European Cooperation in Science and Technology
- COST -

Secretariat

Brussels, 8 December 2011

COST 4167/11

MEMORANDUM OF UNDERSTANDING

Subject :	Memorandum of Understanding for the implementation of a European Concerted Research Action designated as COST Action FA1105: Towards a sustainable and productive EU organic greenhouse horticulture

Delegations will find attached the Memorandum of Understanding for COST Action as approved by the COST Committee of Senior Officials (CSO) at its 183rd meeting on 30 November 2011.

MEMORANDUM OF UNDERSTANDING
For the implementation of a European Concerted Research Action designated as

COST Action FA1105
TOWARDS A SUSTAINABLE AND PRODUCTIVE EU ORGANIC GREENHOUSE HORTICULTURE

The Parties to this Memorandum of Understanding, declaring their common intention to participate in the concerted Action referred to above and described in the technical Annex to the Memorandum, have reached the following understanding:

1. The Action will be carried out in accordance with the provisions of document COST 4154/11 "Rules and Procedures for Implementing COST Actions", or in any new document amending or replacing it, the contents of which the Parties are fully aware of.

2. The main objective of the Action is to improve and disseminate knowledge for new and better production strategies, methods and technologies to support sustainable and productive organic greenhouse/protected horticulture in the EU.

3. The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at EUR 60 million in 2011 prices.

4. The Memorandum of Understanding will take effect on being accepted by at least five Parties.

5. The Memorandum of Understanding will remain in force for a period of 4 years, calculated from the date of the first meeting of the Management Committee, unless the duration of the Action is modified according to the provisions of Chapter V of the document referred to in Point 1 above.

A. ABSTRACT AND KEYWORDS

Organic greenhouse horticulture (OGH) (i.e. the production in greenhouses or polytunnels) in the EU should improve its sustainability, production and productivity. Emissions of nutrients and its footprint should be reduced. Production and productivity are too low to meet the demand of the society. The scientific challenges are to design sustainable irrigation and fertilization strategies, to reveal the mechanisms of resilience, robustness and suppressiveness for the management of pests and diseases, to integrate crop management, energy saving, renewable energy sources and new techniques and combinations with other activities and business to realize climate neutral production. This COST Action coordinates, strengthens and focuses the activities of the partners. It improves the communication, offers a common agenda, more and better knowledge for less money, sharing new techniques, an improved dissemination to OGH, basis for further collaboration in joint research proposals and support in the development of EU standards for OGH.

Keywords: Sustainable and productive EU organic greenhouse horticulture

B. BACKGROUND

B.1 General background

In both the EU and global markets the demand for organic products is growing; the greatest proportion is for dairy products, meat products, cereal products and potatoes , but the demand for horticultural products as organic vegetables, fruits and ornamentals is significant and growing steadily. The majority of these products are grown outdoors, but because of the growing demand for all year round fresh products, the proportion grown under protection in glasshouses or polytunnels is increasing. The total acreage of EU organic greenhouse horticulture (OGH) is 3700 ha (in 2009) and this is almost entirely for vegetables and salads. Of this total 235 ha is heated or is kept frost free and about 12 ha is in out of soil production. The area of OGH is increasing yearly by about 5%, while the area of conventional greenhouse production in the EU is stabilizing at about 100.000 ha.

OGH offers consumers the opportunity to buy fresh, healthy and tasty products all the year round thus contributing to the needs of modern society. However, the economic and environmental sustainability of OGH needs to be increased in order to ensure the continued growth of the sector needed to keep pace with market demand. Growing under protection demands high investment in greenhouse infrastructure and associated systems for climate control, specialised irrigation and heating. This is particularly important in Northern European countries. This high investment for OGH results in crop rotations being limited to a small number of products having similar pest susceptibility, resulting in lower yields (up to 40%) compared to conventional crops. From an environmental perspective, OGH has to reduce its foot print in terms of water use, nutrient leaching, and fossil energy use, through natural crop protection techniques and the closing of cycles to stay at the front line of sustainability and to maintain credibility.

As organic greenhouse growers have limited tools for their crop management their intervention has to be highly strategic and based on resilience and the use of robust plant material. Although knowledge to improve production can be gained from conventional greenhouse research and development, specific and new knowledge for OGH as defined in this Action is needed. There is a good amount of research being carried out on OGH and there is more general research from which knowledge could be derived. However, the different groups of researchers are working relatively independently resulting in a lack of expertise and knowledge exchange.

