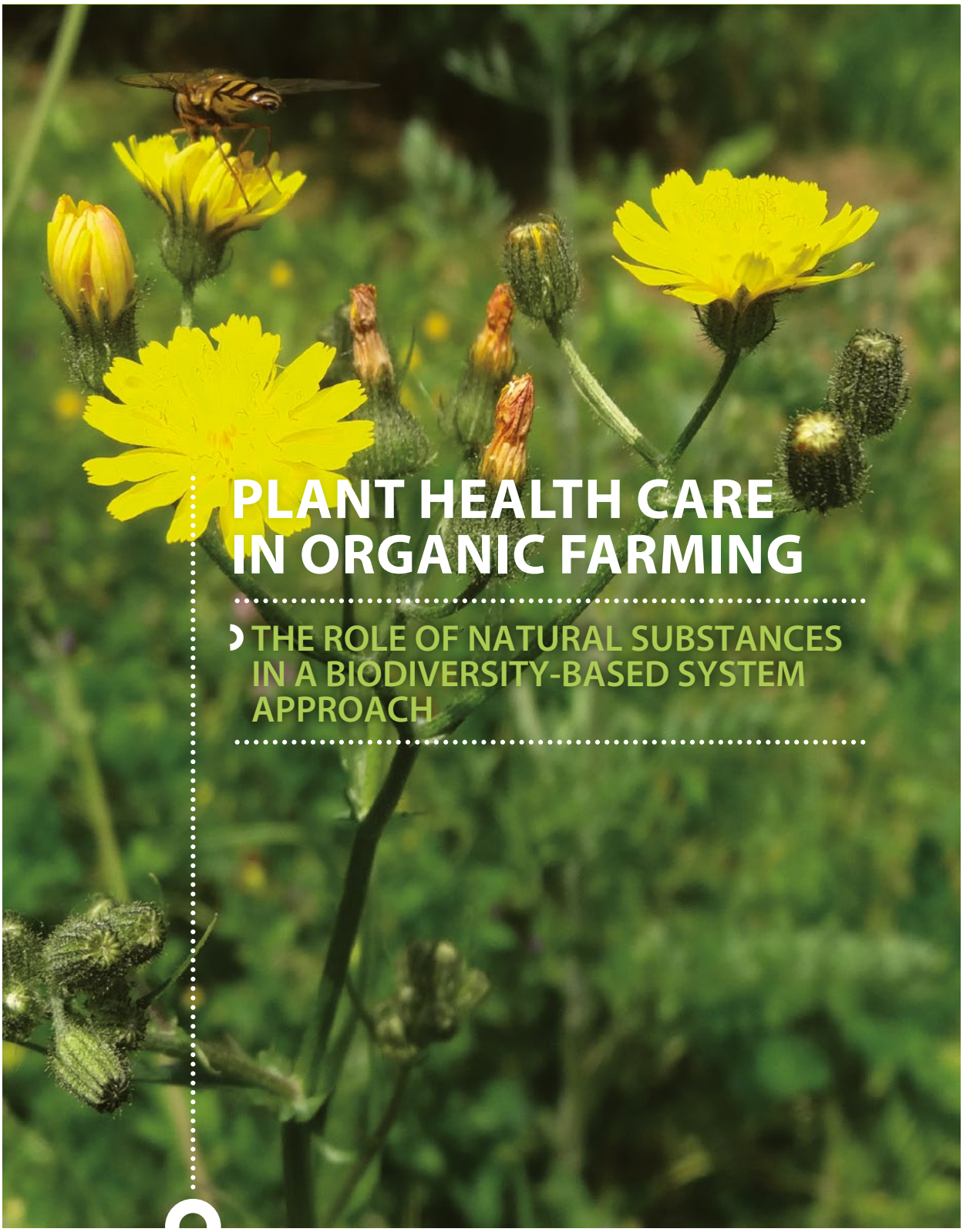

PLANT HEALTH CARE IN ORGANIC FARMING

THE ROLE OF NATURAL SUBSTANCES IN A BIODIVERSITY-BASED SYSTEM APPROACH

IFOAM
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MAIN MESSAGES

From field to farm and at landscape level, a healthy agroecosystem with a high degree of biodiversity is essential for a successful plant health care strategy.

