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ANNEX 1: 4 key research topics

RESEARCH TOPIC

A: Risk management and adaptation of arable farming under price volatility and climate change

CHALLENGE

1.4 Managing risks for EU farmers

RESEARCH GOAL

1.4.1 Find strategies to manage risk factors

WORKING GROUP

WG 3.2 (2.8) & WG 3.1 (1.15)

BACKGROUND

Farming and arable crops are sectors with very high risks. Risks are related to farm income (due to input/output price volatility), to quantity and quality of production (due to weather variability and climatic change) and to farm assets – real estates and human capital (due to climatic change and other unexpected events). Price volatility can increase owing to expected WTO agreements (especially market access improvements) and possible changes of the Common agricultural policy (CAP) (e. g. reduction of direct payments). Climatic change is inevitable, contributing to more frequent catastrophic events (floods, droughts) and continuing basic changes in climatic and soil conditions.

OBJECTIVE

To find general solutions for arable farming and farms to minimize individual categories of risks by improving farm practices, diversification of the production, investment, business orientation and management tools.

CONTENT

The project includes: a) the identification and classification of risks related to arable farming under possible future conditions; b) the assessment of the significance of risks, their size and evaluation; c) the analysis of instruments for risk reduction, e.g. insurance; d) decision support systems for a rapid adaptation to economic context and risk management.

OUTPUT / DELIVERABLES

General instruments, measures and advice on how to minimize individual categories of risks for arable farming. Suggestions for policy makers regarding how to link agricultural policies with private activities in this field, considering risks related with functioning of insurance markets. Related decision support systems.

IMPACT

Better economic situation, less vulnerable farms and cropping systems and improved flexibility of farms producing arable crops.

PARTNERSHIP

Public research institutes; larger private insurance companies.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Connected to 2.1

B: Designing resource-efficient and sustainable cropping systems.

CHALLENGE

4.11 Integrating different sustainability concerns in the design and implementation of innovative cropping systems
4.3 Improved resource use efficiency: nutrients, water, energy
1.2 Technical and economic optimization by innovating sustainable cropping systems

RESEARCH GOAL

WORKING GROUP

WG 3.5 & WG3.1

BACKGROUND

Intensive cropping systems developed after World War II rely heavily on the use of non-renewable or limited resources. This kind of farming is unsustainable and cannot be continued in the future. Only cropping systems with a high productivity and a minimal use of non-renewable resources can be competitive. To design sustainable cropping systems for the future, we need to develop cropping systems that save resources (energy, fossil fuels, P and K, water) by using inputs more efficiently and at the same time maintain a high productivity. Furthermore, these systems should prevent or reduce the pollution of soil and water by pesticides, P, or N, limit the emissions of greenhouse gases and have less harmful impacts on biodiversity. Furthermore, innovating cropping systems must be viable socially and economically as well, and maintain a satisfying level of efficiency regarding renewable but expensive production factors: capital, labour time, land use, etc. Many partial solutions to the problems of efficiency are known, but not always coherent for different objectives and aspects of the global efficiency. The challenge is to optimize resource use over a whole cropping system instead of individual crops.
Saving energy is certainly one major point, common in all regions of Europe, since present cropping systems are highly dependent on non-renewable energy for fertilizer manufacturing (synthetic nitrogen), mechanization, irrigation, and production of most other inputs (extraction of P and K, production of pesticides…). The main possibilities for energy cost reduction are known: using co-product of farm or organic residues as fertilizers, optimizing the crop rotations introducing grain legumes, improving fertilization methods (such as splitting fertilizers doses to better fit the crops needs in time), reducing soil tillage to limit consumption of fossil fuel, optimize the use of the machinery, and use of renewable energy sources.
Water availability, in time and in quantity, is very variable depending on the different regions of Europe. For the southern regions the water problem is pregnant already. The water efficiency and water flexibility of cropping systems are key aspects of their global performance and competitiveness. Under conditions of drought, particular crop practices such as deficit irrigation or the planting of drought-tolerant crops should be implemented.
The efficient use of the limited resources P and K needs to be fostered, through the improvement of fertilization techniques, optimization of nutrient doses, optimal use within a crop rotation and better nutrient recycling.
A major need and research question is actually the design of globally optimized new cropping systems. There is a lack of long-term experiments on cropping systems that enable to study such questions under different pedo-climatic conditions.

