

*COOPERATION*

**THEME 2**

*FOOD, AGRICULTURE AND FISHERIES, AND  
BIOTECHNOLOGY*

**POSSIBLE TOPICS WP2011**

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## Abbreviations

AG:	Advisory Group
CA:	Coordination action
CP:	Collaborative project
CSA:	Coordination or Support Action
ETP:	European Technology Platform
FP6:	6th Framework Programme
IP:	Integrated Project
KBBE:	Knowledge Based Bio-Economy
NoE:	Network of Excellence
LCP:	Large Collaborative Project
P:	Priority (in FP6)
PC:	Programme Committee
SA:	Support Action
SCP:	Small Collaborative Project
SSA:	Specific Support Action
SRA:	Strategic Research Agenda
SRR:	Strategic Research Review
SSP:	Scientific Support to Policy
WP:	Work-Programme

### **Activity 2.1: Sustainable production and management of biological resources from land, forest and aquatic environment**

#### **Area 2.1.1 Enabling research**

*Enabling research on the key long term drivers of sustainable production and management of biological resources (micro-organisms, plants and animals) including the exploitation of biodiversity and of novel bioactive molecules within these biological systems. Research will include 'omics' technologies, such as genomics, proteomics, metabolomics, and converging technologies, and their integration within systems biology approaches, as well as the development of basic tools and technologies, including bioinformatics and relevant databases, and methodologies for identifying varieties within species groups.*

#### **Promoting conifer genomic resources**

**General objective (full description to be further developed):** The project will develop an integrative genomic research programme in conifers using e.g. high-throughput (HT) sequencing, genotyping and gene expression platforms to identify relevant genes and gene networks. The project will also require comparative studies between conifer species with different adaptive and/or reproductive responses and consider the genetic diversity required in forest management.

**Funding scheme:** CP, 6 Million Euros

**Expected impacts:** The generated data and information will form the basis to create an array of pre-breeding tools, i.e. providing tree breeders and forest managers with selection tools and best-practice conservation strategies.

**Additional information:** Suited for international collaboration, e.g. Canada, US

## **Integrated approach to studying effects of combined biotic and abiotic stress in crop plants**

**General objective (full description to be further developed):** Field conditions show a combination of biotic and abiotic stresses. The project aims at gaining a more integrated understanding of the interactions between biotic and abiotic stress signalling pathways in plants and those of growth control (e.g. control of cell and organ growth and meristem activity). The project will progress in moving from studies undertaken in model and semi-model species to crop plants.

**Funding scheme:** CP, 3 Million Euros

**Expected impact:** Results will support the development of breeding and adaptation strategies to maintain and/or optimise yields under varying growth conditions.

## **Efficiency of livestock digestive systems and reduction of the ecological footprint through a combination of systems biology, 'omics' and nutrition**

A more eco-efficient economy is an important component of the Lisbon Strategy after 2010. There is a pressing need to improve the efficiency of animal agriculture to aid food security and reduce environmental footprint. In this environmental discussion, the responsibility of animal production is crucial, as the global demand for animal products is expected to increase by 50% by 2050. The gut is a key biological system that exhibits variation in efficiency of digestion and absorption of nutrients. This variation has its origin in several different factors, including genetic variation, diet and genotype interactions and variation in gut health.

The knowledge of several livestock genomes sequence and recent developments in the area of host-microbe interactomics offers exciting new opportunities to study the interaction between the genome of cow and the microbiota of the gastro intestinal tract. Additionally, metagenomics is coming to age and offers new opportunities to study the diversity and efficiency of microorganisms in the gut.

Increasing the understanding of factors that influence the functioning of the gastrointestinal tract offers new perspectives to improve the efficiency of the livestock digestive systems for monogastric as well as the ruminant production systems. As regards ruminants, the rumen plays a central role in conversion of feed into valuable animal products as well as the emission of green house gases. The diversity of microbes represented in the rumen has a significant influence on nutrient utilization in ruminant animals.

The project will bring together systems biology, metagenomics, microbiology of host and microflora and genetics to increase our understanding of the interplay between livestock nutrition, gut composition and the genome and how this interplay affects the production of green house gases, the efficiency of feed utilization and product quality.

The project will focus on more than one livestock species (at least one monogastric and one ruminant species) and to define key indicator traits to measure the health and efficiency of digestion and explore the genetic basis of these traits. It should complement and collaborate with other related EC projects dealing with livestock gut function for improved nutrition efficiency or environmental footprint.

The project should include the development of bioinformatic resources/tools for possible use by scientists beyond the beneficiaries in the project.

It should also include a training component with the aim to increase the research capacities in developing countries and enlarged EU. This could include, for example, participation to training programmes, short exchanges of staff, training workshops.

The project should include industries, in particular SMEs, to enable close interaction and fine tuning to ensure that the knowledge generated will be converted into tools and technologies for use by industry and SMEs.

**Funding scheme:** CP-IP, 6 Million Euros

**Additional eligibility criteria:** only proposals with an SME involvement of 30% or more of the requested EC contribution...

**Expected impact:** The expected outcomes of this research are improved understanding of the variation in the digestive system, new systems models and tools applicable to selective breeding and nutrition for improved gut health and functionality. This is a multi-disciplinary project which will improve collaboration between different disciplines of animal production and between academia and industry.

**Additional information:** It is viewed that the participation of relevant industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. Therefore, the topic is designed to encourage SME efforts towards research and innovation representing the complete value added of the targeted sectors.

## **Sustaining and managing forest tree genetic resources**

**General objective (full description to be further developed):** Forests are one of Europe's most important renewable resources and provide multiple benefits to society and the economy including conservation of European nature. Forests and other wooded land in the EU cover approximately 177 million ha (over 40 % of the EU territory). Biodiversity plays a major role in maintaining and optimising the various services obtained by forests. Similarly, forest management practices have a direct influence on forest tree genetic diversity. The project will further develop information on forest tree genetic resources in Europe, foster conservation activities and support the use of these resources to implement sustainable forest management practices, including activities at diversification of forests.

**Expected impact:** Resources and information created within project will contribute to providing the forest sector with adequate tools to continue adapting forests to changing environmental conditions while also continue meeting diverse demands from economic activities, biological diversity conservation and society.

**Funding scheme:** CP, 3 Million Euros

### **Area 2.1.2 Increased sustainability of all production systems (agriculture, forestry, fisheries and aquaculture); plant health and crop protection**

*Increased sustainability and competitiveness, while safeguarding consumer health, decreasing environmental impacts and taking account of climate change, in agriculture, horticulture, forestry, fisheries and aquaculture through the development of new technologies, equipment, monitoring systems, novel plants and production systems, crop management through selected plant breeding, plant health and optimised production systems, the improvement of the scientific and technical basis of fisheries management, and a better understanding of the interaction between different systems (agriculture and forestry; fisheries and aquaculture) across a whole ecosystem approach. Research into maintenance of autochthonous ecosystems, development of biocontrol agents, and microbiological dimension of biodiversity and metagenomics will be undertaken.*

*For land based biological resources, special emphasis will be placed on low input (e.g. pesticides and fertilisers), and organic production systems, improved management of resources and novel food and feeds, and novel plants (crops and trees) with respect to their composition, resistance to stress, ecological effect, nutrient and water use efficiency, and architecture. This will be supported through research into biosafety, co-existence and traceability of novel plants systems and products, and monitoring and assessment of impact of genetically modified crops on the environment and human health as well as the possibility of their broader benefit for society. Plant health and crop protection will be improved through better understanding of ecology, biology of pests, diseases, weeds and other threats of phytosanitary relevance and support to controlling disease outbreaks and enhancing sustainable pest and weed management tools and techniques. Improved methods will be developed for monitoring, preservation and enhancement of soil fertility.*

*For biological resources from aquatic environments, emphasis will be placed on essential biological functions, safe and environmentally friendly production systems and feeds of cultured species and on fisheries biology, dynamics of mixed fisheries, interactions between fisheries activities and the marine ecosystem and on fleet-based, regional and multi-annual management systems.*

### ***Livestock Production***

### **Sustainable management of multifunctional agricultural soils in the context of climate change**

**General objective (full description to be further developed):** Soils are a non-renewable resource performing essential functions such as food and biomass production, water storage and sanitation, genepool and a habitat for many forms of life. In order to address issues of soil degradation the project will provide opportunities for research on conservation, fertility of agricultural soils and the relationship between soil biodiversity, plant health and growth. The project will apply systems' approaches capable to capture the complexity of the interplay between environmental conditions, management practices and farming systems. In doing so, it will put emphasis on how to optimize two critical functions of agricultural soils, namely its contribution to carbon sequestration and to sustainable yields.

**Expected Impact:** The project will deliver fit for purpose and scientifically validated decision-support tools, guidelines, novel approaches, techniques and technologies for the different categories of beneficiaries such as farmers, extension services and decision makers.

**Funding scheme:** CP, 6 Million Euros

**Additional information:** Topic suited for selection of two projects

## **Crop production**

### **Reducing mineral fertiliser use in horticulture by recycling treated organic waste as compost and bio-char products**

**General objective (full description to be further developed):** The project aims at enhancing the reuse of organic waste in agriculture (of both urban and farm origin), in order to reduce the use of mineral fertiliser in crop production and minimise the negative impact of agriculture on the environment and on climate change. Different products from currently available bio-waste treatment technologies will be considered for recycling as fertiliser (compost) and soil amendment products (bio-char), their properties analysed and their potential evaluated in terms of crop production and soil improvement efficiency.

**Expected Impact:** The project will contribute to the reduction of chemicals use in agriculture and it will respond to the need of increasing the amount of bio-waste diverted from landfill and recycled into the productive process. It will also contribute to stimulate industrial innovation by improving the bio-waste treatment process and by improving the quality and safety of the final products. The project will also promote a more efficient utilisation of the final products by the end-users (farmers), by studying and developing new application methods.

**Funding scheme:** CP, 6 Million Euros

**Additional information:** Particularly suited for participation of SMEs

### **Development of cover crop and mulch systems for sustainable crop production**

**General objective (full description to be further developed):** Novel cropping systems based on cover crops and (living) mulch shall be developed to increase the duration of soil coverage by plant canopies, minimize the need for and intensity of soil tillage, increase the diversity of species within the plant canopy and the rotation and finally reduce the need for fertilisers and pesticides. A variety of climatic and economic conditions and farming systems in Europe and the Mediterranean shall be considered and the relevant groups of cash crops included.

**Expected Impact:** The project will contribute to creating and transferring knowledge on agronomic practices to move towards a lower-input agriculture in farming systems across Europe and the Mediterranean. Results shall benefit both conventional and organic farming systems.

**Funding scheme:** CP, 6 Million Euros

**Additional information:** Suited for ICPC and SME participation

### **Translating knowledge on flowering time to improve breeding efficiency**

**General objective (full description to be further developed):** Flowering time is closely associated with yield and is altered by a wide range of environmental signals. This trait is already being systematically recorded in breeding programs (selecting for current climate conditions), but under changing climate scenarios, breeding may highly benefit from increased knowledge on the genetic factors of this trait. The project will exploit molecular and

genetic approaches in crop plants to allow a better use of this parameter in breeding programmes.

**Funding scheme:** CP, 3 Million Euros

**Expected impacts:** Results will allow to better use knowledge on the timing of flowering of crop plants to assist in the stabilization of yields in changing environments.

### **Root signalling, growth and development under abiotic stress conditions**

**General objective (full description to be further developed):** Plant growth and development is largely dependent on the plant root system, due to its crucial role in water and mineral uptake. There is a need to further understand root growth regulation under affected by abiotic stresses in the context of complex GxE interactions. The project topic aims at elucidating how roots perceive and are affected by abiotic stress and the role that roots and the broader root-soil complex play in plant adaptation/tolerance to these stresses.

**Funding scheme:** CP, 6 Million Euros

**Expected impacts:** Knowledge and tools generated will support the development of root-targeted breeding strategies to generate varieties that are more tolerant to abiotic stress and thereby be able to sustain crop yield under adverse climatic conditions.

**Additional information:** Topic suited for selection of two projects. Important phenotyping element foreseen under this topic.