Conversion to organic farming entails a transformation of the entire agroecosystem and a minimisation of external inputs, it is not only a substitution of inputs to a less harmful plant health care regime.

More than 90% of organic farmland does not need treatment with plant protection products; plant protection products based on natural substances are a small but essential element, mainly for organic speciality crops such as fruit, vine, vegetables and potatoes.

Protecting and increasing biodiversity must be a priority in public policies to preserve the foundation of the organic approach to plant health and enable its widespread adoption.

To increase the availability of plant protection products suitable for organic farming, it is essential to establish specific EU evaluation and authorisation procedures for natural substances.

An increased number of experts on natural substances and the organic approach to plant health is needed to speed up the authorisation process while ensuring a rigorous assessment of natural substances for safety and compliance with organic principles.

Public funding is essential to generate data needed for the registration process of natural substances of public interest, which have a low return on investment.

To reach the 25% EU target for organic land by 2030, it is also essential to increase research and innovation budgets dedicated to organic approaches to plant health care.

PLANT HEALTH CARE IN ORGANIC FARMING – THE ROLE OF NATURAL SUBSTANCES IN A BIODIVERSITY-BASED SYSTEM APPROACH
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INTRODUCTION

One of organic agriculture's defining traits is its approach towards plant health care, relying mainly on preventive and indirect measures within the agroecosystem. As a last resort, organic farmers can combine these with direct measures, if these are based on the use of natural substances. **The principles of organic agriculture seek to prevent the introduction of new and alien substances into ecosystems. So, the use of synthetic pesticides[1] is prohibited.**

More and more European citizens are concerned over synthetic pesticides use. The European Commission's Farm to Fork and Biodiversity strategies call for a substantial reduction of chemical plant protection products as a priority to reach sustainable food systems. Organic farming's unique approach to plant protection has rightly been identified as essential to reach the Farm to Fork strategy's target of a 50% reduction in chemical pesticide use. Both strategies also set up a goal to reach 25% of agricultural land under organic farming by 2030.

A successful reduction of synthetic pesticide use needs to be well-prepared. Alternative approaches like organic agriculture can only lead the way to a truly sustainable agrifood system if the entire political framework enables their development. In specific, policy measures should be coherent and complementary to contribute to the objectives.

Healthy agroecosystems with a rich biodiversity are resilient and self-regulating to a large degree, making them a prerequisite for a successful plant health care strategy in organic farming. This is why the protection and increase of biodiversity must be the foundation for new approaches in plant health care. Improving the availability of natural substances should complete the system.

A social and ecological transformation of our food system can be successful if farmers have alternative tools and strategies well-adapted to their economic, social and environmental realities.

THE LONG-TERM EFFECT OF AN ORGANIC FARMING SYSTEM: STAGGERING DECREASE IN EXTERNAL INPUTS

A 21-year Swiss system comparison[2] trial found that yields in the organic systems are on average 20% lower than in the conventional systems. However, in organic systems input of fertiliser and energy was reduced by 34-53% and pesticide input by 97%. Organic plots had a more fertile soil and higher biodiversity, likely making these systems less dependent on external inputs.

[1] Synthetic pesticides are plant protection products containing active substances, which cannot be found in nature, but which were created through human endeavour and are newly introduced into ecosystems.

[2] Mäder et al. (2002): Soil Fertility and Biodiversity in Organic Farming. Science 296, 1694 (2002).

ORGANIC FARMING PRINCIPLES FOR PLANT HEALTH CARE

The dynamic development of the organic sector all over Europe was possible because of a smart combination of tradition, innovation and science. The organic principles of health, ecology, fairness and care are its basis.

The Principle of Health

aims at sustaining and enhancing the health of soil, plant, animal, human and planet as one and indivisible. Plant health is based on preventive and indirect management measures and plant nutrition from feeding the soil and enhancing soil quality rather than the plant directly. Healthy agroecosystems enable farms to depend as little as possible on external inputs.

The Principle of Ecology

expresses that organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. Plant health relies on the effective management of ecological processes, adapted to local conditions, ecology, culture and scale. Inputs should be reduced by prioritising reuse and recycling.

