1) extracted or stabilized, and thus allowed; or (2) fortified and thus prohibited. The NOSB is expected to face petitions from other fertilizer manufacturers who want to use synthetic sources of plant nutrients similar to aquatic plant products, fish, and humic acid derivatives.

Sodium (Chilean) nitrate continues to be used on organic farms in the USA. The NOP Rule prohibits farmers' use of sodium nitrate in crop production with the following exceptions: 'use is restricted to no more than 20 % of the crop's total nitrogen requirement; use in spirulina production is unrestricted until October 21, 2005' [7 CFR 205.602(g)]. The American Organic Standards, a set of voluntary private organic standards published by the Organic Trade Association, prohibited the use of sodium nitrate effective January 1, 2003 (OTA, 2003).

Decision making

Certifiers that are accredited by the USDA implement the NOP Rule. Producers provide to their certifiers a *farm plan* that is approved for certification and includes the materials to be used in the coming season. The farm plan serves as the contract between the producers and the certifiers in the process of certifying the operation. Many substances used must appear in the farm plan and be approved by the certifier prior to the application of that substance in order for the operation to comply.

OMRI's mission is 'to provide professional, independent, and transparent review of materials and compatible processes to produce, process, and handle organic food and fiber'. In order to assist certifiers, farmers, and suppliers to make informed decisions about what substances comply with the NOP Rule, OMRI publishes a user-friendly *Generic Materials List*. This list is alphabetical and contains substances that are not explicitly contained in the NOP Rule, e.g. allowed non-synthetic and prohibited synthetic substances.

Because entire formulations must comply the NOP Rule, it is important to determine that all ingredients in a given product are allowed. Many inputs used by organic farmers are identified by brand name and do not contain complete information on generic ingredients. Therefore, it is sometimes difficult to determine whether or not a brand name product complies simply by reading the label. OMRI publishes a *Brand Name Products List* that is used by certifiers, farmers, and others in the industry as guidance. Products are listed based on the *Generic Materials List* and compliance with the *OMRI Operating Manual*.

Farmers are also required to maintain records of all substances applied to crops and soils. Certifiers decide on whether a given farm complies based on the NOP Rule as written and any policy statements provided by the NOP. Producers have the right to appeal, and certifiers serve as the regulatory agents responsible for implementing the NOP with no right to appeal an adverse decision. The NOP is the ultimate executive authority for interpreting the NOP Rule.

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Fertilizers and soil conditioners in organic farming in third countries

*Anke Würth*¹

History, structure and trends of organic farming in third countries not listed on the 'Article 11 list'

The term '*third country not listed on the Article 11 list*' is used for countries, which are not listed on the third countries list of Regulation EC 2092/91. Imports of organic products to the European Union from such countries take place according to Article 11 (6) of Reg. EC 2092/91. The import authorization mentioned therein is granted by the competent authority in the country of import of each Member State. This import authorization is granted individually for each importer with the related producers, and is not valid for any other constellation. The authorization must be renewed annually. In the course of this import authorization, the documents used as a basis for certification are screened again by the authority.

Due to this situation, the final decision on whether an input used is in accordance with the EC 2092/91 depends on the authority in the country of import. Therefore, the decision for imports of organic products into the EU might vary from country to country, but once inside the EU, the products can be traded without any restrictions.

History

The first international inspections for private organic labels took place in the 1980s, e.g. inspections of tea in India according to 'Naturland' standards. The first certifications according to Regulation EC 2092/91 in third countries were realized in the beginning of the 1990s by IMO, and IMO was first accredited in 1992.

Today, IMO is certifying around 1000 projects (involving producers, manufacturers and international traders) in more than 60 countries all over the world. The number of organic projects in third countries is steadily growing due to the increasing demand in Europe (e.g. for organic coffee and tea, but also fresh products like apples from Chile in the winter months).

Structure and trends

Most of the crops cultivated organically are perennial crops like coffee, tea and fruit trees.