OBJECTIVE

To design innovative cropping systems optimizing the use of the limited resources energy, water and nutrients (N, P, K and other). The efficiency of resource use in terms of output unit produced per resource unit used should be maximized. At the same time these resource efficient-cropping systems need to be sustainable in economic, environmental and social terms.
To test the applications of these innovative cropping systems in different regional contexts of Europe (including pedo-climatic and socio-economic aspects) and measure the effectiveness of the progress regarding efficiency and sustainability

CONTENT

Designing innovative resource-efficient cropping systems could use two complementary pathways:

- Gathering scientific expertise for designing new cropping systems on the basis of existing knowledge and models
- Identifying ongoing innovations and emerging improved consistent cropping systems in European farms, and involving “pioneer farmers” or groups of farmers in designing model systems. This second way requires direct contacts with farmers and advisers/transfer organizations.

The cropping system development should be done by means of long-term experiments (farming system and polyfactorial experiments), on-farm research to test the practicability of the improved system and the acceptance by farmers.

The project would be based principally on:

a) data acquisition from different regions, farm types, cropping systems;

b) long-term experiments of different cropping systems should be done, and

c) modeling of resource use and productivity together with a sustainability assessment on the basis on existing indicators.

An initial part of the work would consist in evaluating the possibilities to improve/calibrate existing models or needs to build new models.

An interdisciplinary approach is required (agronomic and environmental sciences, economy, social sciences, innovation sciences…)

Specific regional aspects should also be addressed (transition problems of Eastern European agriculture, water scarcity in Southern regions…)

OUTPUT / DELIVERABLES

Recommendations for policy makers and farmers, system models showing the resource use and environmental consequences of management strategies, more efficient use of agricultural inputs, knowledge transfer.

Assessment of regional strategies, and references on innovative CS adapted to different regions of Europe, including cropping systems adapted to reduced water availability.

Evaluation and quality records of N fertilizer, energy saving and GHG emission reduction by introducing grain legume in cropping systems.

Models of cropping systems with favourable energy balance.

Economic rating of the different systems including the effects of the integration of crops of agronomical interest but with low gross margin.

A scale/framework to evaluate different cropping systems with regard to sustainability.

Recommendations to farmers and stakeholders.

IMPACTS

Enhancement of the sustainability and environmental friendliness of agricultural production.

Decreased dependence of European CS on non renewable or limited resources.

Increased adaptability and flexibility of EU cropping systems.

PARTNERSHIP

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FUNDING INSTITUTION/S

EU + National agencies in joint programming framework

OTHER REMARKS

Need coordination network + research

Includes elements of topics 5-1.1, 1.9, 1.22, 1.19, 1.16, 1.12, 1.17

RESEARCH TOPIC

C: Limiting the impact of AC systems on GHG emissions and climate change

CHALLENGE

4.7 Minimise greenhouse gas emissions per unit of product / 4.1 Improving resource use efficiency: nutrients

RESEARCH GOAL

4.7.2 Minimize N2O emissions/ 4.1.5 Nitrogen optimisation at cropping system scale

WORKING GROUP

WG3.5 and WG3.1 (Original EUROCROP topics: 5.22 and 1.11)

BACKGROUND

Agriculture, animal husbandry and forestry (including deforestation) are reputed to cause around 20% of the world anthropogenic greenhouse gas (GHG) emissions. Arable crops systems are concerned due to the use of N fertilizers and soil tillage practices. The two major greenhouse gases emitted by European cropping systems are CO_2 and N_2O. N_2O being characterized by its high global warming potential.

CO_2 is emitted during combustion of fossil fuels which is necessary for the production of the inputs (fertilizers…), for transportations and for cultural operations. Long-term changes in soil C content also play an important role in the effect of cropping systems on climate change. Carbon may be released from or sequestered in the soil, depending on the management of the cropping system. For instance, conservation tillage has a potential for converting many soils from sources of atmospheric carbon to sinks for this element.

The N_2O emissions result from the use of mineral and organic N fertilizers, and from the N dynamics in soils, due to both denitrification and nitrification. Soil emissions of N_2O are highly dependent on soil nitrate content, water content, temperature and on other soil properties. N_2O attributed to the cropping systems is the difference between natural emissions and the actual emissions due to growing the crop. Both direct (from the arable soils directly) and indirect emissions (from other ecosystems induced by N volatilized from the arable soils and by leaching or runoff of N from these soils) must be taken into account.

In the past, a great deal of work was performed on the relationship between management and one pathway of nitrogen loss (NO_3, NH_3, N_2O etc.). However, there are some trade-offs between the reduction of different kinds of N emissions: e.g. reducing NH_3 emissions by increasing N in soil leading to higher NO_3 leaching. An experimental dataset on those trade-offs is needed, especially on N_2O.

Agricultural practices (conservation tillage or deep plowing, fertilizers or manures applications…) can significantly affect the balance of soil organic carbon and GHG emissions. A global approach accounting for the multiple sources of greenhouse gases is necessary, because the ways to decrease the emission from one source may increase the emissions from other sources. For instance, the replacement of deep tillage by shallow tillage decreases fuel consumption and tends to increase soil C content, but on the other hand it often results in increased direct N_2O emission. Hence, trade-offs must be identified.