The Principle of Fairness

builds on relationships ensuring fairness to the environment and life opportunities. This includes socio-economic conditions where fair prices allow farmers to use environmentally friendly methods. The principle of fairness also implies that developing, producing and using natural inputs should be enabled from an economic and regulatory point of view, as well as through adequate research capacities and funding.

The Principle of Care

lays down that organic agriculture should enhance productivity and efficiency in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment. Plant health care can build on farmers' long experience in natural pest management. When it comes to science, organic agriculture should prevent significant risks by only adopting appropriate technologies and rejecting unpredictable ones.

PLANT HEALTH CARE IN ORGANIC AGRICULTURE: CHANGE THE SYSTEM - NOT ONLY THE PRODUCTS

Organic agriculture aims at creating favourable conditions with healthy plants in a healthy agroecosystem. Ensuring an efficient plant health care strategy relies on combining and implementing three parallel sets of measures:

- **Biodiversity:** Ecological self-regulation,
- **Management measures:** Preventive approach,
- **Direct measures:** External inputs as natural substances or energy.

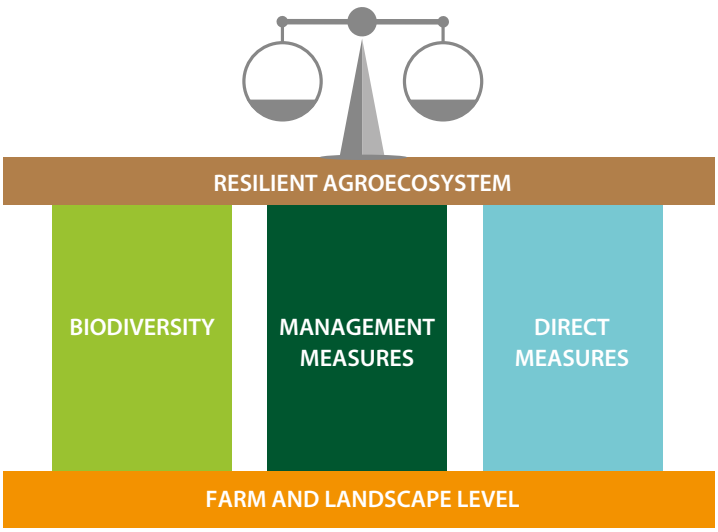
Organic farming prohibits using synthetic pesticides. Living ecosystems are the basis of agriculture, and interactions between the farm and its environment underlie the strategy.

The full use of the preventive potential of management measures and systematic use of agrobiodiversity are at the heart of the organic approach to plant health. This approach provides enough crop protection in arable and grassland farming – representing more than 90% of all organic agricultural land – to completely avoid the use of natural inputs.

In crops like wine, fruit, potatoes and some vegetables, organic farmers can use biocontrol and natural substances if diseases and/or pests occur at unsustainable levels. Since they are part of a combination strategy with other measures, natural substances used as an input are not and do not need to be "highly efficient".

Only the intelligent combination of these aspects makes up an efficient and resilient strategy for plant health care.

THE FOUR COMPONENTS OF A RESILIENT PLANT PRODUCTION SYSTEM



FARM AND LANDSCAPE LEVEL: LAND SHARING, NOT LAND SPARING

An agricultural field is part of a broader landscape with which it interacts. Organic farmers' approach to plant health looks beyond their own fields, as pests do not stop at the farm gate. Organic production is more difficult in a homogenous landscape (monocultures) as the many pests targeting crops will establish long-lasting populations in the ecosystem. Heterogenous landscapes offer greater potential for biological control of plant pests and diseases as they offer safe havens for beneficial organisms beyond the productive area. To support the ecosystem's natural interactions, it is essential that agricultural practices, like an intensified pesticide regime, do not affect landscape biodiversity.

By preserving semi-natural habitats and enhancing biodiversity within the production area, organic agriculture creates multiple source areas of biodiversity contributing to the beneficial heterogeneity of landscapes.