The character of organic production in third countries depends on the country: in many typical *Latin-American*, coffee producing countries, there are smallholder organizations. In Chile, however, well organized, export-oriented contract production might be found. In *Africa*, there can be smallholder organizations organized by big exporters, or big estates managed by one company. In some cases, the structures are supported by overseas aid organizations.

Organic agriculture in third countries is concentrated on the production of *plant products*, while organic products from *animal origin* is rarely found.

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Many organic products from smallholders are at the same time *fair trade products* as well (e.g. coffee from cooperatives). Besides typical colonial goods like coffee, sugar, tea, rice, honey etc., value-added products (i.e. processed foods, mainly wine) are also increasingly being exported. In some countries, local organic markets are emerging.

The main technical challenges for organic production in third countries are posed by the very limited level of training or experience in organic farming practices – often the term ‘organic’ is equal to ‘organic by neglect’. Production often takes place in poor natural conditions, such as acid soils lacking in micro-nutrients, red acid tropical soils which cause problems in P-nutrition and a general shortage of nitrogen. This situation is even more difficult because of the limited availability of adequate and affordable inputs. Often no livestock is present on the farm, so that the fertility cannot be improved with manure from the farm.

Support

Financial support for organic agriculture in third countries is mainly given by overseas aid organizations or the exporter. In some cases, financial support may also come from the importers of the respective products.

Inspection and certification

For inspection and certification in third countries, basically all certifiers are recognized if they are accredited according to EN 45011 or by IFOAM. IMO, for example, has local offices, representatives, and local partners all over the world, and inspections are carried out by local staff if possible. All partners work according to the quality standards set by IMO Switzerland and are supervised by IMO Switzerland. Evaluation and certification is done by IMO Switzerland.

Fertility supply in organic systems, major fertilizers, soil conditioners and pesticides

The fertilizers and soil conditioners used vary from country to country and from crop to crop. To mention two extremes which can be found: (1) In *coffee plantations*, the major input for fertilization used is the ‘pulpa de café’, compost made from the skin of the harvested coffee cherries. This fermented pulp is composted, sometimes together with other materials, and then applied as a fertilizer on the coffee plots. (2) In Chile e.g. in *apple production*, you have a completely different situation: often the plantations are managed according to a specially developed fertilization plan which includes the use of fertilizers from *foliar sprays* to *calcium chloride* applications in order to satisfy the high standards of external fruit quality required on the European markets.

In summary, it can be said that soil fertility is maintained by the use of organic fertilizers such as *compost* made from plants or manure, mostly bought from outside the farm. In some instances, projects have begun to improve soil fertility by intercropping in perennial crops, and the use of *legumes* in crop systems with annual plants is very common.

The use of *mineral potassium* fertilizers, *rock phosphate* and *micronutrient fertilizers* can also be observed, depending on the intensity of production.

In order to decide on the use of off-farm manure, the term “*manure from factory farming*” is defined in a specially developed IMO policy. Among other criteria, this defines the use of antibiotics, the animal husbandry system and the fodder.

The same situation can be found for *pesticides*: Depending on the crop and the country, the pesticides used vary. But the most commonly used pesticides are *home made plant extracts* (although there is no reference to these in EC 2092/91). These are followed by *copper* products, *sulphur* and *neem* based products. It can be said that throughout the world the use of *micro-organisms* is practised. *Mineral oils* are used to control insects, mostly in fruit plantations.

The restriction '*need recognized by inspection body or authority*' is handled by IMO as follows: for all compounds with this restriction, the producer has to hand in a written request to IMO. Otherwise, for all other products where this restriction does not apply, IMO also requests its clients to hand in a written request. This due to the fact that there is no generally valid list of commercial products, and products are hard to assess for use in organic agriculture. The producer then obtains a written answer as to whether the product can be used or not. The use of every product is registered for each producer in a database; an overview can be gained and the intensity of production can be evaluated.

Besides this assessment of an input following a written request, IMO (among other certifiers) also offers *input certification* to the manufactures of inputs. This input certification is based on an inspection and certification scheme analogous to the inspection and certification of organic food products. One inspection takes place per year, documents are filed and if necessary, analyses are made. This certification is then valid for one year and is normally recognized by the other big certifiers operating in third countries.