OBJECTIVE

To better understand the effect of cropping systems on greenhouse gas emissions in order to be able to optimize crop management and cropping systems in the objective of reducing these emissions.
To gain more knowledge on the interactions between the different N emission sources.

CONTENT

Simulation of the effect of crop management on greenhouse gas emissions, N volatilization (NH_3 and NO_X) and of NO_3^- leaching using crop models is the best way to develop a global approach. The simulation of indirect N_2O emission with a model at the landscape level would also be helpful. Such models already exist, but they must be validated and probably improved in the European conditions.

Experimental databases are necessary to validate the models. There is not enough experimental data, especially on the effect of crop management on direct N_2O emissions. The main factors are N fertilizer management, tillage, irrigation, and the application of organic matter. The effect of the amount of N fertilizer has already been studied, but the results are highly variable. The main part of this variability probably results from environmental conditions. However, the timing of N application and the N form also play a role. This must be investigated. The variability of the effect of shallow tillage compared with deep tillage on N_2O direct emissions must also be studied, as well as the effect of the timing and the amount of irrigation interacting with tillage and N fertilizer management. Little is known on the effect of organic matter, because of the diversity of forms of this product. A typological approach is necessary. The emission under legume crops must also be further investigated. The experimental data could also be used to derive emission factors, which can be used to optimize cropping systems instead of modeling. With this approach it would not be possible to investigate all combinations of factors, but on the other hand it should be more robust

Field experiments comparing the different N emissions (N_2O, NO_3, NH_3) of cropping systems designed to reduce N fertilizer use (introduction of legume, use of organic nitrogen), and N leaching (with intercrop practices such as catch crop) in a dynamic way along the rotation in pluriannual experiments.

Create a **network of pluriannual experiments** in different climatic, soil and management conditions (with or without irrigation, with classical soil cultivation versus conservation tillage, more and less intensive…).

The experiments should be completed by an assessment of N emission for organic source of nitrogen. Energy and carbon balances could also be assessed.

At last, knowledge should be integrated in proposals for improved cropping systems in different regions of Europe.

OUTPUT / DELIVERABLES

Knowledge about the trade-off i) for future work on optimization of cropping systems to reduce all source of greenhouse gas emission, ii) to improve N models. A set of data, emission factors, to calibrate/validate N-models and study the effect of cropping systems on greenhouse gas emissions

Cropping systems with low greenhouse gas emissions

Experimental databases on the effect of the main crop management factors on greenhouse gas emissions, especially direct N_2O emissions

IMPACT

Better understanding of N cycling in arable crops, enabling to take targeted measures to reduce N losses and to increase N use efficiency

Less greenhouse gas emitted by cropping systems, per land unit or per unit of output product.

PARTNERSHIP

Partnership: research organizations, networks between experimental and modeling researchers.

FUNDING INSTITUTION/S

EU, national agencies in joint programming

OTHER REMARKS

The project should build on the results of the integrated EU-Projects Nitro-Europe and Carbo-Europe.

RESEARCH TOPIC

D: Better understanding of public concern about Arable Crops production and products and communication with global and local societies.

CHALLENGE

2.8 Understanding and addressing purchaser demand
5.6 Achieving a positive perception of AC systems

RESEARCH GOAL

2.8.2 Understanding the consumers' preferences and needs

WORKING GROUP

WG 3.4 (4.7)

BACKGROUND

Consumer's and citizen's fears over science and technologies used in agriculture and food industries, the archetype being GM crops, have been a growing phenomenon for more than 15 years, increasing in intensity at the occasion of repeated crises. These fears and concerns deal with food safety aspects, on one side ("consumers" perception), and environmental and social impacts ("citizens" perception) on the other side.

These fears are seen to be hampering the wider use of innovating technologies in Europe, and may place additional burdens on industry (e.g. in dealing with co-existence issues to ensure product purity, for current dominant non-GM markets). They cause a more and more dual vision of agriculture which could be caricatured as (bad) intensive polluting agriculture versus (good) environmental organic agriculture.

At a different level, the image in the public opinion of agriculture and Arable Crops production systems is a key point for the future legitimacy of public supports to the sector.

Consumers and citizens are more than ever faced by contradictory choices (including prices, social and environmental impacts of consumption…).

There is a need for AC agriculture to better understand the general public's areas of concern, to provide informed, balanced advice and comments and progress towards a new relationship between AC sector and society. And a need for the consumers to obtain factual elements to light up their choices.

OBJECTIVE

To better understand the EU general public's concerns over AC based food and AC production processes.
To propose actions and contents for public information.
To enhance relations with representative stakeholders.