Perennial wildflower strip

BIODIVERSITY: WORKING WITH NATURE

Enhancing biological diversity in organic farm landscapes provides a wide range of ecosystem services important for plant health care, such as pest control and nutrient cycling. Faunal and floral diversity plays a crucial role in making habitats unsuitable for high infestations of pests and diseases by limiting access to resources and increasing competition, parasitism and predation.

Combining temporal and spatial diversification in organic fields ensures an effective plant health strategy. For instance, a diversified crop rotation (temporal diversification) breaks pests' life cycles by removing host plants and provides nitrogen to the soil thanks to legumes. Intercropping (spatial diversification) provides better weed control by increasing competition for natural resources. Conserving and improving natural landscape features, such as flowering strips or hedgerows, complete the strategy by offering a refuge for beneficial insects.

Finally, **genetic diversity** is of paramount importance in the organic approach to plant health. Organic producers seek to use appropriate, resilient and nutrient-efficient species and varieties, adapted to local conditions. As it is the basis for the natural resistance of plants to pests and diseases, organic plant breeding is key to provide organic farmers with the varieties they need.

Tall fescue in between rows of hops as a habitat for predatory mites

MANAGEMENT MEASURES: CUTTING, COVERING AND OTHER PREVENTION

Organic farmers deploy a wide range of management measures to prevent pests and diseases on their field. Protective measures may include netting and coverage to keep insects away from the crops, mostly used for vegetable crops and orchards. In permanent crops, cutting and pruning aid pest control by removing infested parts and exposing the plant to sunlight and dry air – both fungicidal and bactericidal factors. Organic farmers might prevent weed control by ploughing, soil solarisation, mowing and an adapted tillage regime. They increase soil fertility by using green manure, legumes and, in mixed farming systems, a balanced use of farm manure.

Broccoli under netting

DIRECT PLANT PROTECTION MEASURES

Direct plant protection measures in organic production can be mechanical/thermal weed control and/or **natural inputs**. Organic farmers chiefly use insecticides and fungicides as plant protection products. Herbicides are generally not allowed (see example 1). When organic farmers use external inputs as fertiliser, these are materials of microbial, plant or animal origin.

Think about livestock manure and/or organic residues from cities and food industries.

A system approach in risk prevention is key to using inputs in organic's plant health care strategy. Organic agriculture aims to be as little dependent on external inputs as possible, by prioritising indirect and preventive measures (see example 2). When necessary, external inputs like plant protection products and fertilisers complement the above-mentioned measures. But only if they are **"natural or naturally-derived substances"** according to EU Organic Regulation (EC) No 834/2007.

Organic farmers' self-limitation of only using substances that already exist in nature is an active measure of precaution. This way, organic agriculture rejects the unpredictable risks coming from releasing artificially designed molecules into the environment. But this does not mean natural substances present no foreseeable risks. An appropriate registration process to estimate these risks is indispensable. It could also help to better consider the "multifunctionality" of several natural substances that provide more than one plant health care service, for example plant protection and fertilisation.

Dispenser for onion oil to repel the carrot fly

VARIOUS CATEGORIES OF NATURAL SUBSTANCES EXIST:

- **Substances derived from plant or animal origin, like plant oil and Neem extract**
- **Mineral compounds, like rock powder, sulphur and copper**
- **Micro-organisms such as bacteria, fungi and viruses**
- **Semiochemicals such as pheromones produced by individuals of a species modifying the behaviour of other individuals of the same species**

EXAMPLE 1
WEED CONTROL: AN INTEGRATED APPROACH PREVENTING HERBICIDE USE

Mechanical weeding in Kohlrabi

Herbicides are generally not allowed in organic farming systems. To replace them, farmers apply a set of different measures, as tillage alone is usually not enough if a weed problem occurs. Organic farmers establish preventative crop rotation, use green manure and cover soils to reduce the pressure of weed infestation. Choosing fast-growing varieties with leaves overshadowing the soil can help suppress weeds. The farmer mechanically removes whatever weeds still appear. This combination of indirect and direct methods leads to an environmentally and economically viable outcome.