## *Forestry*

### **ERA-NET on Forest Research in the Mediterranean region**

**General objective (full description to be further developed):** Mediterranean forest and woodlands cover only about 8.5% of the region's area and are one of the most vulnerable forest ecosystems. In addition, Mediterranean forests are exposed to increased risks related to drastic land use changes and climate change. The ERA-NET project will coordinate national research activities of EU and non-EU MED countries and help set up common research programmes.

**Expected impact:** The ERA-NET is expected to reinforce scientific cooperation on forests throughout the Mediterranean area and thereby maximising the impact of research activities on sustainable forest management.

**Funding scheme:** CSA, 2 Million Euros

### **Balancing carbon storage, hazard protection and timber production in European Mountain forests**

**General objective (full description to be further developed):** Besides producing wood and delivering services like soil protection, forests in Europe's high mountains store vast amounts of carbon in old trees, deadwood and soils. Under increasing pressure from effects of climatic changes, there is a need to assist mountain communities in managing their forests to meet the various demands coming from economic activities (e.g. feeding sawmills and bio-energy), environmental protection and preserving natural carbon stocks. This task requires application of advanced techniques of modeling, planning and management and dissemination.

**Funding scheme:** CP, 3 Million Euros

**Expected impacts:** The project will contribute to both fostering economic activities in more marginal mountain regions as well as help to preserve important environmental functions of European mountain forests (e.g. halting loss of erosion, biodiversity, carbon sequestration).

## *Fisheries*

### **Beyond Maximum Sustainable Yield (MSY): defining management targets and their consequences**

**General objective (full description to be further developed):**

Restoring fish stocks to Maximum Sustainable Yield (MSY) is political commitment for fisheries management but will have to be applied in the context of an Ecosystem Approach to Fisheries management. There is a need to re-evaluate and redefine the concept for application in support of the Common Fisheries Policy (CFP) reform and the contribution of the CFP to the implementation of the marine environmental policy, the Marine Strategy Framework Directive (MSFD). The project will ensure the successful implementation and subsequent development of the CFP and MSFD, with a particular emphasis on effectively integrating ecosystem considerations and environmental policy commitments into fisheries management. The project should provide clear and operational definitions of MSY variants that could be used in EC fisheries management in this context. Joint programming actions between the scientists and the fishing sector, including experiments at sea, will have to be planned in order to test the concepts, the methods and the tools. A regional dimension will have also to be considered in the case studies.

**Funding scheme:** CP, 6 Million Euros

**Expected impacts:** Provision of adequate knowledge to support the CFP reform and the implementation of the Marine Strategy Framework Directive; Inclusion of climate-change effects into the fisheries management measures; Impact assessment of socio-economic consequences for the fishing sector; Integration of stakeholder knowledge in research-based advice; Development of synergies and co-operations between the main actors (e.g .scientific community, fishing sector).

**Additional information:** topic with potential for SMEs participation

### **Socio-economic effects of the main management principles of the new Common Fishery Policy (CFP): impact of new policy framework and opportunities for the fishing sector to develop self- and co-management**

**General objective (full description to be further developed):** The aim is to analyse the socio economics effects and arising opportunities for the fishing sector of the main management principles of the future Common Fisheries Policy (CFP). Options for a revised CFP to be considered include a regionalised policy framework, co-management where the fishing industry takes co-responsibilities for policy implementation and individual or collective transferable rights. Joint programming actions between the scientists and the fishing industry will have to be planned for the analysis of impacts and opportunistic analysis of the impact of the transferable systems and to support development of fishing industry self-and co-management measures. A regional dimension will have to be considered.

**Funding scheme:** CP, 3 Million Euros

**Expected impacts:** Provision of adequate knowledge to support the CFP reform; Inclusion of stakeholder knowledge into research-based advice; Development of synergies and co-operations between the main actors (e.g .scientific community, fishing sector).

**Additional information:** topic with potential for SMEs and EUR12 participation

## *Aquaculture*

### **Aquaculture feeds and fish nutrition: paving the way to the development of efficient and tailored sustainable feeds for European farmed fish**

**General objective (full description to be further developed):** Recently, EU has supported research on the replacement of fish meal and fish oil (separately or simultaneously) in the formulation of alternative aqua feeds for several fish species. The way forward requires the investigation of the long term effects of changes in diet formulations on fish performance, including threshold effects, nutritional intervention in early life stages, carry-over from maternal diets to larvae etc. The project will also explore how differences in nutritional experience at critical early life stages, could affect fish development, metabolism, resistance, growth performance etc. In addition, it will focus on the establishment of quantitative requirements for nutrients (with particular emphasis on micronutrients and vitamins throughout the life cycle), on the evaluation of the nutritional value of alternative feeds and will develop (with the involvement of relevant SMEs) adequate and innovative delivery vectors for nutrients and supplements.

Species to be considered: Atlantic salmon (*Salmo salar*), carp (*Cyprinus carpio*), sea bass (*Dicentrarchus labrax*), sea bream (*Sparus aurata*)

**Funding Scheme:** CP, 5 Million Euros

**Expected impact:** Development of basic knowledge, such as the quantification of nutritional requirements of different species, or the long term effects of alternative feeds on various physiological functions of fish; complementary with on-going RTD activities supported by the European feed manufacturing industry; contribution in the development of feeds tailored to the nutritional requirement of European fish species, which should ideally lead to a gain of productivity of the production sector; involvement of SMEs in related RTD activities.

**Additional information:** topic with involvement of SMEs and potential for EUR12 participation.

### **Setting the basis for assessing and monitoring the potential genetic impact of domestication of farmed aquatic species on wild populations.**

**General objective (full description to be further developed):** Based on the precautionary approach, the European Union is promoting a high level of environmental protection. Aquaculture provides safe and healthy seafood, while raising challenges related to its environmental sustainability. One of the risks related to the aquaculture operations is the escape of cultured aquatic organisms. Anticipating the future development of more intensive breeding programmes throughout Europe, the risk of genetic impacts from aquaculture escapees on wild populations needs to be addressed before the domestication process of cultured species is further intensified. The objective of the project will be to draw the baseline demographic and genetic information on life-history and structuring of wild populations of key EU aquaculture species to monitor and assess the potential genetic impact of aquaculture activities. In addition, strong focus will be on the development of innovative tools for identifying the genetic origin of fish and ensuring traceability of farmed and wild animals.

Species to be considered: carp (*Cyprinus carpio*), sea bass (*Dicentrarchus labrax*), sea bream (*Sparus aurata*), Pacific cupped oyster (*Crassostrea gigas*)

**Funding Scheme:** CP, 2 Million Euros

**Expected impact:** Anticipate potential risk of interaction between aquaculture escapees with wild animal and of depression of the fitness of the later (domestication of aquatic species is progressing fast due to the recent development of new (bio)technologies that greatly facilitates the selection of phenotypes with better performance); development of the knowledge basis for the objective assessment of this risk (and associated threats on biodiversity); underpin the future development of reliable monitoring of the interactions between farmed and wild animals; The tools developed by the project will also be relevant for ensuring the traceability of seafood (species concerned).

**Additional information:** topic with involvement of SMEs and potential for EUR12 participation.

### **Area 2.1.3 Optimised animal health, production and welfare across agriculture, fisheries and aquaculture**

*Optimised animal health, production and welfare, across agriculture, fisheries and aquaculture, inter alia through the exploitation of genetic knowledge, new breeding methods, improved understanding of animal physiology and behaviour and the better understanding and control of pests, parasites and infectious animal diseases and other threats to the sustainability and security of food production, including zoonoses. The latter will also be addressed by developing tools for monitoring, prevention and control, by underpinning and applied research on vaccines and diagnostics, studying the ecology of known or emerging infectious agents and other threats, including malicious acts, and impacts of different farming systems and climate. New knowledge for the safe disposal of animal waste and improved management of by-products will also be developed.*

#### ***Animal health and zoonoses***

### **Alternative/complementary medication for livestock under organic farming systems:**

**General objective (full description to be further developed):** Allopathic medication will become increasingly obsolete because of the residues in meat, egg and dairy products and because of the negative impact on soil and water, via faeces and urine excretion. Alternative concepts are based on tolerant or resistant breeds and on prevention through herd management. Nevertheless, alternative medicines are needed in order to complement preventive measures. There is a need to help SME to develop novel products, equipment, software and diagnostic tools that are appropriate in particular to meet the requirements and constraints of the organic production system and compensate the reduction in the use of allopathic treatments set up in the organic regulation. Participatory approach is necessary to test usability of the potentially developed products,

**Funding scheme:** CP, 3 Million Euros

**Expected impacts:** Impact can be not only on organic farming but also important for other farming methods in relation to the potential reduction of residues in food and in the environment. It will promote the competitiveness of SMEs in developing novel products and equipment.

**Additional information:** topic with potential for SMEs (20%)

### **Management and control of increased livestock parasite infection risks due to global change**

#### **Description**

The aim of this topic is the development of innovative tools to monitor changing patterns of helminth infections - including the development and spread of drug resistance- in livestock (ruminants) in order to determine the most effective treatment and control strategies (excluding vaccination). This will require an interdisciplinary approach, involving parasitologists, climatologists, geographers, epidemiologists, information scientists, statisticians and veterinarians. Geographical information systems (GIS), Remote Sensing (RS) and Spatial analysis techniques, together with new diagnostics will monitor the distribution and spread of parasite infections and drug resistance. This will be correlated with changing

environmental and climatic conditions to generate models and predict future trends. The project will focus on nematodes and trematodes.

**Justification**

Parasite infections in ruminants are a major constraint for the productivity and profitability of animal production. Global environmental, climatic and economic changes are challenging traditional methods of animal husbandry. Changes in animal husbandry together with climate change will affect patterns of parasite infections because they depend on specific environmental conditions to survive and disperse.

Increased demand of animal products together with a limited (even decreasing) availability of agriculture lands will entail an increase in intensified grazing with a stronger parasite contamination of pastures. Parasite control relies heavily on treatments with antihelmintic drugs. However, the development and spread of drug resistant parasites will hamper the control in a medium and long term and hence the sustainability of livestock production. Relevant for sustainable production, food security, food safety, public health, “One World One Health”, MDGs..

**Funding scheme** : CP, 3 Million Euros

**Additional information**: Active involvement of SMEs.

**Expected impact:**

Technical and practical solutions (e.g. simple low cost multi-parasite species diagnostic tools, risk maps, GIS based disease surveillance and forecast) for the control of the parasite infections. Better management of anthelmintics allowing preserve their efficacy. Contribute to a more sustainable use of pasture and pharmaceutical resources. Improve the competitiveness of European livestock in a growing global trade. Beneficiaries include farmers (SMEs), veterinarians, consumers. High potential for capacity building in the EU and outside.

**New/next generation of researchers for Neglected Zoonoses at the animal-human interface:**

**Description**

This topic focuses of targeted measures aiming at improving the career prospects for young researchers in neglected zoonotic diseases at the animal – human interface. The key research questions are: What is the added value of a closer cooperation of human and animal health compared to sectoral work alone? What are potential financial savings of a closer cooperation? What are potential new institutional arrangements at central and peripheral level of a closer cooperation in partnership (e.g. joint zoonoses surveillance in animals and humans)? What is the potential of a closer cooperation both in the EU and in developing and transition countries? What are the prospects of a global subsidiary principle of zoonoses control? The activities should comprise training of young scientists and support young researchers to establish independent research activities in disease-endemic countries. In addition to the scientific aspects of the diseases, socio-economic, institutional and decision making aspects should be also addressed with an integrated and multisectoral approach. High quality science contents, demonstrated organisation and management abilities and clear indications of sustainability and impact will be prerequisites of selected actions. Coordination with ongoing EC activities in neglected zoonoses is encouraged as well as participation of SMEs.

**Justification**

Neglected zoonoses diseases cause not only very important losses to the livestock productivity (with impact on the whole chain: farmers (meat, milk, hides, skins, wool, labour), local and international traders, slaughter houses, transporters, butcheries, control programmes)

but also high burden in the human populations (DALYs, diagnosis, treatments, care, control programmes) in endemic countries.