The major benefit of this COST Action is the creation of a network or community that will give a boost to the development and availability of integrated knowledge and solutions specifically for organic greenhouse horticulture. The results arising from this Action will contribute to keeping OGH competitive, to improving its sustainability and, as a consequence, to fulfilling the needs of both consumers and society.

B.2 Current state of knowledge

The Action concentrates on the following five topic-areas: Robust planting material; Soil fertility, suppressiveness and water management ; Plant health; Energy saving and climate neutral production and finally Sustainability and standards

These five topic-areas are specific and essential for determining new knowledge and innovative solutions for OGH.

Robust Planting Material

At the moment cultivar tests and other trials use different formats across Europe and therefore the trial results are not comparable. These formats need to be standardised in order to allow robust comparisons to be made. . They will need to be designed to take account of the needs of regions with similar growing conditions.

Healthy plants can be produced only by healthy seeds and this often requires seed treatments to ensure clean seed. Several non-chemical methods of seed treatment approved by EU standards for organic cultivation are being developed or are under research. These methods are not commonly known throughout the EU and their use differs widely.

Soil fertility, Suppressiveness and Water management

This topic is a key one for OGH. Soil fertility management in organic horticulture is much more complex than in conventional production systems. In organic horticulture, soil fertility management is based on agro-ecological strategies which need deep knowledge of the pedo-climatic situation and of nutrient flow through the agro-ecosystem. This is influenced and regulated by crop rotations, cover crops, green manuring, and compost application integrated with low input organic fertilizer.

Mineralization rates, as related to plant consumption, are also critically important as are nutrient budgets.

Another important issue in OGH which is strongly connected with the nutritional and plant protection aspects is water management. Mismatching of water and nutrient supply with plant uptake can cause major environmental burdens. A number of recent research projects complement the investigation on agro-ecological approaches to soil fertility management. These include a dynamic nutrient balance approach to simulate nitrogen availability, a focus on fine-tuning manure applications to crop demand and innovative approaches to the collection and treatment of greenhouse effluents. Disease suppression is crucially important in OGH and this is influenced by optimum soil conditions and nutrient supply.

Plant Health

Plant Health and pest/ disease management are important topics in OGH. Pests and diseases (both soil borne and above ground) are an enormous threat for the stable and robust production of organically grown greenhouse vegetables.

Management of diseases depends on a thorough knowledge of the three major components of a disease: susceptible host plant, virulent pathogen, and favourable environment. Fungal diseases can be controlled by modifying the environmental parameters, by working on the agronomical practices, by using natural inducers of resistance and by treating with biocontrol agents. The integration of biological, genetic and agronomic measures will make a major contribution to plant disease management. Pest control is mainly based on frequent releases of insectary reared natural predators, also called “augmentative biological control”. This practice is often viewed as a strategy in which natural predators are used as a replacement for pesticides with sometimes limited understanding of their ecology and biology. However, pests and natural enemies are in reality embedded in complex food webs with all kind of interactions among species. It is important for scientists to develop applied biological control research within the frame of our basic knowledge of ecological and biological control theories.

Energy saving and climate neutral production

OGH systems in Northern-Central Europe use even more energy than traditional greenhouse production in the same region. This is not only per ton of production (33 GJ/ton vs 26.3 GJ/ton) due to reduced yields, but also per unit surface area (6% more). This is explained by the need to control climate more strictly than in traditional greenhouse horticulture for disease prevention purposes. Energy is a very high fraction of production costs (some 20%) even more so in organic greenhouse production, where the small size of the farm usually does not make cogeneration economical.

A huge amount of research has been devoted in the past 30 years to decrease energy needs for greenhouse production in regions where production would be impossible without heating. Nevertheless, energy use for heating still is the largest contributing factor to the environmental impact of greenhouse production determined by LCA (Life Cycle Analysis) (EUPHOROS). The energy saving has been largely achieved through modified climate and crop management along with the application of technical improvements such as improved crop cover materials and insulation. Climate modification has been shown to be difficult to apply to organic greenhouse production, due to the enhanced risk of disease development. An additional factor is that soil cultivation is known to increase greenhouse humidity, which is an even worse problem in unheated, Mediterranean greenhouses. There is therefore a particular need for energy thrifty crop/climate management approaches to be developed for OGH.

Sustainability and Standards

Specific measurement tools for this sector need to be developed for the assessment of the ecological, social and economic sustainability of OGH systems. There is good and ongoing work already available for conventional and organic agriculture but horticulture is less well covered. There are some aspects of horticulture such as field vegetable production and orchards where research networking is recommended for the evaluation of the sustainability of horticultural production systems including organic, conventional, and integrated apple orchards. Little or no work has been done for OGH but lessons can be drawn from other areas. Standards for OGH are due to be discussed by the Commission in 2012.