EXAMPLE 2
COPPER MINIMISATION: STRATEGICALLY REDUCING COPPER USE

Plant protection products containing copper are especially important in organic wine, fruit, hops, potato, vegetables and ornamental plant production. Still, organic agriculture is a perpetual research process to reduce copper use, as it remains an external input. The strategy to minimise copper use in organic farming has two main aims. First, a precautionary risk minimisation for copper and other external inputs. Second, the reduction of dependence on copper and other external inputs, and the adaptation of plant health care strategies to better align with the organic farming principles.

Through this strategy, organic farmers and growers seek to increase their production system's resilience. They look for more than an alternative product, by combining different measures: choosing appropriate varieties, optimising management measures, using alternative product with lower risk and application rate.[3]

Grapes

[3] Read more in IFOAM Organics Europe's copper minimisation paper 'Strategy for the minimisation of copper in organic farming in Europe' (May 2018) on https://www.organicseurope.bio/content/uploads/2020/10/ifoam_eu_copper_minimisation_in_organic_farming_may2018_0.pdf?dd

CURRENT LEGAL AND ECONOMIC SITUATION FOR NATURAL SUBSTANCES IN PLANT PROTECTION

LEGAL BACKGROUND FOR REGISTERING NATURAL SUBSTANCES

EU legislation defines the principles and practices of EU organic agriculture. Every certified organic farmer needs to follow them or risk losing their organic certification. To ensure these rules are followed, control bodies or authorities (supervised by national authorities) inspect every organic farmer at least once a year.

EU LEGISLATIVE PROCESS FOR AUTHORISING THE USE OF INPUTS IN ORGANIC AGRICULTURE

The EU Organic Regulation (EC) 834/2007, Art. 4[4] limits inputs in organic agriculture to 'natural or naturally derived substances'. For substances to be authorised, they have to follow two sets of regulations:

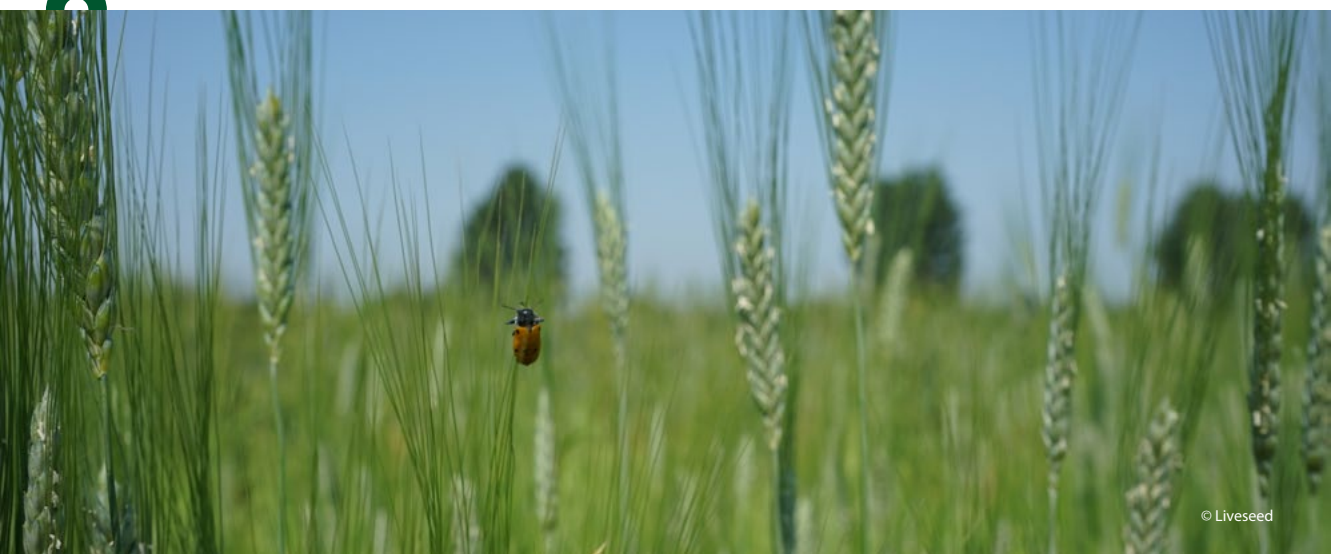
1) First, the input needs to be registered in the corresponding horizontal legislation:
   a. Regulation (EC) 1107/2009 for plant protection products;
   b. Regulation (EC) 2003/2003[5] for fertilisers, except for soil conditioners, organic fertilisers, or secondary raw material;

2) After, it has to be added to the annexes of the Regulation for organic production (EC) 889/2008 listing the products and substances authorised in organic production.