**Funding scheme:** CSA

**EC contribution:** max. 2 Million Euros

**Additional information:** SMEs can be encouraged Could be a Specific International Cooperation Action (SICA)

**Expected impact:** it is expected to establish a long-term training programme that is open to promising young scientists in neglected zoonotic diseases at the animal-human interface. It should further manage a career development programme to support young researchers in establishing themselves with independent research in disease-endemic countries. The action should establish collaboration with ongoing training and career development activities in neglected zoonotic diseases with an aim to establish a joint, coordinated programme.

Capacity building, technology transfer. Improvement of animal production and public health. One World One Health concept development of a “culture” of collaboration at the animal-human interface. Breaking barriers and building bridges between AH and HH. Global challenges: food security, global health, face climate change impact (which has a potential impact on the prevalence and distribution of some of the NZ)

## **Development of multiple field tests for rapid screening of pathologies as well as simple laboratories tests**

### **Description/Justification**

The aim is to develop field tests based on new or current technologies for use in a rapid first line early multiple screening of pathologies / syndromes in livestock, wildlife and companion animals. The tests should be able to discriminate several diseases with the same sample. The selection of diseases to be considered in each species can be guided by different criteria such as syndromes or statutory control programmes. In addition to the basic qualities required of specificity and sensitivity, criteria of low cost, simplicity, rapidity, stability will be sought. The project will also address simple laboratory diagnosis including preliminary enrichment methods. The project is targeted to the participation of SMEs. The project should foresee appropriate plans of technology transfer including transfer of reagents from research institutions and academia as appropriate.

### **Justification**

Diagnosis is a key/ crucial tool in prevention and control of infectious diseases. Its improvement of specificity, sensitivity, low cost, rapidity, simplicity, stability, potential to cover several diseases at the same time and fit for purpose are a universal and systematic priority.

**Funding scheme:** CP, 3 Million Euros

**Additional information:** Targeted to SMEs.

**Expected impact:** Rapid low cost screening will facilitate early detection and rapid decision making. Bridge bottlenecks between research labs and SMEs. Technology transfer.

## **European interprofessional network addressing zoonotic diseases transmitted via companion animals**

### **Justification and Description**

There is an ever increasing presence of companion animals in current societies in close interaction with human beings and in many cases also with food animals. In addition to dogs and cats, exotic animals from a large variety of species are also being introduced in considerable numbers through legal and illegal trade. It is well documented that 60% of

infectious diseases in humans originate in animals and about 75 % of emerging diseases are zoonotic (e.g. Echinococcosis, leishmaniasis, psittacosis, monkey pox, influenza, Salmonella, antimicrobial resistant pathogens, rabies) and they are also a potential source of pathogens for food animals (including fish). However, information on incidence in animals and people and on strategies for disease prevention and control is fragmented.

This coordination action aims at creating multidisciplinary and multisectorial inter-professional network of experts as an unprecedented “think tank” to provide an overview of the current situation and propose targeted actions to prevent, reduce and eliminate the health risks for humans and food animals associated with keeping companion animals. Possible liaison with US (USDA and CDC), Australia, New Zealand, Canada can be envisaged.

**Funding scheme:** CSA, 1 Million Euros

**Additional information:**

**Expected impact:** Multisectorial and multidisciplinary inter-professional European network including policy makers and sociologists, addressing in a comprehensive approach the companion animals in society and their implication in the transmission of pathogens affecting humans and / food animals. Transfer of knowledge to different layers of society. Sociological impact. Impact on animal welfare. Interest for veterinary and medical students and young professionals.

## *Animal welfare*

### **ERA-Net on animal welfare**

**General objective (full description to be further developed):** Cooperation between European research funding bodies in the area of animal welfare started with the SCAR collaborative working group on animal health and welfare. The proposed network should establish principles and mechanisms for the evaluation of joint calls and for the management of trans-national projects. The ERA-Net could be seen as an extension of the existing ERA-Net on animal health (EMIDA)

**Funding scheme:** CSA, 1 Million Euros

**Expected impact:** It is expected that further coordination efforts in the area of animal welfare will consolidate the initiated process of identifying major research needs and pooling resources for funding and implementing research activities in a synergistic manner

**Additional information:** ERA-Net

## *Animal production*

### **Development of next generation European system for sire evaluation (dairy cattle)**

Next to pedigree, genomic evaluation is an indispensable additional tool for balanced breeding of livestock species and especially dairy cattle. European cooperation and exchange is necessary to make a new dairy herd improvement system directly based on the performance data of the European farmers.

Since the genomic breakthrough, European breeding companies (mostly farmer’s owned) face challenges worldwide on the cattle breeding market. Competitors go for short term aims, offering genetics of families that have already a large influence within the breed causing even further threat for world wide inbreeding. Europe needs to develop a dairy herd improvement

system directly based on the performance data of the European farmers. For this, further improvement of current methods for genomic selection is needed, and the tools must be made more flexible and user friendly.

The project should focus particularly on:

- translation methods between different genotyping platforms,
- scientific communication about extended reference populations,
- development of software to make feasible exchanges between countries and breeds,
- common development of new genetic software for wide field applications,
- detection and data collection of new traits for genomic evaluation,
- methods and tools to improve genetic variation within the breeds.

The will include: meetings and workshops for fine-tuning of national and regional efforts; capacity building elements including training destined to the enlarged EU; communication efforts for the dairy industry (artificial insemination centres).

**Funding scheme:** CP-FP.

**Additional eligibility criteria:**

- Max EC contribution: 3Million Euros.
- Only proposals with an SME involvement of 30% or more of the requested EC contribution...

**Expected impact:** Genomic evaluation/selection is a major concern in the Cattle Breeding Industry, mostly SMEs and the project should help them to capitalize on this recent technology to maintain and strengthen European expertise as a reference for breeding value estimation. This close-to-implementation project should reinforce European competitiveness in dairy cattle breeding, taking into account renewed breeding goals like production efficiency, welfare and quality.

**Additional information:** It is viewed that the participation of relevant industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. Therefore, the topic is designed to encourage SME efforts towards research and innovation representing the complete value added of the targeted sectors.

#### **Area 2.1.4 Socio-economic research and support to policies**

*Providing the tools needed by policy makers and other actors to support the implementation of relevant strategies, policies and legislation and in particular to support the building of the European Knowledge Based Bio-Economy (KBBE) and the needs of rural and coastal development. The Common Fisheries Policy and the new European Maritime Policy will be supported through a whole ecosystem approach for the harvesting and the farming of marine resources. Research for all policies, including the Common Agricultural Policy, will include socio-economic studies and cost-benefit analysis, comparative investigations of different farming systems including multifunctional ones, cost-effective fisheries management systems, the rearing of non-food animals, interactions with forestry and studies to improve rural and coastal livelihoods.*

#### **Strengthening the impact of fisheries related research through dissemination, communication and technology transfer**

**General objective (full description to be further developed):** The objectives are to increase dissemination of scientific knowledge on fisheries related research and to improve communication between scientists, industry, policy makers and stakeholders for a better implementation of the Common Fisheries Policy (CFP). Specific attention will be given to dissemination towards the EU citizens. Focus will also be on facilitating exploitation and transfer of research outcomes through innovative friendly-user applications and new technologies.

**Funding scheme:** SS/CA, 1 Million Euros

**Expected impacts:** Provide better communication between the different actors; improve dissemination towards the main end-users (e.g. ICES); improve transfer of knowledge from research into the scientific advice.

**Additional information:** topic with potential for EUR12 participation

#### **Feasible and cost-effective crop-specific coexistence measures, labelling, and traceability requirements.**

##### **Description:**

Further development and implementation of feasible and cost-effective coexistence measures, labelling and traceability requirements remain a key issue for the application of biotechnology in EU agriculture, as well as for freedom of choice for farmers and consumers. This project will address the practical and safe implementation of various transgenic and non-transgenic biological containment strategies, crop-specific technical segregation measures, and coexistence practices in crop and seed production, including measures for the co-existence between non food/feed GM crops and non-GM crops. The project should also assess scientific, economic and legal issues surrounding the practical implementation of coexistence in European agriculture and freedom of farmer and consumer choice. In addition the issue of coexistence for GM and non-GM commodities within supply chains at international level is increasingly important, due to the asynchronous approval processes of biotechnology products in the EU and its major trading partners. Finally the project should provide a comprehensive information system for sharing research results with Member States and other stakeholders and a public communication programme to engage relevant Member States authorities, agro-food chain operators and other stakeholders from the beginning to the end of the project. Due

to the political nature of this topic a wide range of participants representing the complete EU farming topography is necessary as is the participation of global partners from the trade point of view, and small and medium enterprises who can exploit and develop coexistence tools.

**Funding scheme:** CP, 3 Million Euros

**Expected impact:**

The project will support the coherent and practical implementation of feasible and cost-effective crop-specific coexistence measures and labelling and traceability requirements.

**Additional information:**

Coexistence can be achieved ex-ante using much less minimum distance requirements than currently suggested and given the low damage costs, ex-post liability from an economic point of view would be a preferable tool. Koch et al. have investigated ex-post liability rules in the EU 27, but still there are a number of open questions, such as possibilities for reducing ex-post liability costs. Comparing the benefits and costs for different systems for ex-post liability would be helpful for member states. Most of the research to date has concentrated on maize and to a lesser extent on oil-seed rape and sugar beets while coexistence will become important in those areas where there is a relatively high concentration of the GM crop. Research has concentrated on coexistence at the farm (field) level but the major challenge for the future will be coexistence within the supply chain at international level, because of asynchronous approval processes. Tools are needed which will improve the flexibility of coexistence regulations. Need for field based biological containment case studies which for example combine insect resistance and herbicide tolerance gm traits with CMS in maize and for testing stability and also for reliability of bc tools under field conditions.

## **The CAP and sustainable land use in peri-urban areas**

**Short rationale/description:** Peri-Urban areas fall between the lines of urban and rural development, while they provide close to consumer supply chains

**Funding scheme:** CP, 1.5 million Euros

## **Developing a data system for European organic market information**

**Short rationale/description:** This project aims to increase the transparency of the European market for organic food through better availability of market intelligence. Currently, no official market statistics (such as volume and value of production and retail sales) of the European market for organic food exist. Data are collected and published by various bodies, including governments, private companies and academic research institutions.

**Funding scheme:** CP, 1.5 Million Euros

## **Innovative Tools to link supply and demand in developing country markets**

**Short rationale/description:** There are contradictory studies on the influence of imported food on developing country markets. Food aid from OECD countries or low price imports from productive Asian regions could undermine the local production capacity, while urban poor may benefit

**Funding scheme:** CP, 1.5 Million Euros

## **Towards the farm of tomorrow - Innovative forms of mixed farming for optimized use of energy and nutrients**

**Short rationale/description:** The topic would respond to the challenge to climate change mitigation and adaptation. It would develop innovative ideas, strategies and technologies to connect livestock and crop production at farm, district and landscape level

**Funding scheme:** CP, 6 Million Euros

## **ACTIVITY 2.2 Fork to farm: Food (including seafood), health and well being**

### **Area 2.2.1 Consumers**

*Understanding consumer behaviour and consumer preferences as a major factor in the competitiveness of the food industry and the impact of food on the health, and well-being of the European citizen. The focus will be on consumer perception and attitudes towards food including traditional food, understanding societal and cultural trends, and identifying determinants of food choice and consumer access to food. The research will include the development of data bases on food and nutrition research.*

### **Strategies for improving communication between social and consumer scientists and food technology developers**

Communication barriers between food technologists and the public can lead to a rejection of investment intensive and useful new (food) technologies by the public based on misunderstandings, fears or mistrust. This is often due to a lack of information or to a supply of information that cannot be understood by the consumer. In addition, rejection of a new technology can also be the consequence of a lack of the technology developers' knowledge of the preferences or needs of consumers. An important first step in removing these barriers is the building up of a successful bilateral dialogue between social and consumer scientists and technology developers leading finally to a more confident and better informed consumer. The main task of this project is to identify existing barriers, make food technologists aware of them, and find ways to build up a successful dialogue with social/consumer scientists as a first step towards the public dialogue. Participants of this action should come from all groups to be consulted before and during technology development: food scientists and technologists from companies, universities and research institutes, industry non-technical experts, consumer scientists, ethical experts, representatives of science media/journalists and consumer groups.

**Funding scheme:** Coordination and Support Action (supporting action). The requested European Community contribution shall not exceed EUR 1 000 000.