Regulatory framework

Organic agriculture in the third country sector (countries which are not on the Article 11 list) is regulated through EU Regulation 2092/91, which lists only active ingredients. In addition, private standards and national lists (e.g. the FiBL inputs list) are taken as a basis in order to better assess and evaluate inputs. National lists from countries which have just begun to create their own regulations can sometimes cause problems due to the fact that these lists are often not adapted to the changes from the amendments of the Regulation EC 2092/91.

The decision about whether an input used is in accordance with Regulation EC 2092/91 is taken by the control body which certifies the producer. There is no certainty that this decision will be accepted by the authority of import.

Hot issues

Due to the fact that the decision upon the use of an input is taken decentrally by the producer's control body, the different evaluation systems and requirements of the private control bodies on the international market create unnecessary competition, with negative effects on the organic sector (i.e. producers may select the certifier which is most likely to accept all the inputs they want to use).

- Different interpretations of the import authorities in different countries may create confusion and disadvantages among producers and consumers.
- The absence of standardized procedures for the evaluation of inputs causes a lot of work and uncertainty for the certifiers and their clients.
- For smaller input manufacturers in countries with few organic operators only, input certification is often not economically viable. Do only big players stand to gain?
- Some manufacturers are reluctant to disclose information, because there are relatively few organic clients.

- The certification bodies cannot contact any specially responsible authority, as the organic products they certify are imported into many different countries with many different interpretations of Annex II.
- There is no general acceptance of inputs which are allowed in recognized third countries (listed in Article 11). The products allowed for the use in organic agriculture in Switzerland (which is a recognized third country) cannot automatically be used in third countries not listed in the Article 11 list, e.g. Turkey.

Decision-making

Fertilizers, soil conditioners and pesticides have to be evaluated by the producer's control body. These bodies base their decision on Annex II and the inputs list of private standards, and also refer to broadly recognized lists established by mandated institutions, such as the FiBL list. But there is always the risk that these decisions on whether an input can be used might be overridden by the importing authority, and that the import of a product could be refused. Additionally, it might happen that the import authority in one Member State does not accept the import of an organic product from a third country not listed on the Article 11 list because of the use of a certain input, whereas another Member State gives an import authorization for the product. This shows the difficulty of decision-making on the inputs used in third countries. There is no one hundred percent guarantee for the producer and the control bodies, that the decision upon an input will be accepted by the authority of import. Also, the decisions between the control bodies vary, which might cause unnecessary competition.

About the 'ORGANIC INPUTS EVALUATION' project

The 'ORGANIC INPUTS EVALUATION' project is an EU Concerted Action project carried out under the Quality of Life Work Programme, 5th Framework Programme. It is funded by the Commission of the European Communities (QLK5-CT-2002-02565; full title: Harmonised and Standardised procedures for evaluation of plant protection products, fertilizers and soil conditioners for use in organic agriculture) and co-funded by the Swiss Federal Office for Education and Science (BBW 02.0113). The project lasts from January 2003 until December 2005.

The objective of this Concerted Action project is to develop recommendations for harmonized and standardized procedures for the evaluation of plant protection products, as well as for fertilizers and soil conditioners authorized for use in organic agriculture according to Council Regulation 2092/91. The project proceeds in three phases:

- Inventories of current evaluation procedures in the participating countries (separately for plant protection products and fertilizers and soil conditioners).
- Elaboration of standardized evaluation procedures.
- Recommendations for evaluation procedures and identification of research needs.