B.3 Reasons for the Action

There is a lot of research being done in Europe and Northern America about protected cultivation. However, much of it is in the "grey literature" of project reports and there is a lack of homogeneous analysis tools. Therefore there is much to be gained by joining together with other institutions to discuss experiences and perspectives in order to compare scientific approaches, and to develop common theoretical concepts and references.

There is also a need to provide guidelines wherever factors acutely relevant to organic horticulture are affected, such as the management of climate and crop, for the prevention/early detection of diseases. Experts with experience of various climates, socio-economic environments and national regulations will be able to learn from each other and find viable solutions more quickly than separately.

The COST Action system is a unique vehicle to build a strong research network to:

- coordinate existing research activities focused on the specific requirements of organic greenhouse horticulture and to make maximum use of the scattered expertise, capacities and scarce financial means. This will include the development of common approaches and standards necessary for the exchange and application of research generated knowledge.
- improve the accessibility of this existing knowledge for researchers, advisors and the industry.
- develop a common research and innovation agenda with the industry and TPorganics to contribute to regional, national, European and international research programmes.
- submit new joint proposals for research within programmes such as the European Framework Programme.
- support the EU in the development of standards for OGH. It is expected that the EU Commission will make a start on the formulation of standards for organic greenhouse production in early 2012.

B.4 Complementarity with other research programmes

The COST Action will create an immediate synergy with related scientific networks such as ISHS (International Society of Horticultural Science), ISOFAR (International Society of Organic Agricultural Research) and OACC (Organic Agricultural Centre Canada).

No other current or planned research programme exists that has the same objectives and benefits as this COST Action. In addition, this COST Action is complementary to several on-going EU Framework projects, such as:

- SOLIBAM: A collaborative project that aims to develop strategies for organic and low input integrated breeding and management.
- ENDURE: A network of excellence for diversifying crop protection, not only in greenhouse horticulture, but in plant production in general
- PURE: A collaborative project to reduce the pesticide use and risk in European farming systems with integrated pest and disease management.
- EUPHOROS: A collaborative project aiming at the reduction of the external inputs in high value protected horticultural and ornamental crops.

In addition, the COST Action is complementary to the several other international research programmes, such as:

- The FAO databank on cultivars Hortivar (hortivar@fao.org).

Furthermore, this COST Action will complement many on-going national research programmes; a full inventory will be made by each WG at the start of the Action.

C. OBJECTIVES AND BENEFITS

C.1 Aim

The main objective of the Action is to improve and disseminate knowledge for new and better production strategies, methods and technologies to support sustainable and productive organic greenhouse/protected horticulture in the EU.

C.2 Objectives

WG1: Robust Planting Material

- To develop standardized methods and protocols for the variety testing of organic greenhouse crops and for the evaluation of seed treatments. The drivers are the demand for resilient planting material and for effective and chemical free techniques for seed treatment.
- To make available the results of international variety trials through Organic e-prints or other means of open communication.

WG2: Soil fertility, Suppressiveness and Water management

- To develop efficient, sustainable and safe fertility and water management strategies using standardized guidelines in a systems approach for different pedo-climatic conditions.
- To design strategies for the use of composts and other amendments in soil fertility and disease suppression.
- To develop alternatives for peat as a substrate in the production of young plants
- To develop sustainable and safe technologies and strategies for reducing risks in drain water recycling.

WG3: Crop Health

- To design resilient cropping systems with a maximum use of ecological support functions to suppress greenhouse pests and diseases and enhance biological control. These functions can include functional diversity of natural enemies, food sprays, banker plants, habitat and climate management, and induced plant resistance

WG4: Energy saving and Climate neutral production

- To analyse the energy economy and the use of fossil energy in existing organic greenhouse systems in relation to region, growing system and cropping schedule.
- To develop options and evaluate their feasibility for climate neutral production in different regions in the EU, by specifically considering the reduction of energy demand, energy-efficient process management, the use of renewable sources of energy and the climate neutral CO2 enrichment of the greenhouse air.

WG5: Sustainability and Standards

- To assess indicators for the ecological, social and economic sustainability of organic greenhouse systems, and to specifically assess total factor productivity. This contrasts reliance on non-renewable inputs, like fossil fuel or peat, with multiple outputs like yield quantity and quality, and environmental and social services.
- To produce roadmaps on how to improve sustainability in OGH across EU
- To inform and give policy advice to stakeholders, especially for the development of EU standards for OGH.