CONTENT

Engagement and consultation through surveys and meetings to ascertain views and assertions.
To rationalize this into a list of key concerns and provide balanced information notes in response.

OUTPUT / DELIVERABLES

Wide publication of balanced view document addressing widely held concerns in the general public – including identifying areas of doubt.

IMPACT

Development of engagement in the debates on science and technologies in agriculture. Renewed dialogue with society and stakeholders.

PARTNERSHIP

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FUNDING INSTITUTION/S

EU

ANNEX 2: EUROCROP topics in relation to AC challenges and goals

Chal/ goal nbers	CHALLENGES FOR ARABLE CROPS		topic is oriented to			
colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
1.0	TECHNICAL AND ECONOMIC EFFICIENCY OF ARABLE CROP SYSTEMS					
1.1	Increase level and stability of yields					
1.1.1	increasing yield potential of varieties by breeding	1.1.A Increasing yield potential of varieties by breeding: abiotic tolerance --> see 1.1.3		x	1	
		1.1.B Increasing yield potential of varieties by breeding: biotic tolerance				
		1.3 Increasing yield stability through genetic resistances to crops enemies (weeds, pests and diseases)/ breeding / network ICP			x	1
1.1.2	increasing yield potential of varieties by management practices	**--> go to 1.2.6: cropping systems scale**				
1.1.3	increasing yield stability through varieties and crops physiological plasticity	1.4 production of varieties tolerant to drought, N deficiency, weeds, pests and diseases through understanding crops reactions to stress, and tools for breeding // (ex 1.5)		1		
		1.1A Increasing yield potential of varieties by breeding: abiotic tolerance		X	1	
1.2	Technical and economic optimisation by innovating sustainable Cropping Systems	**--> 1.4**				
1.2.1	measuring economic performance of cropping systems					
1.2.2	developing alternative crop management					
1.2.3	developing precision farming SYSTEMS	5-1.2 Use of new technologies/methods to increase the efficiency of crop management	1			
1.2.4	optimising cropping systems with reduced or no tillage	1.16 Optimizing crop rotations in reduced or no tillage conditions	1			
1.2.5	optimising investments and work organization					
1.2.6	optimization and management of crop rotations	1.17 Management of crop rotations/Prevent and control weed infestation, disease and pest infection	1		1	
		1.2 Better effects of crop rotations on Weed/Pest/Diseases / alternative crops and cropping systems	1			
1.2.7	developing more effective support for farmers: extension and services					
1.3	Adaptation of production systems and crop rotations according to changes in farming framework conditions					
1.3.1	setting up of tools and strategies to support adaptation to change	2.1 production systems and rotations: impact of increasing commodity and inputs prices on production systems	1			

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
1.3.2	analysis of specific regional actions to adapt to change	2.2 Economics of farm size: economies of farm size under changing market and political conditions with focus to new member states			1	
1.4	Managing risks for EU farmers					
1.4.1	Find strategies to manage risks factors	1.15 / 2.8 Risk management of arable farming under price volatility and climate change (+ Decision support system for a rapid adaptation to economic context)	1			
1.5	Increasing logistics efficiency					
1.5.1	predicting harvest and quantities					
1.5.2	improving storage efficacy					
1.5.3	improving batching and marketing					
2.0	MEETING DEMANDS ALONG THE VALUE CHAINS					
2.1	Increase efficiency of transformation processes					
2.1.1	Increasing efficiency of processing and opportunities for wider exploitation of crops products and by products.	4.4 Better understanding of the interaction between crop quality characters and processing – to identify areas for improvement and development			1	
		4.5 Development of pest and disease control measures to protect/enhance product quality	X			1
2.2	Characterization of quality and standardization					
2.2.1	Harmonization of sampling and test methods to guarantee quality					
2.2.2	developing more efficient / rapid AC products characterization methods (analyses)					
2.2.3	promoting the elaboration of EU and international standards for AC products					
2.2.4	developing certifications for AC production methods/ Standardising assessments between Member States.					
2.2.5	developing information networks	4.8 Development of information transfer programme to increase production and use of EU-derived plant proteins	1			
2.3	Ensuring food safety	3.3 preventing safety risks in AC	1			
2.3.1	Preventing contamination					
2.3.2	monitoring and ensuring food safety along the crop chains					
2.4	Meeting food and industrial quality standards					
2.4.1	understanding and managing the determinants of quality along the crop chain					
2.4.2	Delivering quality / Better matching of market demand and delivery by crops = *master CROP MANAGEMENT impacts on quality efficiently*	4.9 " Contrôle of mycotoxins" (ex Development of early warning systems to predict incidence of specific disease problems that may have an influence on crop quality	1			
2.4.3	Maintain confidence of consumers that any quality specification is effective (including GM free segregation method)	4.3 Development of co-existence strategies for EU arable crops with GM and non-food crops.	1		1	
2.4.4	breeding for quality	4.1 Better understanding of the genetic determinants of quality traits to help develop better cultivars capable of delivering required quality in the face of abiotic stress		1		