**Expected Impact:** 1) Early identification of issues that can lead to rejection of new (food) technologies before the start of the development or at the latest before the marketing phase. 2) Higher awareness of food technologists regarding the risk of their R&D work becoming a public issue and their own responsibility in this field. 3) Means of informing food technologists on how and where to obtain the relevant information and how to formulate information that can be understood by non-technologists. 4) Higher competitiveness of the European food and food machinery industry due to more successful launches of new technologies.

### **Area 2.2.2 Nutrition**

*Understanding beneficial and harmful dietary factors as well as the specific needs and habits of population groups as a major controllable factor in the development and reduction of occurrence of diet-related diseases and disorders including obesity and allergies. This will involve the investigation of new dietary strategies, the development and application of nutrigenomics and systems biology, and the study of the interactions between nutrition, physiological and psychological functions. It could lead to reformulation of processed foods and development of novel foods and ingredients, dietetic foods and foods with nutritional and health claims. The investigation of traditional, local, and seasonal foods and diets will also be*

*important to highlight the impact of certain foods and diets on health, and to develop integrated food guidance.*

## **Development of functional foods and ingredients**

The aim of this topic is to develop foods and/or food ingredients (flavonoids excluded) beneficial to human health and therefore expected to bear nutrition or health claims. The research can be complemented and supplemented with the use of available, already existing scientific knowledge generated at the molecular, cellular or whole-organism level, particularly in humans, and through epidemiological studies. The research will include studying the role and mechanisms (absorption and activity) of selected food components as well as the factors influencing their functional properties. Translational research approaches should be favoured with a view to achieve food market development. Where appropriate, gender issues should be considered.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project targeted to SMEs). The requested European Community contribution shall not exceed EUR 6 000 000.

**Expected impact:** The expected project results should clearly be of interest and potential benefit to SMEs. It will increase the innovation potential and competitiveness of the European food industry, in particular SMEs. It will provide sound scientific substantiation for developing new functional foods and will support the common European policy on health and nutrition claims. It will enhance cooperation between scientific disciplines and stakeholders in Europe.

**Additional information:** It is viewed that the participation of relevant industrial partners, in particular SMEs, should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. Only proposals with an SME involvement of 35 % or more of the requested EC contribution will be selected. This will be evaluated under the criterion 'Implementation'.

## **New technologies and tools and its potential application to nutrition research**

New research opportunities in the nutrition area are arising through the use of cutting-edge technologies. Bio- and nanotechnologies, neuroimaging and cognitive sciences, bioinformatics, "omics" offer significant potential for the nutrition research. This potential may be more easily realised if available methods and tools are used in a comprehensive manner and in particular in combination with traditional nutrition techniques and methodologies. The aim is to explore and understand the power and limitations of these rather novel technologies and their use in combination with the more traditional methodologies in nutrition research in order to make the results/studies comparable and/or interrelated.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project). The requested European Community contribution shall not exceed EUR 6 000 000.

**Expected impact:** To understand potential and limitations of newest techniques in nutrition research. To achieve scientific and technological breakthroughs in the development of integrated tools and methods for nutrition research. The European added value lies in valorising and developing cutting edge technologies and methodologies for the nutrition scientific community.

**Additional information:** It is viewed that the participation of relevant international partners from Australia, Canada, USA and New Zealand should add to the scientific and/or

technological excellence of the project and/or is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation.

### **Influence of early nutrition on health outcomes of infant**

Increasing evidence demonstrates that pre- and postnatal nutrition, metabolism and lifestyle have long lasting programming effects on later health. Research should aim at understanding the mechanisms of optimal nutrition in quality and quantity in the pre-conceptual period, in pregnancy and in infancy. Better knowledge of the mechanisms of the programming effect on development, metabolic diseases and health risk in later life is needed. Characterisation of factors such as placental function, early growth patterns, pre-pregnancy weight status, pregnancy weight gain, gestational diabetes, breastfeeding, genetic variation, environment, gender, physical activity together with ethnicity and geographic background should be studied. The role of total diet, macronutrients and micronutrients in optimising maternal weight gain during pregnancy should be investigated through animal and human studies. Optimal nutrition should be formulated through recommendations. International collaboration is encouraged.

**Funding scheme:** Collaborative Project (large-scale integrating project). The requested European Community contribution shall not exceed EUR 9 000 000.

**Expected impact:** A better understanding of the impact of early nutritional programming on development, metabolic diseases and health risks in specific subgroups of the population, leading to an effective selection of preventive measures. Identification of the nutritional status of pregnant women in Europe. Optimisation of nutritional intervention in normal pregnancies and in pregnancies complicated by obesity and gestational diabetes. Formulation of guidelines for optimal nutrition during conceptual period, pregnancy and infancy/breast feeding.

**Additional information:** It is viewed that the participation of relevant international partners from US should add to the scientific and/or technological excellence of the project and/or is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation.

### **Translation mechanisms for targeting interventions on micronutrients**

Evidence shows that adequate nutrition during the six months before pregnancy, the pregnancy itself and the first two years of child's life is crucial for survival and optimal development (including growth, cognitive, language, social and motor development). Adequate nutrition is key in the achievement of the Millennium Development Goals for reducing the proportion of people who suffer from hunger and malnutrition. However, implementation of science-based policy initiatives to reduce malnutrition is not always successful. The work should explore best ways to valorise existing scientific results on micronutrient needs for targeted groups, identify best practices to improve micronutrient status at large-scale and translate efficiently the knowledge into operational capacities such as households, communities, governments. South East Asian region countries are targeted. For the development of specific and targeted policy guidance and for ensuring successful implementation of measures/actions to reduce malnutrition, the specificities of the countries should be taken into account, such as their national health systems and their political, cultural and socio-economic situations.

**Funding scheme:** Coordination and Support Action (supporting action). The requested European Community contribution shall not exceed EUR 2 000 000.

**Additional eligibility criteria:** Minimum number of participants: 3 from different Member States or Associated countries and 3 from different ICPC from South East Asia.

**Expected impact:** To achieve the Millennium Development Goals in reducing the proportion of people who suffer from hunger and malnutrition, improving health status of infants during the first 24 months and the mother during the pregnancy. This should eventually contribute to the alleviation of the burden of malnutrition and improve health in adulthood, as well as mitigate the risk of chronic diseases.

### **Area 2.2.3 Food processing**

*Optimising innovation in the European food industry through the integration of advanced technologies into traditional food production including fermented food, tailored process technologies to enhance the functionality, quality and nutritional value of food including organoleptic aspects in food production including new foodstuffs. Development and demonstration of high-tech, eco-efficient processing and packaging systems, smart control applications and more efficient valorisation and management of by-products, wastes, water and energy. New research will also develop sustainable and novel technologies for animal feed, including safe feed processing formulations and for feed quality control.*

### **Sustainable cleaning and disinfection technologies**

Disinfection is one of the most critical processing steps in fresh-cut vegetable and fruit production, and is mainly based on the use of chlorine. Due to the health and environmental risks associated with the formation of carcinogenic halogenated disinfection by-products, there is a need to reduce or circumvent the use of chlorine, minimising at the same time water consumption and waste water. The aim of this topic is to develop an innovative and holistic approach to cleaning and disinfection strategies in fresh-cut vegetable and fruit production that face three major challenges: (i) improving product safety and shelf-life, (ii) reducing water use, (iii) reducing chemical emissions in the waste water – without affecting quality. To this end, the colonisation patterns (biofilms on food and equipment surfaces) and the sensitivity of microorganisms to cleaning and disinfection agents and processes have to be studied first. Hygienic design and cleaning characteristics of the processing equipment have to be considered as well. The research should lead to new best available techniques reference documents and a new Code of Best Practice for disinfection and cleaning operations.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project targeted to SMEs). The requested European Community contribution shall not exceed EUR 3 000 000.

**Expected impact:** The European added value lies in an enhanced innovation capacity of the equipment manufacturing industry, strengthening the competitiveness of the European freshcut

food industry and offering improved food products of high quality and safety. The expected project results should clearly be of interest and potential benefit to SMEs. The research will contribute to sustainability in general and, more particularly, to the EC Directive on Integrated Pollution Prevention and Control (IPPC) in terms of reducing chlorine environmental emission in water and decreasing the water consumption rates in food industries up to 20-50%.

**Additional information:** It is viewed that the participation of relevant partners from the food and the equipment manufacturing industries, in particular SMEs, should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. Only proposals with an SME involvement of 35 % or more of the requested EC contribution will be selected. This will be evaluated under the criterion 'Implementation'.

## Food Factory of the Future – Design Study

The aim is to support a conceptual design study for a new research infrastructure of a clear European dimension and interest. The study should address all key questions that will help to assess the scientific, technical and financial feasibility of the proposed new facility. It should lead to a 'conceptual design report' allowing policy makers and their advisors to prepare relevant strategic decisions for the development of the new research infrastructure. The objectives of the infrastructure will be to enhance knowledge transfer and provide a sound science base in relation to innovative, consumer friendly and sustainable food production concepts, business models, emerging technologies, added value products and services. The infrastructure should provide for technologies and facilities for all steps in the food processing chain as well as for general concepts such as virtual design, information technologies, vision systems and robotisation, and the development of new business models. The research infrastructure should offer unique research resources and services to users from different countries, attract young people to science and network among existing facilities, independent of its location and operator.

**Funding scheme:** Coordination and Support Action (supporting action). The requested European Community contribution shall not exceed EUR 2 000 000.

**Expected impact:** The funded project should address the key questions concerning the assessment of the technical and financial feasibility of the new facility. The proposed infrastructure will contribute to the technological development capacity and to the scientific performance and attractiveness of the European Research Area. The European added value of the research infrastructure itself lies in fostering innovation in food science and technology and a cost-effective use of scientific resources in this field. In the end, this will assist EU manufacturers across the food and high-tech sectors, in particular SMEs, to faster adapt to global competitive challenges.

**Additional information:** It is viewed that the participation of representatives of the food and machinery industry including SMEs should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the work to be undertaken.

This will be considered in the evaluation.

## Sustainable and functional food packaging

Food packaging plays a crucial role in preserving the quality and safety of food during distribution and storage from farm to fork, and contributes to the generation of waste. The European food packaging industry needs new food packaging materials and flexible packaging systems to stay competitive on the global market. The new functional and consumer-oriented solutions have to ensure the safety and quality of food, reduce food losses, and reduce the environmental impact of food packaging. The industrial applicability of the research has to be demonstrated together with the positive impact on the environment via a Life Cycle Assessment of the whole value chain.

**Funding Scheme:** Collaborative Project (small or medium-scale focused research project targeted to SMEs). The requested European Community contribution shall not exceed EUR 3 000 000.

**Expected impact:** The main expected impact is the application of sustainable packaging by the food industry. The European added value lies in the combination of a lower environmental impact and a higher competitiveness of European packaging and food industries, including SMEs. The project will provide an answer to consumers' demands regarding food safety and environmental issues.

**Additional information:** It is viewed that the participation of relevant industrial partners from the food and the packaging industry, in particular SMEs, and/or other end-users should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. Only proposals with an SME involvement of 35 % or more of the requested EC contribution will be selected. This will be evaluated under the criterion 'Implementation'. Up to 3 projects may be funded.

### **Satiety control through food structures made by novel processing**

The aim of this topic is to develop food products that are beneficial in the regulation of food intake through accelerating satiation during a meal, enhancing satiety, and/or reducing appetite. The approach to food development should be via novel processing methods (high pressure, pulsed electric fields, advanced heating technologies, ultrasound) and guarantee food safety. The efficiency of the foods developed in satiating and/or reducing appetite has to be proven in human trials against biomarkers of satiety and/or appetite. A multidisciplinary collaboration of researchers in food processing, nutrition and consumer science with food producing enterprises will be instrumental to reach the objectives of the topic.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project targeted to SMEs). The requested European Community contribution shall not exceed EUR 6 000 000.