Although the Action covers five different topics, these will all be carried out in close coordination and supported by the work in WG5 which will analyse new developments and designs in the other four WGs in terms of productivity and sustainability.

This Action aims to establish and extend a network among European and other scientists, experts and advisors to design and develop new knowledge and strategies for OGH.

Wherever feasible the Action will focus on the specific aspects of OGH and on the main crops in OGH; these include fruit vegetables, tomatoes being the most important, and leafy vegetables such as salads.

C.3 How networking within the Action will yield the objectives?

This COST Action will yield the objectives by:

- Developing a collaborative community of multidisciplinary researchers and advisors
- Jointly developing a detailed action plan and a common research and innovation agenda.
- Organising meetings, focused workshops, Short-Term Scientific Meetings (STSM) to meet specific challenges and to provide vehicles to support the training of Early Stage Researchers.
- Developing web-portals and social media applications to facilitate discussion and development of ideas and to act as primary focal points for best practice guidelines and recommendations.

C.4 Potential impact of the Action

The COST Action, which benefits are described in B3, will lead to:

- An effective network that can deal with the technical challenges of OGH and related policy issues.
- A common understanding of challenges and priorities for further research and development
- Standardization of research protocols and methods.
- Better access to research results leading to effective knowledge transfer to the industry, policy makers, society and researchers that highlights new opportunities and perspectives for OGH.

C.5 Target groups/end users

The target groups and end users are the following:

- **Researchers**: experts in agronomy, plant physiology, soil science, water and nutrient management, energy management, economics, systems sustainability etc. The Action will make new standardized procedures, guidelines, approaches and new techniques available to all.

- **Advisors** from the industry will get easy access to new knowledge and innovative tools and who can take a role in the dissemination.
- **Certification scheme developers and certification bodies** who are constantly seeking scientific justification for new and existing rules and standards.
- **Policy makers** from national and international bodies, and bodies from the industry who are seeking information for policy development.
- **Industry** - growers, suppliers and trade often depend on interactions with researchers and advisors for new knowledge to implement in their businesses.

All groups except the industry are directly involved in this Action. They are invited to take part as an expert or to comment on the proposal or both. The industry is involved indirectly.

The relations with the different groups will further be expanded during the lifetime of the Action.

D. SCIENTIFIC PROGRAMME

D.1 Scientific focus

The scientific programme of the COST Action concentrates on five topic areas, with links and interrelationships (see also figure 1)

Robust planting material

The main objective of the work package is to develop efficient tools and strategies to standardize trial setup, aiming at an efficient use of resources for variety testing. During the course of the project the international manuals *'Seed treatment for Organic Greenhouse Crops'* and *'Variety testing for Organic Greenhouse Crops*' will be developed.

The first manual will compile the different methods of seed treatment for OGH with their advantages and disadvantages as well as their fields of application, while the second manual will show the characteristics of variety testing in OGH in different European regions with special consideration of resilience and robustness of new cultivars. Existing national guidelines and analysis sheets will serve as a basis. These are to be supplemented by: 1. Trials for seed treatment 2. Methods for the investigation of resilience factors for protected crops like winter firmness, cold hardiness, salt resistance, weed suppression or utilization of light. Facts and characteristics of trial setups for these ranges are to be collected, developed further in the context of the Action and tested in trials. Major testing efforts will be made for tomato. Other protected crops like corn salad, eggplants, cucumbers, peppers etc. will also be described based on existing information between COST countries or other available information.

Soil fertility, Suppressiveness and Water management

The scientific program of this topic is focused on three interlinked research areas:

- *Soil fertility and water management strategies(systems approach)*

  For profitable and sustainable OGH, the implementation of specific agricultural practices (i.e. crop rotation, green manuring, organic amendments) able to activate soil biogeochemical cycles is the basis of soil fertility management. Other important factors include nutrient and organic matter sources, along with the size, biodiversity and activity of the microbial populations in the soil

  Irrigation management based on evapotranspiration to control emission is not obvious and new approaches should be proposed for organic production systems. From this perspective, integrated production systems that would increase the efficiency of water and nutrient use on farms would be developed for different pedo-climatic condition, and standardized guidelines defined by COST researchers. It will ensure strong result integration from different organic growing systems to develop and validate robust models and tools for soil fertility management.