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
2.5	Maintain quality of products during storage					
2.5.1	Controlling ingress to grain/seed batches of different cultivars with different quality parameters/ Contamination with lower, or different quality seed/grain					
2.5.2	Prevent loss of quality and increased risk of deterioration in store as a result of reducing chemical armoury to control pest and disease/					
2.6	Increasing nutritional value					
2.6.1	Characterizing and improving the nutritional properties of AC raw products	4.10 Optimise the digestibility of plant proteins fed in animal diets	1			
		3.2 Optimizing AC for optimal utilization of nutrients in human and animal nutrition and/or utilization of components of AC or by products of food processing for non-food applications	1			
2.6.2	Reduce unfavorable impacts of processing on nutrition	4.2 Better understanding of the interaction between processing methods and nutritional quality of produce – to optimise bio-availability	1			
2.6.3	Preserve and develop nutritional properties					
2.7	Addressing consumer demand in nutrition and dietetics					
2.7.1	developing the role of AC products in health troubles prevention: elaborating balanced diets	3.7 Science based integration of feed crops and related animal products in consumers' health concerns		1		
2.7.2	enhancing the role of AC products for health: identifying essential elements and understanding their roles and benefits					
2.8	Understanding and addressing purchaser demand					
2.8.1	understanding the needs and procedures of industrial purchasers	3.8 Understanding the industrial needs and involving the industry in exploiting crops potential for bio based products				1
2.8.2	understanding the consumers' preferences and needs	4.7 Better understanding of public concerns associated with GM technologies to help shape communication strategies	1			
2.8.3	meeting consummers' expectations	4.6 Develop and improve carbon footprints for EU produce and develop agreed standard methods for their determination across Europe	1			
2.9	Brand and quality standard protection / To ensure consumer confidence					
2.10	Increasing producer share of any added value					
3.0	NEW OUTLETS AND MARKETS					
3.1	Developing New food uses					
3.1.1	identifying components of interest, properties and potential uses					
3.1.2	setting new processes for new products					
3.1.3	enabling benefits and risks assessments for new products					
3.1.4	adapting species to new needs: breeding and genetics	3.1 Optimizing AC for new healthy products	1			
3.2	Developing New feed uses					
3.2.1	identifying components of interest, properties and potential uses					

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
3.2.2	setting new processes for new products	3.5 Strategies to enhance nutritional quality and processability of crop products and by-products fom food industry, bioenergy or biorefinery to secure supply to the European feed sector	1			
3.2.3	enabling benefits and risks assessments for new products					
3.2.4	adapting species to new needs: breeding and genetics					
3.3	Developing Non food/ non feed uses	3.9 Land use optimisation for Food, feed and NonFood/Nonfeed, and synergies between production and services/ how to optimize land use and synergies at different scales			1	
3.3.1	identifying components of interest, properties and potential uses					
3.3.2	setting new processes for new products					
3.3.3	enabling benefits and risks assessments for new products	3.12 Ecocertification				
3.3.4	adapting species and crops to new needs: breeding, genetics, new crops management					
3.4	Global optimization of resources (land, biomass, energy) and choices for new productions to develop sustainable and productive territories					
3.4.1	whole crop utilization	3.4 Whole crop utilization	1			
		3.10 Sustainable Whole crop utilization for Non feed / non food, food and feed, and synergies between different outlets	1		?	
3.4.2	Land use optimization for new and traditional products	3.11 Agro-industrial partks and land use: closing the regional mass and energy cycles integrating agriocultural production, processing, mass flow and logistics and providing balanced services to society	?		1	
3.4.3	optimization of logistics	3.6 Improvement of competitiveness of crop production on the global feed and related markets: strategies for competitive EU feed production	1			
4.0	SUSTAINABLE PRODUCTION and ENVIRONMENT ASPECTS					
4.1	Improving resource use efficiency: nutrients					
4.1.1	Understanding crop species nitrogen use physiology					
4.1.2	Improve nitrogen fertilization practices on crops					
4.1.3	Breeding for crops species with improved N uptake and nitrogen efficiency	1.21 Breeding for crops species with improved N uptake and nitrogen efficiency	1			
4.1.4	Developing N fixating organisms for non legume crops					
		5-2.2 Global assessment of N emissions of cropping systems			1	
4.1.5	Nitrogen optimization at cropping system scale / developing reduced nitrogen input and productive cropping systems/	1.22 Developing reduced nitrogen input and productive cropping systems/ (nitrogen optimization at cropping system scale / Optimize legumes in Cropping systems)	1			