The following institutions are participating in this project:

- Danish Agricultural Research Centre for Organic Farming (DARCOF), Denmark
- Research Institute of Organic Agriculture (FiBL), Switzerland
- EcoS Consultancy, United Kingdom
- Istituto Sperimentale per le Nutrizione delle Piante, Italy
- Associazione Italiana per l'Agricoltura Biologica, Italy
- Louis Bolk Instituut, The Netherlands
- Soil Association, United Kingdom
- Ludwig Boltzmann Institut for Biological Agriculture, Austria
- Austria Bio Garantie / InfoXgen, Austria
- Associação Portuguesa de Agricultura Biologica, Portugal
- Universität Gesamthochschule Kassel, Germany
- Danish Plant Directorate, Denmark

For more information on this project, please visit the project website www.organicinputs.org

FiBL publications in English

Current Evaluation Procedures for Plant Protection Products Used in Organic Agriculture. Proceedings of a workshop held September 25 - 26, 2003 in Frick, Switzerland

Edited by Bernhard Speiser and Otto Schmid. Research Institute of Organic Agriculture FiBL, Frick, Switzerland 2004, 101 Pages, ISBN 3-906081-55-9. 22 CHF. Order no. 1341.

The articles in this volume describe the evaluation procedures for plant protection products used in organic agriculture. They summarize the situation in various (mainly European) countries and the evaluation procedures and criteria for international institutions. This volume of proceedings was produced as part of the European Project 'Organic Inputs Evaluation'. Project information is available at www.organicinputs.org.

Development of a European Information System for Organic Markets - Improving the Scope and Quality of Statistical Data. Proceedings of the 1st EISfOM European Seminar held in Berlin, Germany, 26-27 April, 2004

Edited by Guido Recke, Helga Willer, Nicolas Lampkin and Alison Vaughan. FiBL, Frick, Switzerland, 2004, 254 Pages, ISBN 3-906081-53-2. 30 CHF . Order no. 1339.

The proceedings of the first European Conference about data collection in organic farming include more than 50 papers, covering various aspects of organic farming statistics (farm structures and production; farm incomes and prices; the supply chain and trade; retailers and consumers: supply balances and policy evaluation). The conference was organised by the project 'European Information System for Organic Markets' (www.eisfom.org).

Assessment of the Socio-Economic Impact of Late Blight and State of the Art Management in European Organic Potato production Systems

By L. Tamm, A.B. Smit, M. Hospers, S.R.M. Janssens, J.S. Buurma, J.P. Mølgaard, P.E. Lærke, H.H. Hansen, L. Bødker, C. Bertrand, J. Lambion, M.R. Finckh, C. Schüller, E. Lammerts van Bueren, T. Ruissen, S. Solberg, B. Speiser, M. Wolfe, S. Phillips, S.J. Wilcoxon and C. & Leifert. Research Institute of Organic Agriculture FiBL, Frick, Switzerland, 2004, 106 Pages, ISBN 3-906081-54-0. 22 CHF , Order no. 1340.

In Europe, late blight, caused by *Phytophthora infestans*, is the most devastating disease affecting organic (and conventional) potato production. The extent of economic damage varies between European regions. Copper has been the single most important control agent in organic late blight control. Therefore, the reduction or an eventual phasing out of copper use will have varying impacts in different regions. This report presents the results of a detailed survey conducted in seven European countries as part of the European funded project 'Blight-MOP'.

Underlying Principles in Organic and "Low-Input Food" Processing – Literature Survey

Edited by Otto Schmid, Alexander Beck and Ursula Kretzschmar. Research Institute of Organic Agriculture FiBL, Frick, Switzerland, 2004, 118 Pages, ISBN 3-906081-58-3. Available as PDF file. Order no. 1350.

This literature review about processing of organic and low-input food describes the underlying principles, the regulatory framework, problem areas as well as consumer expectations and concepts of food processing companies. The study was conducted within the EU funded Integrated Project 'Quality Low Input Food' ([www.qlif.org](http://www qlif.org)).

A Guide to Successful Organic Marketing Initiatives

By Otto Schmid, Ulrich Hamm, Toralf Richter and Andrea Dahlke. FiBL, Frick, OMIaRD Publication, Volume 6, 2004, 210 Pages, ISBN 0-9543279-5-5. 30.00 CHF Order no. 1338.

The handbook provides information based on the business and marketing ideas developed in the EU research project Organic Marketing Initiatives and Rural Development (OMIaRD), including useful advice on the market and policy issues to take into account. Further publications from the OMIaRD-project can be ordered via the OMIaRD-Homepage at www.irs.aber.ac.uk/omiard.