- *Compost quality and disease suppressivenes*

  Compost itself can be of different origins and quality in terms of nutrients and disease suppressiveness. Inoculation of compost with biological control agents (BCA) may increase its suppressive effect, although interactions with external factors and fine-tuning are extremely important for the effectiveness of this form of biological control. The major constraints in the implementation and commercial exploitation of inoculated compost include the lack of a multidisciplinary approach which integrates microbiological knowledge with process technology expertise to ensure consistent compost properties and standardized process protocols (guidelines).

  Growing media production for organic nursery activity is another important area of technical and social interest particularly with respect to peat. Compost substitution could be a technical solution to this problem which will be ruled on soon at European level. Compost utilization as such or inoculated with BCA is a subject that would be deeply investigated via this COST Action for its potential technical and economic impact.

- *New* technologies *reducing risks in drain water recycling*

  To meet the coming regulation of zero nutrient emission according to the EU Water Framework Directive, new systems have to be developed. Firstly, soil-grown crops make the effluent recycling (closed system) difficult as collecting drains would have to be installed with a minimal soil perturbation and contamination from other agricultural or industrial neighbouring activities. Secondly, effluents are rich in organic matter, which makes the disinfection process to reuse this waste water and limit pathogen propagation really challenging. Moreover, unbalanced ion concentrations in the waste water (*i.e.* SO_4, Na, Cl) can increase soil salinisation, and limit plant growth and product quality. The Action will provide advanced knowledge essential for the development of sustainable cultivation systems adapted to different country requirements, with the aim to fulfil new regulations regarding water and nutrient emissions as well as consumer demands for safe and high quality products.

Plant health

Criticism of many crop health research programs is that they are developed independently, without knowledge of how recommendations for control of a particular pest or disease interfere with other control measures. This fragmented approach can be counter-productive especially in OGH because of the enormous diversity of pests and diseases that can occur in these crops. Not only do these pests and diseases interact directly and indirectly in complex food webs, but they can also interact with the control measures. Thus there is a strong need for a systems approach to integrate all measures used for crop health. A part of this systems approach is the incorporation of other factors such as climate management, soil suppressiveness and fertilisation, which are inextricably linked to plant health and pest & disease control. Adverse implications for plant health arising from the integration of these different crop management approaches need to be evaluated in order to optimize pest and disease control in a sustainable way.

This topic area aims to design resilient cropping systems with a maximum use of ecological support functions that suppress greenhouse pests and diseases and enhance biological control. Items to be covered include: Essentials of systems approach, increasing plant resistance, effects of nutrition on above-ground pests and diseases, new natural enemies and microbials, functional diversity, food web interactions (negative and positive), habitat management, banker plants and food sprays, climate management for suppressing pests and diseases and finally new technologies.

Energy saving and climate neutral production

The main aspects being considered in the framework of national or international programs are:

- Reduction of primary energy use using greenhouse design by improving the performance of the greenhouse as sun energy collector (cover materials, reduced ventilation, reduced shading) by increasing insulation of the greenhouse (double covers, thermal screens) and by short and long term energy storage.

- Improve efficiency of crop management at climate level (temperature integration, higher humidity), at crop level (early detection), and by carbon dioxide fertilization
- Substitutes for fossil energy with geothermal heat or application of waste heat

With respect to many of these topics it would be relatively straightforward to transfer insights from traditional to organic greenhouse horticulture, although it would be necessary to re-evaluate feasibility in view of the different cost-structure of organic production with respect to traditional greenhouse production.

The expected result of this topic is a climate neutral organic greenhouse production by 2030.

Sustainability and standards

As a first step, indicators for the ecological, social and economic sustainability of organic greenhouse systems will be assessed, especially total factor productivity indicating reliance on non-renewable inputs versus the multiple outputs, like yield quantity, quality or environmental and social services. Expert panels and case study information from OGH holdings will be used where available.

As a second step roadmaps how to improve the sustainability in specific areas will be developed. In some cases trade-offs between improving different sustainability indicators might be necessary and a focus on current hot topics like the gaseous emissions of CO_2 CH_4 and NO_x will be imperative. Other indicators like energy efficiency have great synergies with cost savings and they are already receiving great attention in (O)GH. If specific gaps in the methodology arise we will endeavour to close them.

In a third step the information gained on suitable sustainability indicators for OGH and the knowledge on best pathways and roadmaps how to improve them can feed into policy advice to EU stakeholders developing specific standards for organic glasshouse horticulture. The information produced within this COST Action will be very valuable guidance for EU policy making on the specific topic of organic greenhouse horticulture. We will use well established social tools like stakeholder workshops and social interactions to facilitate a wide uptake in lively discussions and shared learning.