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
4.1.6	**Improving resource use efficiency: PK & other nutrients**	1.23 Better use of manures: treatment , application, timing	1			
4.1.7	**Efficient use of slurry and manure in cropping systems**	5-1.3 linking arable crops production to livestock farming *(5- (2.4 + 1.3) Integrated assessment of the exchange of organic fertilisers from region with high livestock densities to arable region / Integration of arable and livestock farming)*			1	
4.1.8	**Integrate livestock and arable farming**					
4.2	**Improving resource use efficiency: energy**					
4.2.1	**Assessing energy use in crop chains and at farming level**	1.20 Understanding and calculating energy costs in crop chains and at farm level / New methods and references for energy balance of cropping systems	?		1	
4.2.2	**Innovating for high energy efficiency of cropping systems**	1.19 Innovating for improved energy balance of cropping systems	1			
		2.7 Establish competitive crops rotations for bioenergy: Analyse the contribution of different crops and crop rotations to bioenergy yields and their economical and ecological impacts in selected regions of Europe			1	
		2.6 Economics of straw removal: identify different local consitions for straw removal in Europe and analyse their impact on supply costs			1	
4.2.3	**Innovating for high energy efficiency in transformation processes**					
4.2.4	**Improve energy efficiency of agricultural input production**					
4.2.5	**Efficient use of agricultural equipment**					
4.2.6	**Use of agro-fuels in the crop chains**					
4.2.7	**Develop competitive cropping systems for agro-fuels**					
4.3	**Improved resource use efficiency: water**					
4.3.1	**Breeding for high water use efficiency**	1.8 Improving crops water USE efficiency:Varietal evaluation & breeding		1		
		1.9 Water efficient cropping systems			1	
4.3.2	**Improving water management in cropping practices**	5-2.1 Designing and testing water efficient cropping systems in a multi-scale approach	1			
4.3.3	**Improving irrigation water at farm level**	1.10 Sustainable irrigation in relation to water and soil (drainage, Salinisation).	1			
4.3.4	**Improving irrigation water at irrigated bassin level**					
4.4	**Maintaining diversity in genetic resources of crops**					

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
4.4.1	**More systematic use of wild relatives in crop breeding programs (disease and drought tolerance)**					
4.4.2	**Conserving genetic resources of cultivated crops (e.g. gene banks)**					
4.5	**Enhancing biodiversity in agro-ecosystems**					
4.5.1	**Understand biodiversity**					
4.5.2	**Measure biodiversity: indicators**					
4.5.3	**Efficient biodiversity enhancement**	5-3.1 Efficient biodiversity enhancement			1	
4.5.4	**Assess risks of GM crops**					
4.6	**Ensure an effective crop protection in the long term (integrated crop protection)**					
4.6.1	**Understanding the genetics of resistances**					
4.6.2	**Understanding and forecasting crop antagonist interaction (biology, attacks and wastes)**	1.13 Forecasting of pests and diseases taking into account cropping and management system and crop canopy sensibility			1	
		1.14 Preserving the durability of crop protection tools		1		
4.6.3	**Innovating in plant protection products**					
4.6.4	**Integrated crop protection at cropping system level**	5-3.2 Effective crop protection strategies			1	1
4.6.5	**Deal with new and evolving plants pathogen problems**	5-3.3 Deal with new and emerging pathogens (pests, diseases, weeds)	1			
4.7	**Minimize greenhouse gas emissions per unit of product**					
4.7.1	**Manage the carbon cycle**	2.5 Establishment of a common methodology for measurement of carbon release and to use this methodology to compare production systems for selected crops in selected regions of Europe			1	
4.7.2	**Minimize N2O emissions**	1.11 Reducing greenhouse gas emissions of cropping systems			1	
4.8	**Maintain and improve soil quality**	5-1.4 Integrated soil protection (physical, chemical and biological aspects)/ tasks: 1/Avoid compaction, Reducing soil erosion 2/ Improve soil Chemical properties (OM, salinisation…) 3/ Improve soil biological properties by adequate cropping systems			1	
4.8.1	**Maintain and improve soil physical properties**	1.5 Avoid compaction and reducing soil erosion	1			
4.8.2	**Maintain and improve soil chemical properties**	1.6 improve soil chemical properties	1			
4.8.3	**Maintain and improve soil biological properties**	1.7 improve soil biological properties	1	?		
4.9	**Reduce water pollution**					
4.9.1	**Minimize runoff**					