Increasing the availability of natural substances in line with organic's approach to plant health remains essential for a smooth transition to organic farming systems. But the approval process hampers this development for several reasons.

[4] The new Organic Regulation (EC) 2018/848 repealing Regulation (EC) 834/2007 will apply from 1 January 2022. Natural inputs will continue to follow the same registration process to be allowed in organic agriculture.

[5] New Fertilisers Regulation (EC) 2019/1009 repealing Regulation (EC) 2003/2003 will apply from 16 July 2022. It will cover more fertilising products, including materials that are traditionally used in organic agriculture.



LIMITED CONSIDERATION OF THE SPECIFIC CHARACTERISTICS OF NATURAL SUBSTANCES IN THE EU REGULATORY FRAMEWORK ON PESTICIDES

Regulation (EC) 1107/2009 laying down the rules for the authorisation of plant protection products was designed for synthetic substances and is not suitable for natural substances in many aspects.

Data requirements

The data to be submitted for the approval of active substances are defined for synthetic substances. These are usually newly designed, highly efficient single molecules, released in the environment for the first time, whereas natural substances have an existing natural background, are often more complex in composition and present a wider range of modes of action. This creates technical difficulties to adapt the registration criteria to natural substances and may even lead to non-authorisation of an active substance due to technical feasibility. For instance, it may be difficult to identify and characterize all individual compounds of a botanical active substance containing a hundred different ones.

Propolis' chemical composition is complex and depends on its botanical and geographical origin. In May 2020,[6] the European Commission did not approve propolis as an active substance – according to Regulation 1107/2009 – because the information provided were not sufficient to perform a risk assessment. Propolis was authorised in former EU organic regulation[7] (1991) but was de-listed because it is not considered a pesticide under EU horizontal legislation.

Risk assessments

Risk assessments have been designed to evaluate the predictable risks arising from releasing newly synthesised chemicals into the environment. But this logic cannot apply to natural substances since they are already present in nature. Their natural background should serve as reference in risk assessment to assess the additional risk of the proposed use. This approach would avoid the detection of "level of concerns" at concentrations close to, or theoretically even below, those levels already present in nature.

This is particularly true for ubiquitous mineral substances such as copper, which can – and should – be found everywhere. Copper is also an essential micro-nutrient that is present in small quantities in the human body. Synthetic molecules, however, should not be found everywhere, especially not in humans.

Furthermore, many of these substances already have a long history of safe use in plant protection, so that any adverse effects are well-known and mitigation measures can be applied.

[6] Commission Implementing Regulation (EU) 2020/640 of 12 May 2020 concerning the non-approval of propolis extract as a basic substance in accordance with Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market.

[7] Council regulation No 2092/91 of June 24, 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs.

Progress in the registration process

Still, EU institutions have made some progress to better adapt the registration process for plant protection products to natural substances.

There are **individual guidance documents** for several categories of natural substances. These include microorganisms, semiochemicals and botanicals (plant extracts), which substantially contribute to a better adapted evaluation of these substances. Yet improvements are still needed on updating or developing of new guidance documents.

Regulation (EC) 1107/2009 recently introduced the '**basic substances**' category. It describes substances useful in plant protection but not predominantly used for this. For instance, vinegar, stinging nettle extract, or sucrose are registered as basic substances. The registration process is supposed to be easier, cheaper and faster than for ordinary pesticides. But the practical implementation of this process is challenging. Basic substances are a useful category, allowing farmers, farming organisations and research institutions to apply for the substances and indications required on the field. However, due to a lack of data, many substances are authorised with only few uses needed in organic farming.

Establishing natural substances as their own category

Beyond these developments, it is key to establish natural substances as a category of their own in regulation (EC) 1107/2009. This is the legal pre-requisite for a dedicated authorisation process taking into account the specific characteristic of these substances while stringently assessing their risks. Establishing natural substances as category will ensure only natural substances that are necessary and safe for farmers, consumers, and the environment will find their way into EU markets.