This WG will obviously heavily draw on the experience and results coming out of the other four topics. In return it will feed back with sustainability information and assessment on the improvements to OGH worked out in the four other topic areas.

D.2 Scientific work plan methods and means

The goals of this project will be realised by the following methods: organizing specialised workshops and meetings, short term scientific missions (STSMs), dissemination and sharing of information via websites, social media, conferences, scientific papers and articles for the industry.

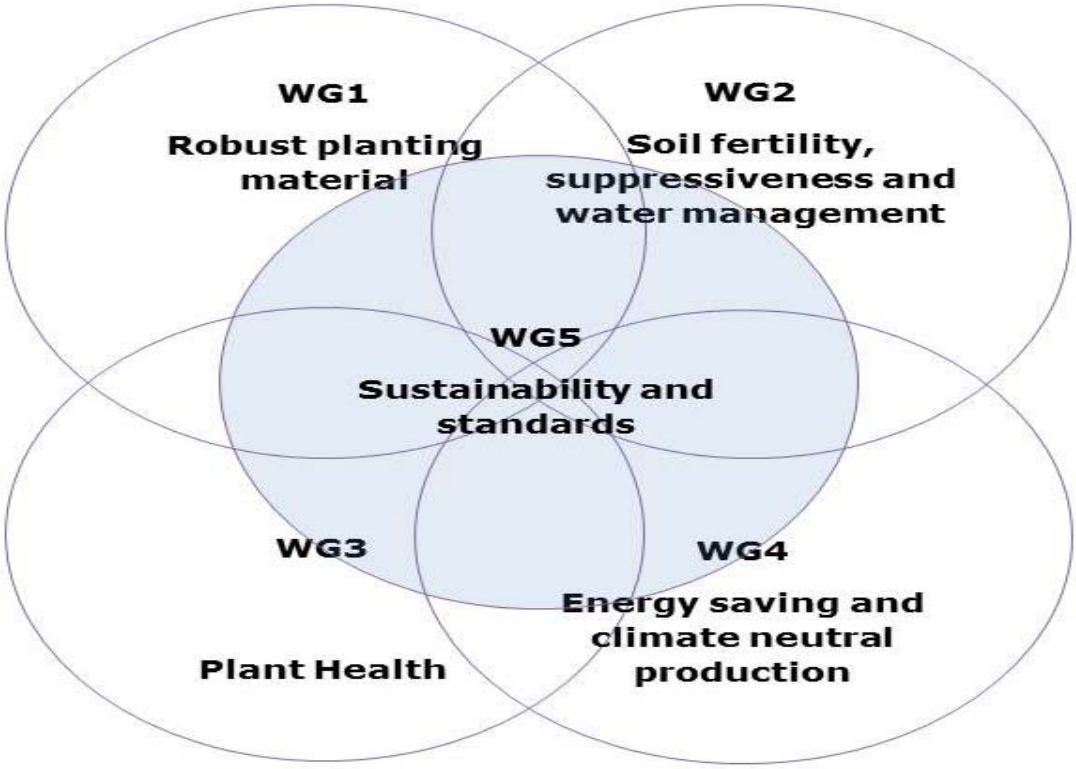

Figure 1. Relation and interaction of the Working Groups

The first four WGs focus on improved and new technologies. When necessary these WGs work together on common subjects like the effect of soil amendments in WG2 on pest and disease resistance in WG3, or the effect of energy conservation by climate control in WG4 on disease control in WG3 etc. WG5 integrates all aspects with respect to economic and environmental sustainability on system level.

Objectives of the five working groups are written in chapter C.2.Objectives. The objectives will be achieved by the following **deliverables**:

The deliverables for each WG and/or the Action in general are:

- Inventory of the available information and ongoing research and WG plan (A)

- Publication of reports of the WG meetings and workshops on the website (B)
- An annual competitive call for STSMs, with preference given to Early-Stage Researchers (C)
- A workshop at the end of the second year, in month 28 to present and discuss results, drafts and plans; it will be open to the relevant scientific community (D)
- Dissemination of the results, deliverables and list of references on the website of the Action and/or as Organic e-print and in articles for the industry (E)
- A common research and innovation agenda (F)
- Conference at the end of the Action, which if possible to coincide with the Conference/Symposium of the ISHS Working Group ´ Organic Greenhouse Horticulture´ (G)

The deliverables for each WG are:

WG1: Robust Planting material

- International manuals ´Seed treatment for organic greenhouse crops` and ´Variety testing for organic greenhouse crops´ to be finalised at the end of the Action (1b); first drafts after 28 months(1a)

WG2: Soil fertility, Suppressiveness and Water management

- A guideline booklet on soil fertility management for OGH (2a)
- Document on organic substrate for protected crops(2b)
- Guideline for the standardization of composting process, taking into account the use of BCA and initial organic residues to obtain suppressive compost(2c)
- Document on monitoring and control tools for water management(2d)
- Document on risks of OGH for human health(2e)

WG3: Plant health

- Document on the management of greenhouse climate related diseases (3a)
- Document on the management of pests by non-chemical means (3b)

WG4: Energy saving and climate neutral production

- Inventory of the energy economy and the use of fossil energy in present OGH in relation to region and growing system(4a)
- Guidelines for the reduction of the primary use of energy use in different regions (4b)
- Information package on the information of energy use by climate control, carbon dioxide fertilization an crop management(4c)
- Document on the feasibility of substitutes of fossil energy(4d)

WG5: Sustainability and Standards

- A meeting to assess available sustainability indicators leading to a toolkit(5a)
- Indicator toolkit for sustainability of OGH (5b),
- Roadmaps to improve sustainability for key aspects, GHG, total factor productivity, socio-economics) based on work package outcomes (5c)
- Publication on the scientific background for standards and good practices in OGH (5d)
- An open stakeholder seminar to present results and findings (5e)

E. ORGANISATION

E.1 Coordination and organisation

This COST Action is a means of coordinating several research projects in different laboratories and institutes in different European and Western countries that are already financed. These efforts will be coordinated via this COST Action to increase knowledge for sustainable and productive organic greenhouse horticulture in the EU. The coordination of research will be achieved by realizing the deliverables of the different WGs as described in chapter D.2 Scientific work plan- methods and means.

The organisation of this Action will follow the rules and regulations set by the COST guidelines (doc. COST 4159/10)

The Management Committee (MC) will be convened by representatives of the participating countries as described in the COST guidelines. The MC will elect a Chair and Vice-Chair by majority vote. The MC will set up five Working Groups (WG). MC will appoint a leader and deputy leader for each WG. Meetings of the MC will take place at least once a year, preferably linked to a WG meeting/workshop. This will ensure efficient use of budget, coordination of the activities and discussion about the objectives and critical issues of the Action. If necessary small meetings may be held

The WGs will also meet during the MC meetings and discuss the progress and coordination of their specific WG objectives. WG leaders will report the progress of their respective WG based on the predefined timetable to the MC. The WG leaders are responsible for achieving the objectives, deliverables and milestones of each WG and for reporting their achievements to the MC. If necessary, intermediate Core Group meetings will be held.

A website together with a connection to social media will be established to provide information about the COST Action, to communicate within and outside the network, as well as to document its progress and achievement of its objectives. It will be the responsibility of the MC Chair to organize the website and to keep the content up-to-date. The website will contain a restricted access page for registered participants of the COST Action. In addition, mailing lists will be established to keep the MC members informed regarding the progress of the COST Action and as a mean of communication between members of the MC and WGs. Reports and papers from the Action will be made available through the website.

An STSM- evaluation committee will be appointed by the MC with one coordinator and one representative of each WG. This committee will favour the mobility and training of young researchers. Depending on budgetary constraints a number of STSMs will be financed each year for exchange of technologies and training between laboratories and institutes. As defined by the rules of COST the application for the STSMs will be sent to the Chair of the evaluation Committee. The approval process is subject to the COST rules and procedures.

In Month 28 the WGs organise workshops to stimulate exchange of information, of ideas and to show progress among the WG and other experts and target groups. These workshops will be organized preferably at the same time and at the same place.

E.2 Working Groups

The structure of the COST Action is based on five WGs:

- WG1: Robust planting material
- WG2: Soil fertility, suppressiveness and water management
- WG3: Plant health
- WG4: Energy saving and climate neutral production
- WG5: Sustainability and standards

MC members based on their specialty and interest will take part in the different WGs. Each WG will elect a leader and a deputy leader to guide the scientific progress in their WG. WG leaders will report progress on WG objectives and deliverables to the MC.

Meetings of the WG will be organised on a yearly basis as two to three day meetings at different partner locations. These frequent gatherings are scheduled in order to have an optimal exchange of ideas, to discuss progress, to build upon acquired knowledge and plan future activities. Joint WG meetings are eventually possible to enhance integration of activities from different fields, and promote interface between WGs.