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
4.9.2	Minimize nitrate leaching					
4.9.3	Minimize phosphorus losses					
4.9.4	Minimize leaching of agrochemicals					
4.9.5	Minimize long term impact of agrochemicals					
4.10	Developping strategies to face climate diversity and climate change					
4.10.1	Improving crop plasticity to face climate diversity and global change					
4.10.2	Anticipating / forecasting the changes of climatic conditions and their effects on crops	1.18 Anticipating/forecasting the changes of climatic conditions and their effects on crops			1	
4.10.3	Developing climate change strategies in the agricultural sector	2.4 Economics of adaptation to climate change			1	
		5-2.3 Integrated assessment of management strategies for different climatic scenarios.	?		1	
4.11	Integrating different sustainability concerns in the design and implementation of innovative cropping systems					
4.11.1	Design innovative and sustainable production systems which take account of the diversity of evaluation criteria concerning sustainability	1.12 Evaluation of different farm types concerning the sustainability of their cropping systems	1			
		5-1.1 Environmental and economic optimisation of (low-input) cropping systems	1		?	
4.12	Developing common sustainability assessment methods					
		5-3.4 Scaling issues: find sustainable solutions on different scales			1	
		5-3.5 Evaluate best region for crop production.	1		?	
4.12.1	Developing sustainability assessment methods for arable cropping systems and farms					
4.12.2	Developing sustainability assessment methods for crop chains					
4.12.3	Development of specific European experimentation networks					
5.0	SOCIETAL SUSTAINABILITY					
5.1	Improve efficiency in value chain and networking					
5.1.1	Promote cooperation along the chain to facilitate joint strategies					

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
5.1.2	**Developing new tools to share information**	6.5 Comparative analysis and identification of the innovation opportunities to increase efficiency in the arable crops chain and networks.			1	
		6.10 Value chain and networking/ Analyze trust along the network			1	
		6.11 Value chain and networking: Analyze value chain and market power.			1	
5.2	**Reinforcing entrepreneurship and innovation capacity of AC systems**					
5.2.1	**Promote awareness of market trends in AC chains (clearly identify arable crops market trends)**	6.8 Analysis of farmer awareness of market trends and identification of knowledge gaps			1	
5.2.2	**Develop service and institution to stimulate enterpreneurship in AC chain** ((To find how it is possible) to stimulate and promote entrepreneurship in AC sector to improve the competitiveness of the sector)	6.9 Analysis the factor of entrepreneurship at EU level			1	
5.3	**Developing income with indirect relations to AC production: income from other activities**					
5.3.1	**Managing multifunctional and pluriactivity farming**	2.9 Researching new activities and possibilities to the farmers in the new market situation, new tools for the rural development.			1	
5.4	**Improving the integration of arable crops into rural territories and economies**					
5.4.1	**Defining contribution of AC to societal needs (Gaining a proactive role in supporting rural sustainability)**	6.3 Deprivation in the quality of rural life: provision of public and social goods and services.			1	
		6.4 Connection between land consolidation and arable crops.			1	
5.4.2	**New approaches to improve integration of AC in rural economy (Innovation in land use/ Support and manage the process of adoption of innovation to improve the competitiveness of AC systems)**	6.6 Structure and interaction between arable crops and urban planning.			1	
		6.7 Open innovation	?		1	
5.5	**Promote a consistent regulatory and governance system to strengthen the competitiveness of AC**					
5.5.1	**Identifying coherent policy framework for AC system**	2.3 adopting consistent policies: designing improved contractual options to allow flexible access to land for farming in the new Member States			1	
		6.1 Definition of services for improving farmers' orientation, sensitiveness and adaptability to the market.	1			
		6.2 Designing EU policy for improving arable crops competitiveness in consideration of globalization process and the three main uses of crops: food, feed, energy.	1			

colour code = priority		TOPIC TITLE	applied needs	basic knowledge	system explaining	coordination action
5.6	**Achieving a positive public perception of arable crops systems**					
5.6.1	**developing a positive image of arable crops chains and crops products**					
5.6.2	**developing a positive image of AC production systems**					
			35	5	35	4

finding solutions: *immediate applied needs (applied results are expected in the project duration)*

research for basic knowledge: *understanding in order to find future solutions*

System explaining research: *understanding in order to find future solutions*

coordination actions

Annexe 3: Short literature review

Michel Godet, Manuel de Prospective Stratégique, 2ème édition / Dunod, Paris 2004
(English, Spanish and Portuguese translations published by UNESCO)

Michel Godet, with Philippe Durance and Adam Gerber, Strategic foresight, la Prospective, Problems and Methods, LIPSOR Working Paper N°20, October 2006 / download on website
http://www.cnam.fr/lipsor/eng/softwares_04.php

Food for life (2006): Stakeholders' Proposal for a Strategic Research Agenda 2006-2020

Scenar 2020 Scenario study on agriculture and the rural world / Final report contract N°30-CE-00400887/00-08, January 2007