A NECESSARY BUT LENGTHY TWO-STEP APPROVAL PROCESS

Once authorised under EU horizontal legislation, a substance must still be approved under the EU Organic Regulation for use in organic production. This double approval process can take several years.

Member States should submit any request to add a substance to the list of substances authorised under organic production to the European Commission. The independent Expert Group for Technical advice on Organic Production (EGTOP) assists the Commission by assessing the compliance of the substances with the objectives and principles of organic production. The EGTOP also provides non-binding recommendations if a substance should be authorised for organic production. The European Commission generally follows the EGTOP's opinion.

Including these substances in the EU Organic Regulation causes a time lag between introducing an input in agriculture and its legal use in certified organic agriculture. Regular EGTOP meetings – at least once a year – could reduce this time lag while ensuring inputs are rigorously assessed against organic's principles.

Garlic extract has been added to the list of substances authorised for plant protection in organic agriculture in 2018, while it was authorised as active substance in the EU horizontal legislation for pesticides since 2009.

A GROWING NEED FOR EXPERTS ON NATURAL SUBSTANCES

Finally, a further bottleneck is the lack of experts in national and EU authorisation and risk management bodies about natural substances and organic farming. Targeted hiring and training programmes at all levels are urgent to contribute to this kind of expertise.

ECONOMIC BACKGROUND OF APPLYING FOR REGISTRATION OF NATURAL SUBSTANCES

Registering an active substance / plant protection product, whether natural or not, requires time and money. Risk assessment is needed, but studies required for risk assessment can cost millions.

Public support for the registration of natural substances in plant protection in organic farming systems is key – especially for authorising niche products – to reach the Farm to Fork strategy's goal of increasing the EU's organic land to 25% and reducing chemical pesticide use and risk by 50% by 2030.

(RE-)AUTHORISING NEW & EXISTING SUBSTANCES

Newly designed synthetic substances can be patented and offer a high potential of return on investment as they are used in high-intensity production systems with large acreage. The market segment for natural substances is small because they have lower efficacy, and their use relies on an integrated and systemic approach towards plant protection not requiring large quantities of inputs. Moreover, it is not possible to get intellectual property rights for most natural substances, resulting in a very limited return on investments for the producers.

The financial aspect and the time and resources it takes to register a natural substance make the introduction of new natural substances or even re-authorisation of registered substances highly unattractive and/or unfeasible for private companies.

Bacillus thuringiensis is the longest known and most widely used microbial biocontrol agent in agriculture. In April 2019, EU approval for the active substance *Bacillus thuringiensis ssp. tenebrionis* expired. Organic farmers use this strain of *Bacillus thuringiensis* to control potato beetles. Despite a long history of safe use, no application for renewal of approval was submitted, mainly because the market was too small to make it financially attractive. Novodor®, the only registered plant protection product using this active substance, was withdrawn from the market, and organic farmers were left in a technical impasse.

So public money is essential to:

- Finance the registration process of natural substances of public interest when there is little to no return on investment for a private company;
- Ensure natural substances with a long history of safe use remain available for farmers;
- Contribute to the increased availability of natural substances that will allow a smooth transition to organic farming.

BASIC SUBSTANCES

The same logic applies to basic substances. They cannot be marketed as plant protection products or formulated with other components – other than water or other basic substances. This makes application for registration unattractive for companies as they would finance an expensive authorisation for a single substance product anyone can copy and sell.

As of today, authorisations of basic substances relevant for organic agriculture have usually been introduced by organic farming associations or research institutes. In some cases, they have been financed by public money. However, widespread public funding of basic substance applications for substances needed in organic farming is still necessary.