**Expected impact:** The European added value lies in an enhanced innovation capacity in the field of novel processing, a broader application of the technologies by the food industry, and strengthening the competitiveness of the European food industry. The expected project results should clearly be of interest and potential benefit to SMEs. The development of food products for control of satiety and/or appetite is a part of the preventive strategies to reduce the burden of chronic disease of the European population. The research will contribute to European health policy, in particular the Strategy for Europe on Nutrition, Overweight and Obesity related health issues. The new and/or improved food products of high quality and safety will enlarge the range of processed foods in order to help consumers reach a balanced diet.

**Additional information:** It is viewed that the participation of relevant partners from the food industry, in particular SMEs, should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. Only proposals with an SME involvement of 35 % or more of the requested EC contribution will be selected. This will be evaluated under the criterion 'Implementation'.

### **Processed foods with lower content of salt, fat and sugar**

The aim of this topic is to reduce the content of salt (sodium), fat (saturated and trans-fatty acids) and/or sugar (mono- and disaccharides) in processed food products in order to overcome technological barriers to the reduction of the components concerned while ensuring food safety and quality. The food types worked on should be major contributors to high intakes of the components concerned in Europe. At least the following food categories should all be included: bakery products, meat products, cheeses and ready-to-eat meals. The proposal has to show clear quantitative goals for reduction. The work will also include taste and texture optimisation, an evaluation of the acceptance of the new products by consumers, including labelling issues and affordability, and an estimation of the impact of the reformulation on the overall nutrient intake of consumers. A multidisciplinary collaboration of researchers in food processing, nutrition and consumer science with food producing enterprises will be needed to reach the objectives of the topic. Efficient technology transfer will be achieved and application of the developed processes by the industry, in particular SMEs, is required.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project). The requested European Community contribution shall not exceed EUR 6 000 000.

**Expected impact:** The European added value lies in coping with the different recipes for traditional and processed foods from different countries in order to lower the risk of nutrition-related health problems. Contribution to European health policy, in particular the Strategy for Europe on Nutrition, Overweight and Obesity related health issues and the EU salt reduction initiative. The expected project results should clearly be of interest and potential benefit to SMEs. To enlarge the range of processed foods that will help consumers reach dietary adequacy.

**Additional information:** It is viewed that the participation of relevant partners from the food industry (one per food category studied), in particular SMEs, should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation.

#### **Area 2.2.4 Food quality and safety**

*Assuring chemical and microbiological safety and improving quality in the European food supply. This will include understanding the links between microbial ecology and food safety; developing methods and models addressing the integrity of the food supply chains; new detection methods, traceability and its further development, technologies and tools for risk assessment, including emerging risks, management, and communication, as well as enhancing the understanding of risk perception. This will also include science based methods for risk benchmarking in the field of food safety.*

#### **Safety and quality of ready-to-eat foods**

New eating habits, like the increasing consumption of convenience food, are changing the ways of preparing and storing food. The consumption of ready-to-eat (RTE) or minimally processed foods is growing together with the pressure on the food industry to reduce waste and increase shelf-life. Research in this area should address public health risks focusing on pathogens and/or organoleptic quality aspects associated with these developments. In order to produce safe products and stay competitive on the global market, the European food industry needs new predictive and probabilistic models and decision-making tools to quantify and manage spoilage and pathogen risks. This will also enable the food industry to implement safe milder processing procedures. Strategies at food business operator level to mitigate the identified public health risks/quality aspects from RTE food products should be developed in cooperation with food producing SMEs.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project targeted to SMEs). The requested European Community contribution shall not exceed EUR 3 000 000.

**Expected impact:** The European added value lies in offering food of increased quality and safety to consumers as well as in an enlarged innovation capacity of the food industry, strengthening its competitiveness. Comparable scientific evidence to serve as basis for increased safety and quality of RTE foods will be provided, enabling food business operators and especially SMEs to better identify where improvements are still possible from the public health point of view in the RTE food production chain. The research activities are expected to produce, implement and validate user-friendly decision making tools for optimisation of food processing techniques, product innovation, and/or food product shelf-life determination. In the interest of consumers, industry and policy makers, the efforts will improve food safety and

minimise food spoilage. The expected project results should clearly be of interest and potential benefit to SMEs.

**Additional information:** It is viewed that the participation of relevant industrial partners, in particular SMEs, should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. Only proposals with an SME involvement of 35 % or more of the requested EC contribution will be selected. This will be evaluated under the criterion 'Implementation'. Up to three proposals may be funded for this topic.

## **Pan-European Total Diet Study**

It is essential to have accurate information on people's actual total dietary exposure to chemical contaminants. This can be achieved through total diet studies (TDS). Research in this area should assess the dietary exposure to chemical contaminants of different age, sex and population groups in Europe. It includes identification of typical baskets of foods that are common in the overall diet. Dietary intake of contaminants from these foods, processed for normal use and consumption, should be investigated. Harmonised methods should be developed for data collection and the construction of a European database, available to risk assessors and risk managers.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project). The requested European Community contribution shall not exceed EUR 6 000 000.

**Expected impact:** The European added value lies in providing European risk assessors and risk managers with a priority-setting tool consisting of a database containing information on the levels of contaminants in food, which will enable them to focus their limited resources on those contaminants that pose the greatest risks to public health. In addition, total diet study results can be indicators of environmental contamination and can be used to assess the effectiveness of specific risk management measures. This will lead to an increased safety of the food chain.

**Additional information:** It is viewed that the participation of relevant partners from industrialised countries who have gained a certain experience with conducting total diet studies, should add to the scientific and/or technological excellence of the project and/or lead to an increased impact of the research to be undertaken. This will be considered in the evaluation.

### **Area 2.2.5 Environmental impacts and total food chain**

*Protecting both human health and the environment through a better understanding of the environmental impact on and from food/feed chains. This will involve study of food contaminants and health outcomes, monitoring of environmental effects, developing enhanced tools and methods for the assessment and management of impacts on, and resistance of, food and feed chains to global changes, in particular to the environment. Assuring quality and the integrity of the food chain requires new models for commodity chain analysis and total food chain management concepts, including consumer aspects.*

## **Environmental sustainability in the European food and drink chain**

This topic will harmonise and integrate methods and methodologies with regard to environmental impact assessment of food and drink products. Research will focus on the key environmental sustainability challenges, including climate change adaptation, along the food production and supply chains and elaborate adequate strategies to cope with them. European environmental standards will be elaborated and comprehensive sustainability indicators

developed for use in consumer education strategies. Studies of the variation in environmental approach of companies that produce similar products will give a basis for the potential for improvements and reliable data on environmental impacts. It is important to investigate actual systems, covering several representative European regions.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project targeted to SMEs). The requested European Community contribution shall not exceed EUR 3 000 000.

**Expected impact:** High European added value is expected, as there is an urgent need to bring coherence in the scientific approaches across the EU regarding sustainability of the food production and supply chains. This would result in reliable and comparable quality data putting an end to the current inconsistent way in which environmental information regarding food is brought to the attention of the European citizen. In turn, this information will raise environmental and ethical awareness enabling the consumer to change his purchasing decision and behaviour. It will also result in an increased understanding of the sustainability of Europe's food production and supply system in the light of climate change and produce vital, science-based information to policy makers on the best practices for European food systems to adapt to this phenomenon. The topic's alignment with the EU sustainable consumption and production policy would be a significant contribution to the global Sustainable Development agenda. It will also speed up the creation of a safe and sustainable low-carbon and resource-efficient economy that is capable of competing successfully in global markets. The expected project results should clearly be of potential benefit to SMEs.

**Additional information:** It is viewed that the participation of the food industry, in particular SMEs, should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. Only proposals with an SME involvement of 35 % or more of the requested EC contribution will be selected. This will be evaluated under the criterion 'Implementation'. Up to two proposals may be funded under this topic.

## **Reducing post-harvest losses for increased food security – SICA**

Improving food security requires a comprehensive approach towards post-harvest research as such losses are known to be significant, especially in low and medium-income countries. This topic aims at identifying, developing and sharing of appropriate technologies to reduce postharvest losses and/or generating higher value products from bio-waste on and off farms while at the same time maintaining the quality and safety of the food. Research in this area should develop strategies and procedures and identify areas where real targets of improvement can be set and achieved. This may include benchmarking as appropriate, and should result in best practices. Demonstration activities under real-life third country conditions involving relevant food chain actors are essential parts of the work to be carried out. The principle of mutual interest and shared benefits will underpin this international cooperation action with developing countries.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project) for Specific Cooperation Actions dedicated to International Cooperation. The requested European Community contribution shall not exceed EUR 3 000 000.

**Additional eligibility criteria:** Minimum number of participants: 3 from different Member States or Associated countries and 3 from different ICPC.

**Expected impact:** The European and international added values lies in increasing the effectiveness of the food chain by reducing post-harvest losses. Food chain efforts from farm to fork including food manufacturers, processors, retailers up to and including consumer involvement and education will contribute to this goal. Best practises including handling,

transport and storage procedures are expected outcomes, with target improvements and demonstration of these. A high focus on dissemination and education is expected in order to make a tangible contribution to achieving the Millennium Development Goals.

**Additional information:** It is viewed that the participation of SMEs should add to the scientific and/or technological excellence of the project and/or is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation. Up to two proposals may be funded under this topic.

### **Food science and the retail sector: a platform for preparing the effective integration of research findings into innovative concepts and applications**

An innovating food and drink sector is a key area for job creation, global competitiveness and societal benefit. However, food research and food industry alone cannot reach the overall objective of creating an innovation-friendly market of food and drink products. The newly developed products have to reach the consumers and give them a positive product experience. Fostering innovation thus necessitates the involvement of a retail sector that is open to offer new, added value products to the consumers in an early phase and consumer acceptability. The main task of this topic is to stimulate and deepen the discussions between research, food industry, retailers and consumers on science-based evidence regarding future technologies and processes that the industry wants to use and food and drink products the consumer can trust

**Funding scheme:** Coordination and Support Action (supporting action). The requested European Community contribution shall not exceed EUR 1 000 000.

**Expected impact:** A discussion forum between food research, food industry, retailers and consumers regarding future food technologies and value added food products and services; new ways to inform retailers about food innovations; building up trust between retailers and consumers on the one hand and scientists and food producers on the other hand, hereby contributing to a lead market initiative by the industry; identification of risks impeding the uptake of such products by the consumer.

**Additional information:** It is viewed that the participation of relevant partners from the food industry, the retail sector and the consumer level should add to the scientific and/or technological excellence of the project and is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation.

### **Area 2.2.6 European Research Area**

#### **Coordination action in support of the implementation by participating States of a Joint Programming Initiative on 'Health, food and prevention of diet related diseases'**

Following the Commission's Communication on Joint Programming to tackle Europe's major societal challenges, the Competitiveness Council has welcomed a common commitment of EU Member States to address the prevention of diet related diseases. The successful coordination action must support the implementation of a pilot Joint Programming Initiative by proposing innovative ways of pooling national expertise and resources and establishing closer and robust collaborations among the participating States in the field of food and health research for diet related diseases' prevention.

**Funding scheme:** Coordination and Support Action (coordinating action). The requested European Community contribution shall not exceed EUR 2 000 000.

**Additional information:** Applicants must be national/regional agencies and/or ministries funding activities related to the area addressed.

**Expected impact:** Support to the establishment of the Joint Programming Initiative on 'Health, food and prevention of diet related diseases', in particular support of the management structure and development of the Strategic Research Agenda.

### **ERA-NET on Sustainable food production**

Bearing in mind the importance of a sustainable approach towards food production and supply various European food chain actors (industry, research community, public authorities and civil society) have begun to organise themselves at European, national and regional level. The aim of this coordination action is to establish an ERA-NET to promote coordination of existing national research programmes between Member States in order to overcome the current fragmentation of research activities, programmes and policies across Europe and contribute to increasing innovation and competitiveness in the food sector. It will bring together national programmes related to sustainable food production and create synergies by pooling resources and know-how existing in the member states. It will also provide a forum for exchange of information and best practices between Member States and for setting up joint, transnational calls.

**Funding scheme:** Coordination and Support Action (coordinating action). The requested European Community contribution shall not exceed EUR 2 000 000.