The World of Organic Agriculture - Statistics and Emerging Trends 2005

By Helga Willer and Minou Yuseffi, IFOAM and FiBL, 2005, 188 Pages, ISBN 3-906081-64-8. 24.00 CHF . Order no 1365.

This global study about organic farming represents an impressive collection of figures and illustrations. The study also features a chapter on the market situation and emerging trends for several continents.

All books listed above as well as further FiBL publications may be ordered via the FiBL shop at shop.fibl.org or directly from the Research Institute of Organic Agriculture FiBL, Ackerstrasse, CH-5070 Frick, Tel. +41 62 8657 272, Fax +41 62 8657 273, E-mail info.suisse@fibl.org; Internet www.fibl.org. Some of the publications can be downloaded free of charge via the Organic Eprints archive at www.orgprints.org.



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Chris Koopmans is head of the Soil & Plant Department at the Louis Bolk Institute. This private research institute in the Netherlands focuses on organic and sustainable farming, healthcare & nutrition. He leads many national funded research projects on organic and sustainable farming. He is member of the advisory group of Biologica, the platform organization for organic farming and marketing. He worked as a researcher at Michael Fields Agricultural Institute, (US) and University of Amsterdam (NL).



Alfred Berner is a senior researcher in soil science at the Research Institute of Organic Agriculture (FiBL) in Switzerland. He has twenty years of experience in composting and organic fertilization. He evaluates fertilizers and soil conditioners for the Swiss inputs list since 2001.



Erik Steen Kristensen has been the leader of the Danish Research Centre for Organic Farming (DARCOF), since it was initiated in 1996. Currently, DARCOF co-ordinates about 150 research scientists working at 20 different institutes in 44 different research projects. In the period 1982-2003, Erik Steen Kristensen has published approx. 130 titles, of which 100 are published in scientific journals and 70 are published internationally. He participated in approx. 35 international congresses, more than half of these with invited contributions.



Francis Blake has over 25 years experience in the organic farming sector. He established an organic farm in 1976 and managed it for 10 years, before co-founding the UK Organic Advisory Service in 1986. From 1988 he was Certification Director of Soil Association Certification Ltd. (now the largest certifier of organic products in the UK), before becoming the Standards and Technical Director for the Soil Association in 1999. He is heavily involved in the development and promotion of international standards for organic agriculture and he is the President of the IFOAM EU Regional Group.



Alexandra Maurer da Costa has been working for the technical department of AGRO-BIO since 1999, as a technical consultant and editor of two bulletins ('A Joaninha' and 'Infobio'). She is responsible for the coordination of technical information and updating of input lists, and she is the Portuguese delegate in the IFOAM EU Regional Group.



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Marie-Christine Monnier is a senior agronomist, initially specialized in soil and farming systems. She is experienced in research and development, project management and organic farming standards/ regulatory improvement. She is involved in the organic sector at French national level, and has been a member of the IFOAM EU group since 2000.



Stefano Canali is a soil scientist at the Consiglio per la Ricerca e la Sperimentazione in Agricoltura - Istituto Sperimentale per la Nutrizione delle Piante of Rome. His researches deal with fertility and quality evaluation and enhancement of organically managed soils. As technical expert for soil fertility issues of the Italian delegation, he participates at meetings in the working groups on organic farming under the EU Commission, DG Agriculture. He has been coordinating the official Italian list of F&S for organic farming since 1999 and has been member of the group of stakeholders for organic soil fertility management under the Ministry of Agriculture since 1997.



Otto Schmid is a senior researcher in socio-economics, marketing and agricultural policies at the Research Institute of Organic Agriculture (FiBL) in Switzerland. He was head of the FiBL organic advisory service from 1977 to 1990. Since 1998, he has been a lecturer in organic farming systems and agro-marketing at ETH Zürich. He is strongly involved in international input evaluation and standards development, as a member of the IFOAM Standards Committee (from 1977 to 2002), as head of the IFOAM delegation in Codex Alimentarius (since 1991) and as a member of the IFOAM EU Group (since 1999).