E.3 Liaison and interaction with other research programmes

In B.4 the complementarity with other EU projects is given. Also it is described that the participants operate in many national and international networks. The advantage of this programme is the liaison and interaction with many other national research programmes and networks.

E.4 Gender balance and involvement of early-stage researchers

This COST Action will respect an appropriate gender balance in all activities and the Management Committee will place this as a standard item on all the MC agendas. The Action will also be committed to considerably involve Early Stage Researchers. This item will also be placed as a standard item on all MC agendas.

F. TIMETABLE

The total time of the COST Action is 4 years and four months to include the full activities of four growing seasons. The time table (in months) is as follows:

Timeline	**Milestone**	**Deliverables** (see for description D.2)
M01 – 02	- Initial MC meeting, election of chairs, etc - Launching the website	Action: Website
M03-04	- MCmeeting - WG meetings - 1st round of STSM applications	A, B, C, 5a and outline of 5b
M10	- Core group meeting (optional)	Report
M16	- MC Meeting - WG meetings - 2nd round of STSM applications	A,B,C,E, outlines of F, 1a, 2b, 2d, 3a ,3b, 4a,4b, 5c and 5 d; draft of 5b
M22	- Core Group meeting (optional)	report
M28	- MC Meeting - WG meetings - 3rd round of STSM applications - (Joint)Workshops per WG	A,B,C,D,E,1a,5b; outlines of 2a, 2c,2e,4b,4c,4d; drafts of F, 2b,2d, 3a, 3b,4a, 5c and 5d
M40	- MC Meeting - WG meetings - 4th round of STSM applications	A,B,C,E, 2b,2d, 4a, 5c and 5d partly; drafts of 2a, 2c, 2e, 3a,3b,4b,4c,4d
M46	- Core group meeting (optional)	Report
M52	- MC Meeting - WG meetings - Conference	B,E,F,G,1b,2a, 2c,2e, 3a, 3b,4b,4c,4d,5c, 5d,5e

The planning of the meetings and workshops in the different WGs will be such to stimulate exchange of information and ideas among WGs. That is, the workshops will be planned preferably at the same time and location.

G. ECONOMIC DIMENSION

The following COST countries have actively participated in the preparation of the Action or otherwise indicated their interest: AT, BE, CH, DE, EE, ES, FR, HU, IL, IT, NL, SE, SI, TR, UK.

On the basis of national estimates, the economic dimension of the activities to be carried out under the Action has been estimated at 60 Million € for the total duration of the Action. This estimate is valid under the assumption that all the countries mentioned above but no other countries will participate in the Action. Any departure from this will change the total cost accordingly.

H. DISSEMINATION PLAN

H.1 Who?

The target audiences of this COST Action can be categorised as researchers, advisors, certifiers, policy makers and the industry (as specified under chapter C.5). Finally, the general public will be targeted as the public awareness of the attainments of organic research and the degree of sustainability of the organic industry contributes to the image of the industry and its products.

H.2 What?

Website: A public website will be made available to disseminate a wide variety of information regarding the activities and achievements of the COST Action. This website will be open to the general public and all target audience groups. The latest results will become available through articles that are understandable for the general public. To stimulate interaction with a wider public social media will used. A dedicated password-protected section of the website will be used to post specialized working documents among participants of this Action.

Publications: as described in D.2 several technical and scientific documents are important deliverables for the WGs in this Action. The Action will aim when relevant to publish these manuscripts in peer-reviewed scientific journals or proceedings of international conferences. Shorter versions of these documents will be presented in a less complex format to the industry, policymakers and certifiers in more popular magazines and in a less technical format to the general audience. They will also be made available as Organic e-prints

International conferences: Knowledge and attainments gained from the COST Action will be presented at international conferences like those organised by, amongst others, ISHS and ISOFAR.

Electronic communication network: Electronic message networks will be established at different levels. One will be available to the general public, policy makers, industry, scientists and experts - people not directly involved in the Action but interested to be kept informed. Another network will facilitate specific groups such as different WGs and MC. This will be used for communication and discussion between members of these groups.

Events: Each WG will organise a workshop to communicate, integrate and promote scientific knowledge by bringing experts together at a European level. A Conference will be organized at the end to disseminate specialized knowledge to the scientific community, especially to early stage scientists and to advisors, certifiers, policy makers.

H.3 How?

The means of dissemination are described in chapter H.2. The means are differentiated to the mentioned target groups as mentioned in C.2 and H.1. During the Action these means and the volume of the dissemination will be evaluated and updated.