**Expected impact:** This action will improve the linking and efficient integration of national/regional programmes. It is expected that the coordination efforts will help identifying major research gaps, extend Europe-wide partnership, pool resources for funding, implement research activities in a synergistic and inter-disciplinary manner and lead to better knowledge management. The increased coherence of sustainable food production programmes will lead to greater efficiency of human and financial resources and of scientific infrastructure. Ultimately, the cooperation may lead to sustainable funding networks enabling the translation of information gained from innovative research into social and economic benefits. In turn, this will contribute to a consolidated European research area sustainable food production and supply and strengthen Europe's influence and leadership in the international arena of research for global sustainable development.

### **Activity 2.3 Life Sciences, biotechnology and biochemistry for sustainable non-food products and processes**

- *Strengthening the knowledge base and developing advanced technologies for terrestrial or marine bio-mass production for applications in industrial processes and in energy production. This will include plant, animal and microbial genomics and metabolomics to improve the productivity and composition of raw materials and bio-mass feedstocks for optimised conversion to high added-value products including biological resources utilisable in pharmaceutical industry and medicine, while exploiting natural or enhanced terrestrial and aquatic organisms as novel sources. This will fully incorporate life cycle analysis of bio-mass production practices, transportation, and storage and market deployment of bio-products.*
- *Addressing the application of industrial bio-technologies within whole crop and forest bio-mass chains to realise the full potential of the bio-refinery approach (e.g. green chemicals), including socioeconomic, agronomic, and ecological and consumer aspects. This will be enhanced by an increased understanding and control of plant and microbial metabolism at the cellular and sub-cellular level, and how this is integrated into whole system performance in the production of high value commodities deploying bio-processes with increased yield, quality and purity of conversion products, including bio-catalytic process design.*
- *Using or developing bio-technologies for novel and improved high quality, high added-value and renewable forest based products and processes to increase sustainability of wood and wood production, including timber, renewable materials and bio-energy stocks.*
- *Addressing the potential of biotechnology to detect, monitor, prevent, treat and remove pollution.*
- *Maximising the economic value of waste and by-products through new and potentially energy-saving bio-processes, alone or in combination with plant systems and/or chemical catalysts.*

#### **Area 2.3.1 Novel sources of biomass and bioproducts**

*The production of bio-mass in terrestrial environments is of greatest importance for the development of the KBBE as this will deliver feedstocks and precursors for nearly all bio-industries or directly saleable end-products.*

*Research and development activities will foster the optimisation of these biomasses for industrial purposes. It will generate knowledge in metabolic control, pathway design, metabolic engineering in plants, animals and other organisms (such as fungi)<sup>1</sup>, and domestication and breeding, also improving agricultural traits. Novelty will rely to some extent on screening of terrestrial biodiversity and discovery of new organisms and new biochemical pathways. The development and optimisation of novel expression systems in terrestrial organisms will eventually lead to new products and practices.*

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<sup>1</sup> However, the focus will be on plant and animal biotechnology. Microbial biotechnology will be mainly covered in Areas 2.3.3 and 2.3.5.

## **Plant photosynthetic efficiency: from C3 towards C4 system**

**Description/Justification:** Suboptimal photosynthetic efficiency is the major limitation for industrial crop productivity and yield. C4-type plants show more efficient photosynthesis (efficiency up to 7%) than C3 plants (efficiency ca. 1-2%) because of their specific CO<sub>2</sub> concentration mechanism. C4-type plants are found in many families, often from sub-tropical environment, where they developed natural adaptation to high temperatures and associated water deficits. They represent only ca. 1% of all plant species, yet they constitute 5% of all biomass and are responsible for fixation of ca. 30% of carbon dioxide. However, the vast majority of crops cultivated today belong to the C3 type.

The aim of the project is to adapt, via metabolic engineering and appropriate phenotypic screening techniques, photosynthetic CO<sub>2</sub> assimilation mechanisms in C3-type plants (either terrestrial plants or algae) towards more efficient C4 architecture and biochemical mechanisms. The plant species selected for experiments can include model plants, but should focus on crop species of economic relevance. The objective of the project is to increase biomass yields (e.g. by reduction of photorespiration, optimisation of the organelle function) and to redirect the allocation of selected assimilates to the harvested tissues and organs in the cultivated plants. The project will also investigate the response of the modified C3→C4-type plants to abiotic stress, in particular water stress. This will include determination of mechanisms regulating response to abiotic stress in terms of e.g. water use and carbon budget, in order to aim for stress adaptability in the function of such physiological parameters as growth rate and photosynthetic rate in the C3→C4 plants.

**Funding Scheme:** Collaborative Project (large scale integrating project). The requested European Union contribution shall not exceed EUR 9 million. Up to one project may be funded.

**Expected impact:** *The project will improve the potential of the plant source material in agriculture, biorefineries, production of biofuels, and generation of novel plant products. This will contribute to the KBBE goals of a more sustainable economy, supporting also the Millennium Development Goals.*

**Additional information:** International co-operation with third countries, including ICPC, will be an added value; this will be considered during the evaluation. The active involvement of SMEs and industry is seen as a necessary element in this research: in addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 25% or more of the requested EC contribution will be selected. This topic is expected to contribute to active participation of relevant partners from the enlarged European Union.

## **Perennial grasses: optimisation of biomass production**

**Description/Justification:** Mixtures of perennial grasses make up most of the world's natural terrestrial biomass and are superior to plant monocultures in carbon sequestration, maintenance of soil and water quality, and nutrient management than is the case in annual plant communities. Compared to traditional biomass crops, perennial grasses have better Water Use Efficiency (WUE) and Nitrogen Use Efficiency (NUE) and they cover the soil for 15-20 years. Several studies highlight their positive environmental impact compared to annual crops in terms of CO<sub>2</sub> and energy balance. Perennial grasses are thus an ideal plant system to allow the generation of novel varieties of plants that show higher productivity with existing inputs, stable productivity with reduced inputs while focussing on the use of marginal land, thus avoiding competition with areas used for food production. New grass varieties are

needed to address the challenge of climate change and to allow a longer sowing period. The generation of early emergence plants will reduce the use of pesticides and increase the biomass yield in the first year of cultivation, especially on marginal lands.

The aim of the project is to tackle some specific bottlenecks along the whole gramineae-based production chain, such as homogeneous ripening to permit a timed harvest. In order to improve biomass density and to reduce losses due to high moisture content during storage and transport, the project will improve characteristics of biomass by increasing the capacity for rapid drying. Specific issues such as osmotic regulation (guard cell function), senescence or regulation of metabolite degradation could be considered. Adaptation of grasses to possible adverse environmental conditions encountered on marginal lands (e.g. salinity, water deficits) should be included in the work.

**Funding Scheme:** Collaborative project (small or medium-scale focused research). The requested European Union contribution shall not exceed EUR 3 million. Up to three projects may be funded of which up to one would be SICA-ICPC (implementation details to be clarified).

**Expected impact:** The project will allow the generation of perennial crops which show higher yield optimising the production system, while at the same providing a stable source of biomass and new plant-derived bioproducts, and exploiting the potential of underutilised marginal lands. Optimised production of raw material from agriculture as resources for added value products will contribute to more sustainable socio-economical and environmental performance. Collaboration with Third Countries such as Latin America, India, Mediterranean and other ICPC will be essential. The project will take into account the environmental sustainability criteria for grassland management and protection, and will fully adhere to relevant national and international regulations for biodiversity preservation. In addition to the evaluation criteria, only proposals with an SME involvement of the order of 25% or more of the requested EC contribution will be selected.. This topic is expected to contribute to active participation of relevant partners from the enlarged European Union.

**Additional information:** None

### **Area 2.3.2 Marine and fresh water biotechnology (Blue biotechnology)**

*The economic and scientific potentials of aquatic environments (principally marine but including freshwater also) remain insufficiently explored using the power that modern biotechnology provides. Moreover, their resources remain largely untapped by European industry. Extreme or specific environmental conditions (e.g. in temperature, pressure, salt content, pH, chemical composition) and the enormous biodiversity of these ecosystems offer multiple opportunities for bio-prospecting, exploitation and use of microbes (e.g. cyanobacteria, fungi), plants (micro- and macro-algae) and animals (e.g. fish, molluscs, sponges) and their physiological performance and genes. This can lead to novel products or sources for industrial applications (e.g. bio-processing, biomass, bio-energy, bio-materials, specialty chemicals, pharmaceuticals, and aquaculture) and beyond.*

### **Marine biotechnology ERA-NET preparatory action**

**Description/justification:** Cooperation between European research funding bodies in the area of Marine Biotechnology started in FP7 under the KBBE-NET high level group umbrella. Building upon this group's conclusions, the overall aim of the CSA is to provided the basis for a successful forum for the exchange of information between Member States, and initiate

the process of identifying research complementarities, so to set up the preliminary basis for future joint, transnational calls. The consortium should expand the partnership of the previous KBBE-NET Marine biotechnology working group to include more funding agencies of the different member states. It is also important that, within this topic, complementarities with other European initiatives are sought and that interactions are established with relevant ERA-NETs and ETPs. It is expected that the opportunity for future global initiatives in the area marine biotechnology is also analysed.

**Funding scheme:** Coordination and Support Action (coordination type). The requested European Union contribution shall not exceed EUR 1 million. Up to one project may be funded.

**Expected impacts:** It is expected that this proposal will consolidate the basis for further coordination efforts in the area of Marine Biotechnology; seek for complementarities between national activities and start pooling resources for funding and implementing future research activities in a synergistic manner.

**Additional information:** This topic is particularly suited for collaboration throughout the enlarged European Union, Associated and Candidate countries.

### **Area 2.3.3 Industrial biotechnology: novel high added-value bio-products and bio-processes**

*This area will address the development and application of industrial biotechnology for the production of high-value products such as fine and speciality chemicals, antibiotics, vitamins, detergents, etc. Industrial biotechnology enables industries to deliver novel products which cannot be produced by conventional industrial methods; in addition it will make possible replacing chemical processes by more resource efficient biotechnological methods with reduced environmental impact, thereby extending and strengthening the KBBE.*

*Research and development will enable among others the discovery of novel enzymes and micro-organisms with novel applications, the elucidation and optimisation of their functions, improvements in concept and design of bioreactors, such as biocatalytic process design, advancing fermentation science and engineering, and improving up- and down-stream processing where relevant.*

## **Deepened and enlarged European cooperation in the area of Industrial Biotechnology - ERA-NET**

**Description/Justification:** Cooperation between European research funding bodies in the area of industrial biotechnology started in FP6 under the ERA-NET umbrella (ERA-IB) and provided a successful forum for exchange of information between Member States and most importantly for setting-up joint, transnational calls.

The proposed network of National Funding Bodies in the area of Industrial Biotechnology will build upon the previous ERA-IB and capitalise on its achievements such as the establishment of principles and mechanisms for the evaluation of joint calls and for the management of transnational projects.

The overall aim of the network is to further increase the level of coordination between European research funding bodies in the area of Industrial Biotechnology, seeking complementarities between national activities and pooling resources to undertake joint funding of transnational projects. Research collaborations shall serve to tackle scientific questions, to better integrate and rationalise genetic, genomic and bioinformatics resources,

and to improve the use of existing infrastructures in Europe. The network must seek to expand the previous ERA-IB membership to include new funding bodies from other Member States in the frame of the enlarged European Union.

In setting priorities for the network's activities it is important that complementarity with other FP7 initiatives is sought and that interactions are established with related ERA-NETs and ETPs.

**Funding scheme:** Coordination and Support Action (coordination type). The requested European Union contribution shall not exceed EUR 2 million. Up to one project may be funded.

**Expected impact:** It is expected that further coordination efforts in the area of industrial biotechnology will consolidate the initiated process of identifying major research needs, extending the partnership, pooling resources for funding and implementing research activities in a synergistic manner. Ultimately, the cooperation shall lead to a self-sustainable and long lasting network of funders in the area of plant molecular sciences, enabling the translation of information gained from innovative fundamental research into social and economic benefits. The European added value lies in supporting and enhancing the ERA on industrial biotechnology.

**Additional information:** None

## **Biocatalysis for chiral compounds**

**Description/Justification:** Biocatalysis is becoming a key element in the toolbox of the process chemist. In particular, biocatalytic transformations are particularly promising in areas such as pharmaceuticals and agrochemicals where target molecules are selective and complex, frequently resulting in multiple chiral centres. While expensive new chiral chemocatalysis are becoming available, the unique properties of biocatalysts offer a green alternative with reduced use of organic solvents, efficient use of reagents and elimination of metal catalysts.