Rasmus Ørnberg Eriksen works at the Danish Plant Directorate within the Danish Ministry of Foods, Agriculture and Fisheries. He is the head of the group administering plant-related issues in organic farming in Denmark (since 2000). As technical expert of the Danish delegation, he participates at meetings in the working groups on organic farming under the EU Commission, DG Agriculture. He participated throughout the negotiation and development of common EU legislation on databases for organic seed, and is responsible for the Danish database. He has been involved in organic farming since his childhood and has experience of working both in organic farming and in greenhouse production. In 1999 he graduated as a Master of Science, Horticulture from The Royal Veterinary and Agricultural University (KVL).



Anamarija Slabe is co-founder and Technical Director of the Institute for Sustainable Development in Slovenia, a private institute for organic farming and sustainable rural development. She prepared the first private standards for organic farming in Slovenia and has been coordinating their further development.



Victor González has been involved in several organic farming organizations in Spain since 1979. He also worked as an extension agent at the Ministry of Agriculture and as an advisor for organic farming in several regions. For 12 years, he worked as an advisor for sustainable and organic agriculture in Nicaragua and Central America, using horizontal dissemination methodologies for technology. Since 2000, he has been the Technical Coordinator of the Spanish Society for Organic Farming (SEAE), and he is also advisor for the organic farmers section of the general farmers' organization (La Unión-Coag), dealing with organic standards. He represents the Spanish members in the IFOAM EU group, dealing with organic standards and policy work.



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Christopher Stopes is a freelance research, technical and market development consultant in organic agriculture, food and agricultural policy ('EcoS Consultancy'). He has been involved in the development of organic standards in the UK since 1987, and has specific expertise in regulatory issues relating to pesticides and other inputs. He has been a board member and Chair of the Certification Committee of the UK organic competent authority (UKROFS, now ACOS). He is currently a member of the UK pesticide regulatory body - Advisory Committee on Pesticides and was Head of Research at Elm Farm Research Centre from 1985 to 1997.



Rob Haward was the Horticultural Development Manager for the Soil Association, and specialized in horticultural sector development, market research across the organic sector and producer support. He facilitated and chaired a range of standards development committees and was involved in several UK MAFF (Ministry of Agriculture, Forestry and Fisheries) research and development projects covering organic horticultural best practice. He recently left the Soil Association to pursue other challenges within the organic sector.



Peter von Fragstein is a senior researcher in nutrient management and crop design at the Department of Organic Farming & Cropping Systems of the University of Kassel. He was a member of the first evaluation group of the AGÖL in the early 1980s. In 2002/2003, he participated in a project sponsored by the German government for the Development of assessment criteria for the evaluation of external inputs in organic crop husbandry.



Alexandra Hozzank specialized in organic pest management. She has been the coordinator of the Austrian inputs list for three years, and of the database infoXgen.com, which lists allowed inputs.



Anke Würth works in the field of international organic inspection and certification at the Swiss head office of the control body Institute for Marketecology (IMO) since 2000. She is the technical manager for the field of off-farm inputs in third countries.

Organic farming is characterized by a strict regulation of plant protection products, fertilizers and soil conditioners, which precludes the use of the vast majority of all available compounds. The European Regulation 2092/91 defines which substances are allowed in organic farming. Nevertheless, the range of products allowed varies greatly between countries.

The articles in this volume describe the evaluation procedures for fertilizers and soil conditioners used in organic agriculture. They summarize the situation in various (mainly European) countries. The collection is not exhaustive, but it gives a picture of the areas where the regulations are similar across countries, and where there are major differences. It also shows the extent to which organic regulations/standards and (non-organic) legislation on usage of fertilizers and soil conditioners are responsible for national differences.

The articles are based on presentations made at the workshop 'Inventory of existing procedures for evaluation of fertilizers and soil conditioners used in organic agriculture', held April 29 – 30, 2004 at Emerson College, Great Britain. The workshop was part of the EU Concerted Action project 'ORGANIC INPUTS EVALUATION', carried out under the Quality of Life Work Programme, 5th Framework Programme.