EXAMPLES OF PLANT PROTECTION PRODUCTS AUTHORISED FOR ORGANIC PRODUCTION ACCORDING TO ANNEX II OF REGULATION FOR ORGANIC PRODUCTION (EC) 889/2008

NAME	DESCRIPTION
Substances of plant or animal origin	
Azadirachtin extracted from Azadirachta indica (Neem tree)	Plant extract (neem oil) used as insecticide.
Pheromones*	Semiochemicals naturally produced by insects that modify the behaviour of other individuals within the same species (attractant, sexual behaviour disrupter…); To be used only in traps and dispensers.
Pyrethrins*	Substances naturally occurring in chrysanthemum flowers, used as insecticide.
Equisetum arvense (Field horsetail) (Basic substance)	A decoction in water of dried edible aerial sterile stems is used as fungicide.
Chitosan hydrochloride* (Basic substance)	Obtained by hydrolysis of chitin from crustacean shells; Elicitor, having a fungicide and bactericide effect via the stimulation of natural defence mechanisms.
Micro-organisms or substances produced by or derived from micro-organisms	
Micro-organisms (not from GMO origin)	E.g. Bacillus Thuringiensis, a naturally occurring soil bacterium, with insecticidal properties.
Spinosad	Natural substance produced by a soil bacterium, used as insecticide.
Other substances	
Carbon dioxide	Used for the control of stored product pests.
Calcium hydroxide* (Basic substance)	Substance of mineral origin, obtained from lime; Used as a fungicide, only in fruit trees.
Copper compounds	Used as fungicide to control downy mildew on grapevine; The organic strategy to minimise the use of copper in organic agriculture is detailed on page 8 (example 2).
Ferric phosphate (iron (III) orthophosphate)*	Iron and phosphate ions are ubiquitous in nature; Ferric phosphate is used as molluscicide.
Paraffin oil	Natural constituent of petroleum (purified); Used as insecticide and acaricide.
Sodium hydrogen carbonate (also known as sodium bicarbonate)	Commonly used as an ingredient in the food market (e.g. as the major ingredient of baking powder); Used as fungicide.

* Substances with more restrictive conditions for use for organic production than those specified in EU horizontal legislation.

POLICY RECOMMENDATIONS

MAKE THE ORGANIC APPROACH TO BIODIVERSITY THE BASIS OF ALL PLANT HEALTH CARE STRATEGIES

- Ensure the **Common Agricultural Policy protects the environment, biodiversity** and environmental services provided by ecosystems. The CAP should fully contribute to the implementation of the EU Farm to Fork and Biodiversity strategies to achieve a transition to more resilient and sustainable agricultural production systems by 2030;
- **Promote organic plant breeding** by supporting research and development of plant varieties suitable for organic production. Ensure fair access to the EU seed market by adapting the variety registration protocols to organic varieties;
- **Invest in research addressing indirect measures of plant protection and beneficial insects.** These aspects should be key components of EU research programmes;
- **Support Member States to promote the use of less harmful pesticides.** National contexts should indicate which measures would be most effective in this respect, for example, introducing an excise tax on plant protection products (PPPs), introducing standard VAT rates on PPPs and lower VAT rates on substances allowed in organic products.

IMPROVE THE AVAILABILITY OF NATURAL SUBSTANCES ACCORDING TO THE ORGANIC APPROACH TO PLANT HEALTH

- **Introduce a definition and separate category for natural substances** in Regulation 1107/2009 – the EU horizontal legislation for placing plant protection products on the market. This is the legal pre-requisite for a dedicated authorisation process taking into account the specific characteristics of natural substances while stringently assessing their risks;
- **Ensure coherence of horizontal and organic regulation and accelerate approval processes.** Introduce a non-binding, ex-ante assessment procedure to predict the compatibility of inputs with the organic standard. The assessment could for example be carried out by the Expert Group for Technical advice on Organic Production (EGTOP). To speed up the process, the EGTOP needs to be further professionalised in terms of funding and procedures;
- **Expand expert knowledge on natural substances and organic agriculture** in all authorities relevant for the authorisation process at national and EU level. Set-up and/or fund initiatives to find more adequate methods of risk assessment for microorganisms, botanicals and minerals;
- **Commit public money to finance the authorisation of natural substances of public interest.** Public funding should support the generation of the data needed for the registration of natural substances with a low return on investment, as long as they contribute to improve the food system's sustainability;
- **Improve and develop participatory research** at national and European level **to enable common applications for registration of natural substances**, in close collaboration with farmers organisations and related stakeholders.

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