The objective of this topic is to enlarge the range of biocatalytic procedures for selective biotransformation. The proposal should aim at the discovery and/or improvement and application in industrial conversions of stereo-specific biocatalyst enzymes that enable the controlled synthesis of only one of the possible stereo-isomers (100% yield). [Lyases, which are among this group, could be one of the targets of the project.] The proposal should reach proof of concept stage for targeted biotransformation for both product and process, and should assess the feasibility of scaling towards industrial needs.

The integration of chemistry, molecular biology, enzymology microbiology and process development is essential to achieve the objective of the project. Molecular modelling techniques should be used to aid the prediction of stereochemical reactions and for insight into potential substrate or enzyme modifications in view of increasing selectivity.

**Funding scheme:** Collaborative Project (large scale integrating project). The requested European Union contribution shall not exceed EUR 6 million. Up to one project may be funded.

**Expected impact:** Enhance the competitiveness and sustainability of the European chemical industry by replacing complex organic synthesis by cleaner biotransformations. Close research collaboration between the European chemical, intermediaries of pharmaceuticals and biotechnology industries, and leading research institutions will both reinforce the scientific and/or technological excellence and the industrial relevance and economic potential of the research. The development of synthetic processes with fewer steps, lower use of toxic reactants and solvents and efficient use of reagents, will improve efficiency. The project

should contribute to realising the objectives of environmental and innovation policy initiatives, such as the Environmental Technology Action Plan (ETAP) and the EU Strategy for key enabling technologies.

**Additional information:** The strong involvement of industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation. In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 30% or more of the requested EC contribution will be selected. This topic may be particularly suited for collaboration throughout the enlarged European Union, Associated and Candidate countries.

## **Cellular, metabolic and genetic engineering for novel compounds**

**Description/Justification:** Metabolic engineering is being successfully implemented for the production of a wide range of natural compounds such as amino acids and organic acids. Genome sequencing efforts and recent advances on "omics" technologies and metabolic engineering have made possible the synthesis of compounds which do not occur naturally, such as is the production of 1,3-propanediol in *E. coli*.

The topic aims at the design of completely new pathways and/or networks with a focus on "new-to-nature" compounds. Gaps in the knowledge of cellular function and regulatory systems in cells must be filled. Special emphasis will be given to relevant operating conditions with the aim of creating new and robust production systems for industrially important metabolites. Catabolism of the compounds developed should also be assessed. Possible applications will be for the production of fine and bulk chemicals, such as new-to-nature and tailor-made biosurfactants developed by extending the biosynthetic capabilities of the production strains beyond their natural synthesis. Careful consideration should be given to ethical issues and potential biosafety implications.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project). The requested European Union contribution shall not exceed EUR 3 million. Up to 3 projects may be funded.

**Expected impact:** Enlarging the application of industrial biotechnology for the production of novel industrial compounds. Increased competitiveness of European biotechnology industry and end-use industrial sectors. The development of new and robust microbial industrial production systems. The development of platform technologies is expected to enhance industry's capabilities for biotechnological applications. The project should contribute to realising the objectives of environmental and innovation policy initiatives, such as the Environmental Technology Action Plan (ETAP), EU Strategy for key enabling technologies.

**Additional information:** The effective involvement of industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. This will be considered in the evaluation. In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 30% or more of the requested EC contribution will be selected. This topic maybe particularly suited for collaboration throughout the enlarged European Union and Candidate countries.

### **Area 2.3.4 Biorefinery**

*This area addresses the development and application of industrial biotechnologies for the conversion of renewable raw materials into sustainable and cost-efficient bulk bio-products (e.g. chemicals such as lactic acid, biopolymers), and/or bio-energy. Regarding biofuels, the*

*focus will be on the development of second generation biofuels with improved energy and environmental balance and which avoid the potential food/fuel conflict.*

*Aiming at achieving integrated and whole crop use of the biomass, biorefineries can use a broad range of biomass feedstocks, ranging from dedicated agricultural, aquatic, forest biomass chains to residues/waste and by-products of biomass-based industrial sectors.*

*Emphasis will be on the discovery, characterisation and development of novel enzymes and strains with optimised biocatalyst and microbial function for improved production of energy and bioproducts; characterisation of the structure and composition of the feedstock for optimised pre-treatment and fractionation of the biomass into its components; development of improved bio-processes with increased yield, quality and purity through bioprocess design, process optimisation and integration as well as downstream processing; fermentation science and engineering. Environmental and social aspects will also be incorporated.*

## **BioWASTE - Novel biotechnology approaches for transforming industrial and/or municipal biowaste into bioproducts**

**Description/Justification:** Industrial and municipal biowastes pose environmental risks while being an important feedstock resource for producing a wide range of bioproducts. The potential to exploit biowastes as raw materials for bioproducts/energy requires the application of new technologies to arrive at novel and economically viable solutions.

The objective of the project is to develop novel biotechnological processes for conversion of the biodegradable fraction of the municipal solid waste or industrial biowastes (e.g. lignin) into valuable bioproducts such as chemicals, biomaterials and nutraceuticals. The full armoury of genomics techniques may be brought to bear on the development of enzymatic and/or fermentation processes. Emphasis should be placed on biowaste streams which are produced in major quantities and at European level. Proposed concepts should apply a cascading approach, giving priority to the transformation towards bioproducts, permitting a possible conversion to energy (e.g. through anaerobic digestion) at a later stage. For industrial wastes, the feasibility of the integration of the developed technologies in to the existing processing chain should be assessed.

Demonstration activities aimed at proving the industrial relevance of the developed concept(s) should also be included. The project will address technological/economic analysis for the up-scaling of the technologies developed for industrial production. The dissemination plan should include a sound strategy for an effective transfer to the end users of the knowledge produced.

In order to avoid duplication with previous EC funded research agricultural and forestry residues are excluded from the scope of the topic.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project). The requested European Union contribution shall not exceed EUR 3 million. Up to three projects may be funded, of which up to one would be SICA-ICPC (implementation details to be clarified).

**Expected impact:** Improved overall sustainability of the biomass processing industry. Increased competitiveness of European biotechnology industry. The project should contribute to realising the objectives of environmental and industrial European policy initiatives, such as Lead Market in Bio-based Products and Environmental Technology Action Plan (ETAP), EU Strategy for key enabling technologies.

**Additional information:** The effective involvement of industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 30% or more of the requested EC contribution will be selected. This topic maybe particularly suited for collaboration throughout the enlarged European Union, Associated and Candidate countries. It is viewed that the active participation of relevant partners from ICPC should add to the scientific and/or technological excellence of the project and/or lead to an increased impact of the research to be undertaken

Discussions are on-going for the assessment of a possible cross-thematic dimension of this topic on "Adapting and mitigating Climate Change".

## **Towards bio-industry - Biotechnology for renewable chemicals and innovative downstream processes**

**Description/Justification:** Biotechnology has predominantly been applied to the production of complex chemicals (e.g. vitamins; antibiotics, amino acids and enzymes). The need to reduce the environmental footprint of producing and processing chemicals, as well as advances in biotechnological processes (e.g. increased productivities of fermentation) and extreme price fluctuation of fossil carbon sources, are driving the interest of the industry for the production of renewable chemicals. These can be precursors of today's synthetic organic chemicals or a resource for new functionalities and applications. Examples being researched are ethanol, butanol, lactate, propanediol and succinate, and it is anticipated that further molecules will also become important.

To broaden the range of platform biochemicals produced by biotechnological routes, research is needed on aspects such as: (i) design and optimisation of enzymatic synthesis for the selected compound; (ii) the selection/development of robust microorganisms with optimised metabolic pathways and adaptation to industrial conditions; (iii) the integration of the biotechnological processes into existing production chains or into a "new chemistry" to be developed for the succeeding transformation chain; (iv) the development and integration of innovative technologies for product separation (e.g. selective product removal/in-situ product removal); (v) research into generic purification strategies such as selective membrane, extraction, adsorption, and crystallization technologies.

The production of the selected chemical(s) and downstream processing shall be demonstrated at least to pilot scale in an integrated approach. Economic viability and eco-efficiency should be evaluated and assessed on a quantitative basis. The project will address the technological/economic analysis for the up-scaling the most promising candidate(s) to industrial production.

In order to avoid duplication with previously EC funded research, the development of bioethanol, biobutanol, 3HPA and PDO are excluded from the scope of the project.

**Funding scheme:** Collaborative Project (large scale integrating project). The requested European Union contribution shall not exceed EUR 9 million. Up to one project may be funded.

**Expected impact:** Enhance the competitiveness and sustainability of European industries by substituting limited fossil resources by renewable ones and integrating cleaner bioprocesses into the production chains. Close research collaboration between the relevant European industries, process development firms and leading research institutions will both reinforce the scientific and/or technological excellence and the industrial relevance and economic potential of the research. The project should contribute to realising the objectives of environmental and

industrial European policy initiatives, such as Lead Market in Bio-based Products and Environmental Technology Action Plan (ETAP), EU Strategy for key enabling technologies.

**Additional information:** The effective involvement of industrial partners, in particular SMEs is essential to achieve the expected impact of the research to be undertaken. In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 30% or more of the requested EC contribution will be selected.

This topic maybe particularly suited for collaboration throughout the enlarged European Union and Candidate countries. Discussions are on-going to assess the possible cross-thematic dimension of this topic on "Adapting and mitigating Climate Change".

### **Area 2.3.5 Environmental biotechnology**

*The concept of the KBBE implies environmental sustainability which will be promoted through the development and application of modern biotechnology.*

*Research and development activities will provide solutions for sustainable processes and products as well as for preventing and cleaning-up pollution. This will comprise the application of biotechnologies for the design, manufacture and use of more environmentally benign products and processes as well as for applications such as bio-sensors, bio-remediation, waste treatment and recycling<sup>2</sup>.*

*In addition, this area will also foster the application of modern biotechnology for the understanding of microbial biodiversity and ecology (e.g. bacterial cell-cell communication). This approach will expand the understanding on systematics and will lead to the unravelling of new genes, pathways etc. with the potential to enrich several of the biosynthetic domains of biotechnology. It will also serve to the purpose of cataloguing and therefore preserving microbial diversity.*

## **GM crops in the EU - systematically assessing the environmental and economic impact**

**Description/Justification:** At the EU level, efforts are ongoing to accumulate data related to environmental risk assessment and post-market environmental monitoring (PMEM) of GMOs. The aim is to better integrate aspects related to specific agricultural ecosystems in the EU, to take account of conflicting results of the effects of GM crops on non-target organisms (NTO), currently obtained mainly in short-term studies, and to improve knowledge on potential long-term effects. Furthermore, data to support the assessment of the economic effects of GM cultivation in the EU are fragmented and need more systematic analysis.

Therefore: (i) current baseline conditions on the similarity of the different bio-geographic regions in Europe with regard to ecological aspects important for Environmental Risk Assessment/PMEM should be established; and, (ii) tailored regional approaches to Environmental Risk Assessment/PMEM should be developed, taking into account the differences in the ecology of the agro-ecosystems. Baseline conditions shall comprise suitable bio-indicators (according to OECD and EEA standards) and the definition of regional protection goals (e.g. protected wildlife and habitats, and ecosystem functions).

Tangible outcomes should comprise: A) a network of EU representative sites for pre-market risk assessment and for long-term monitoring studies; B) a catalogue of selected indicator organisms, covering different ecological functions, being: (i) amenable for laboratory testing

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<sup>2</sup> Where wastes can be regarded as feedstocks for bio-processing and biorefinery they shall be dealt with in the respective Areas (2.3.3 and 2.3.4).

in eco-toxicological Environmental Risk Assessment of NTOs; (ii) suitable as surrogate or focal species for a wide range of NTOs in Europe; and, (iii) assessable quantitatively in the field environment in European regions; and, C) a set of evaluated, standardised and harmonised sampling and testing methods, suitable for Environmental Risk Assessment and long-term monitoring. These outcomes should be verified by means of data collection derived from simultaneous field testing of GMO and their isogenic conventional counterparts. The field trials should also serve as a basis for an economic analysis of the different agricultural practices investigated. Work on updating the EFSA Guidance Document for Environmental Risk Assessment of GM plants as well as output of the EFSA working group on scientific cooperation shall be taken into account.

**Funding scheme:** Collaborative Project (large scale integrating project). The requested European Union contribution shall not exceed EUR 6 million. Up to one project may be funded.

**Expected impact:** Establishing a sound scientific system to identify and quantify environmental and economic impacts of GMOs will contribute to further eliminate current scientific and regulatory uncertainties in the EU. In view of the GMO development pipeline, this project is foreseen as a starting point for facilitating continued research on environmental and economic effects of GMO cultivation in comparison to other agricultural technologies and practices in the EU. The more comprehensive knowledge basis developed – including also clarifications on the risks of not using GMOs – will better support the decision making process in the EU.

**Additional information:** The participation of the enlarged Europe is particularly encouraged to enable sufficient inclusion of various agricultural ecosystems throughout the EU. Further efforts will need to be made by the MS and research programme managers to continuously update the current level of knowledge, particularly in line with upcoming decisions on GMO cultivation in the EU.

#### **Area 2.3.6 Emerging trends in biotechnology**

*Novel technologies and new trends in biotechnology will be instrumental for the rational advancement of the KBBE. Yet, not all future trends in enabling technologies and interdisciplinary research can be foreseen. However the potentials of e.g. meta-genomics, bioinformatics, systems biology, virtual cell, synthetic biology, and nano-biotechnology have become rather concrete. These and other fields deserve appropriate measures in terms of research and development to facilitate effective transfer and implementation into industrial applications.*

### **OCEAN-2011 - Marine microbial communities – New insights into marine ecosystems and their biotechnological potential**

**Description/justification:** Marine ecosystems host the majority of Earth's biomass and contribute significantly to the control of global systems. Within marine ecosystems, microbial communities have an indispensable role in global energy and material cycles, and their rich biodiversity makes them an important source of development of new biotechnological approaches. A better understanding of the complexity of ocean microbial communities will, thus, give important insights on the parameters driving the functioning of marine ecosystems, revealing new correlations between functions of enzymes and proteins. Efforts in sequencing marine environmental samples will allow investigations on microbial diversity and their

functions at molecular level, leading to a better understanding of microbial function. As a result, massive data output from the sequencing of marine environmental samples (e.g. from ocean sampling expeditions) are flooding databases. To interpret these data is a prerequisite to being able to transform the wealth of sequenced information into biological understanding. However, analysis and interpretation of these data, especially metagenomic data, require tools that are currently only poorly developed.

The focus of the proposal under this topic should be on developing new bioinformatics approaches that will enable exploitation, analysis and interpretation of marine microbial metagenome data; standardise, process, integrate and mine the vast amount of data, taking into account their environmental context. IPR issues e.g. the biodiversity convention together with as well as outreach activities, such as dissemination and training of researchers, should also be taken into consideration.

**Funding scheme:** Cooperative project (large scale integrated project). The requested European Union contribution shall not exceed EUR 10 million (5 M€ Theme 5 + 5 M€ Theme 2). Up to one project may be funded (implementation details to be decided).

**Expected Impacts:** This approach will lead, through the creation of a marine bioinformatics workbench, to a better understanding of the complexity of microbial communities, the parameters driving the functioning of marine ecosystems and will reveal new correlations between functions of enzymes and proteins with new processes and potential industrial use.

**Additional information:** The development of this bioinformatics workbench is a clear and natural bridge between environmental issues such as global cycles, biodiversity and new biotechnological approaches. This topic will thus appear as part of the WP2011 -Ocean joint call. The effective involvement of industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of XX% or more of the requested EC contribution will be selected.

## **Increasing the accessibility, usability and predictive capacities of bioinformatic tools for biotechnology applications**

**Description/justification:** The high-throughput revolution in the life sciences over the last decade has led to an ever expanding influx on “omics” (genomics, proteomics, etc) sequence data. Bioinformatics has opened the way towards the exploitation and use of this vast amount of biological data as a source of new biotechnological applications. However, to deliver its full potential and to reduce the ever increasing gap, between the massive influx of sequence data and the low rate of discovery of new biotechnological applications, new innovative bioinformatics approaches are needed. Among the main challenges these new approaches will face will be: the integration of databases; the need for increased interpretative and predictive capacity of data; and for taking account of the molecular complexity of living systems as far as practicable.

Proposals within this topic should focus on increasing the *descriptive* and *predictive* capacities of data, as well as the “*navigating*” power of the bioinformatics tools. They should include the integration and/or development of application oriented databases and the development of *databases* containing information on *systems* rather than molecules, with new management tasks (updates, standards etc.). The proposals should seek multidisciplinary and, where relevant, involve biotechnology companies at an early stage in the development. They should give due consideration to outreach activities e.g. accessibility of databases,

dissemination and training of researches in the effective use of data. IPR issues and protection and sensitivity of data should also be include

**Funding Scheme:** Cooperative project (small scale integrated project). The requested European Union contribution shall not exceed EUR 3 million. Up to three projects may be funded.

**Expected impact:** Better exploitation and long-term usefulness of existing databases. Paving the way for new biotechnological applications on industrial, environmental, marine and plant biotechnology.

**Additional information:** The effective involvement of industrial partners, in particular SMEs, is essential to achieve the expected impact of the research to be undertaken. In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of XX% or more of the requested EC contribution will be selected.

## **Supporting Bioinformatics Infrastructures development for the effective exploitation of genomic data: Beyond health applications**

**Description/justification:** Bioinformatics tools for the effective exploitation of genomic data are of increasing importance across the KBBE. Recent efforts on the development of a pan-European bioinformatics infrastructure have been important but principally focused on health-related applications. It is of critical importance for the KBBE that a balanced approach between health and non-health related applications is fostered from the earliest stages of development of infrastructures. The aim of this topic is to support the KBBE bioinformatics stakeholders to coordinate, join efforts and feed back to the pan-European bioinformatics infrastructures on opportunities and priorities so to reinforce it beyond the health dimension.

**Funding scheme:** Coordination and support actions (coordination type). The requested European Union contribution shall not exceed EUR 1 million. Up to one project may be funded.

**Expected Impacts:** It is expected that this proposal will reinforce the KBBE dimension within the pan-European bioinformatics infrastructure.

**Additional information:** None

## **Towards standardisation in synthetic biology**

**Description/Justification:** Some of the most relevant challenges that Synthetic Biology is facing are the definition, understanding and eventual cataloguing of *biological parts*. The issue at stake is to bring natural existing biological modules to the point of *context-independence* that would be needed for serious engineering. This includes also the pursuit of a *consensus language* for describing biological functions in a quantitative format, as well as a good understanding of whether existing biological systems can be re-factored to be *orthogonal*. Only sufficient compliance with these standards will ensure that a designed element of the system has a high chance of re-utilisation. A successful project must take into consideration, besides the scientific/technical issues, issues in training, ethics and safety.

**Funding scheme:** Collaborative Project (large scale integrating project). The requested European Union contribution shall not exceed EUR 6 million. Up to one project may be funded.

**Expected impact:** A European project will create the appropriate platform for an international dialogue on standards, use and applications in Synthetic Biology.

**Additional information:** Interdisciplinary training is particularly important in synthetic biology because students not only require a detailed knowledge of their primary discipline and how it pertains to the field, but, also, a thorough grounding in the other scientific disciplines involved. In addition, they need to be fully conversant with the ethical, societal and economic issues which are germane to synthetic biology. Applicants should adhere to the Opinion No 25 of the European Group on Ethics in Science and New Technologies to the European Commission "Ethics of Synthetic Biology" (17/11/2009).

## **Applying synthetic biology principles towards the cell factory notion in biotechnology**

**Description/Justification:** The use of the Synthetic Biology approaches to engineer complex systems and redesign biological components towards cell factories will be a paradigm shift towards efficient and safe, engineered biotechnological applications. This effort should be based on attempts at using engineering principles like *orthogonality* and *hierarchy of abstraction* to assemble novel biological systems for the design of novel biomaterials or processes. Cell factory is a notion for the production of efficient and safe manufacturing of special fine, bulk, or fuel chemicals, biosensors for monitoring pollution or bioremediation tools to process contaminants. Risk analysis, training, ethical, legal and societal issues should be integral part of any proposal.

**Funding scheme:** Collaborative Project (small or medium-scale focused research project). The requested European Union contribution shall not exceed EUR 3 million. Up to 3 projects may be funded.

**Expected impacts:** Using technologies to develop engineered biological system by designing and constructing artificial micro-organisms for a given application would have an enormous potential for biotechnological applications and, thus, for European industry. Several applications can be envisioned in the fields of protein design and production, metabolic engineering, carbon fixation, biomass production, biocatalysis, biofuels and bioremediation.

**Additional information:** Applicants should adhere to the Opinion No 25 of the European Group on Ethics in Science and New Technologies to the European Commission "Ethics of Synthetic Biology" (17/11/2009).

## **Ensuring the safety of Synthetic Biology applications**

New technologies not only offer a wide range of useful applications but also potential for abuse, can have environmental and health impacts, and be subject to legal, patent, and intellectual property rights challenge. Safety and the development of efficient safeguards are paramount to society's acceptability of any new technology, in this case synthetic biology. Research, therefore, requires embedding a culture of safety in the development of synthetic biology and developing a system of good governance. This in turn calls for early identification of the possible hazards, knowledge of the potential adverse effects, measurement and control of the exposures, and comprehensive risk assessments.

The proposal's main objectives will be (i) to identify and categorise hazards in function of their likelihood and potential seriousness in view of the main foreseeable developments and applications of Synthetic Biology; (ii) to formulate a conceptual framework for an early, systematic and comprehensive identification of potential hazards of Synthetic Biology; and (iii) appropriate tools and approaches for risk assessment.

**Funding scheme:** Coordination and support actions (coordination type). The requested European Union contribution shall not exceed EUR 1 million. Up to one project may be funded.

**Expected impacts:** Promotion of an ethically acceptable development of synthetic biology for the EU and, thus, the effective exploitation of such technology in the long-term.

**Additional information:** Applicants should adhere to the Opinion No 25 of the European Group on Ethics in Science and New Technologies to the European Commission "Ethics of Synthetic Biology" (17/11/2009).

## **Synthetic Biology– ERA-NET**

**Description/justification:** Synthetic biology aims to (re)engineer and study biological parts, devices and systems that do not exist as such in nature for better studying fundamental life processes, generating functional modular components and developing novel process technologies and applications. Recent activities in the KBBE-NET revealed a high interest of national funding bodies in enhancing existing and/or setting up new activities in close co-operation and co-ordination throughout Europe. A pro-active programming of a European Research Area in Synthetic Biology will contribute to increasing innovation and competitiveness of the biotechnology sector. The coordination of activities at this point in time will avoid the fragmentation of programmes and policies in the ERA and thereby overcome the fragmentation of ongoing research activities.

The aim of this ERA-NET is to provide the basis for a successful forum for exchange of information between Member States, initiate the process of identifying research complementarities and set up the basis for future joint transnational calls.

To reach this aim the first objective is to identify and link together existing national bodies responsible for research policies and funding in the field. The second objective is to develop strategies to set up effective public funding schemes, to mobilise new sources of funding and to coordinate existing and/or newly planned funding programmes at regional, national and European levels. Moreover, complementary features and synergies between the various national and European funding instruments should be explored. The strategies developed should take account of the different angles of the knowledge triangle (research, education and training, and innovation and competitiveness of European industries and SMEs) as well as the ethical, legal, socio-economic and political implications and demands of synthetic biology. Standardisation issues and infrastructure development might be considered as well.

**Funding scheme:** Coordination and Support Actions (coordination type). The requested European Union contribution shall not exceed EUR 2 million. Up to one project may be funded.

**Expected impacts:** It is expected that this proposal will consolidate the basis for coordination efforts in the area of Synthetic Biology; seeking complementarities between national activities and pooling resources for funding and implementing research activities in a synergistic manner.

**Additional information:** This topic is particularly suited for collaboration throughout the enlarged European Union and Candidate countries. Applicants should adhere to the Opinion No 25 of the European Group on Ethics in Science and New Technologies to the European Commission "Ethics of Synthetic Biology" (17/11/2009).