FFRAF report: foresighting food, rural and agri-futures, SCAR, version 2.0 February 2007

Agriculture, environnement et territoires. Quatre scénarios à l'horizon 2025. La Documentation Française, Paris 2006

Hervé Guyomard et al, Résultats de la prospective Agriculture 2013. INRA colloque 4 Octobre 2007, Paris

European Technology Platform Plants for the Future, Strategic Research Agenda 2025, 25th June 2007

European Technology Platform Food for Life, Stakeholders'Proposalfor a Strategic Research Agenda 2006-2020

Innovating for a Better Future, European Technology Platform Suchem

European Biofuels Technology Platform, Strategic Resear'ch Agenda & strategy deployment document, January 2008

Forest based sector Technology platform: A strategic research agenda for innovation, competitiveness and quality of life. Vision 2030

Water Supply and Sanitation technology Platform:

- Water in agriculture, Vision document and Strategic research agenda, WSSTP thematic working group 4, May 2006
- Strategic Research Agenda, Water research, a necessary investment in our common future, October 2006

Annex 4: EUROCROP goals and topics in relation to European Technology Platforms issues

re numbering WP3	CHALLENGES FOR ARABLE CROPS	RESEARCH TOPICS ADDED WP3 / RESEARCH GAPS from WP3 groups	COMMENTS	PFF: Plants For the Future	FFL: Food For Life	BF: Biofuels	WSST: Water Supply and Sanitation Technology	SC: SUSCHEM Sustainable chemistry
	GOALS = questions from AC sector to research							
1.0	TECHNICAL AND ECONOMIC EFFICIENCY OF ARABLE CROP SYSTEMS							
1.1	Increase level and stability of yields							
1.1.1	increasing yield potential of varieties by breeding		PFF 3.2.1 improve plant productivity and quality / PFF 1.2.1. Goal one: Develop and produce sufficient, diversified and affordable high-quality plant / PFF 4.2.1 Goal one: Genome sequences of European crops and major pathogens/ PFF 4.2.2 Goal two: Detailing the parts list of genomes/ PFF 4.2.3 Goal three: From gene to phenotype/ BioF Feedstock7 New crops through plant breeding with optimised characteristics	5		1		
		1.1.A Increasing yield potential of varieties by breeding: abiotic tolerance --> see 1.1.3						
		1.1.B Increasing yield potential of varieties by breeding: biotic tolerance						
		1.3 Increasing yield stability through genetic resistances to crops enemies (weeds, pests and diseases)/ breeding / network ICP						
1.1.2	increasing yield potential of varieties by management practices	--> go to 1.2.6: cropping systems scale	BioF Feedstock1optimise yields and management practices through sustainable landuse			1		
			BioF Feedstock6 energy crop management techniques			1		

1.1.3	**increasing yield stability through varieties and crops physiological plasticity**	1.4 production of varieties tolerant to drought, N deficiency, weeds, pests and diseases through understanding crops reactions to stress, and tools for breeding // (ex 1.5)						
		1.1A Increasing yield potential of varieties by breeding: abiotic tolerance						
1.2	**Technical and economic optimisation by innovating sustainable Cropping Systems**		BioF feedstock 3 Innovative cropping systems for the 4Fagro-forestry systems			1		
1.2.1	**measuring economic performance of cropping systems**							
1.2.2	**developing alternative crop management**							
1.2.3	**developing precision farming SYSTEMS**	5-1.2 Use of new technologies/methods to increase the efficiency of crop management						
1.2.4	**optimising cropping systems with reduced or no tillage**	1.16 Optimizing crop rotations in reduced or no tillage conditions	BioF feedstock 3 Innovative cropping systems foir the 4Fagro-forestry systems			1		
1.2.5	**optimising investments and work organization**							
1.2.6	**optimizion and management of crop rotations**	1.17 Management of crop rotations/Prevent and control weed infestation, disease and pest infection						
		1.2 Better effects of crop rotations on Weed/Pest/Diseases / alternative crops and cropping systems						
1.2.7	**developing more effective support for farmers: extension and services**							
1.3	**Adaptation of production systems and crop rotations according to changes in farming framework conditions**		BioF Feedstock2 Optimise current production systems			1		
1.3.1	**setting up of tools and strategies to support adaptation to change**	2.1 production systems and rotations: impact of increasing commodity and inputs prices on production systems						

1.3.2	analysis of specific regional actions to adapt to change	2.2 Economics of farm size: economies of farm size under changing market and political conditions with focus to new member states						
1.4	Managing risks for EU farmers							
1.4.1	Find strategies to manage risks factors	1.15 / 2.8 Risk management of arable farming under price volatility and climate change (+ Decision support system for a rapid adaptation to economic context)						
1.5	Increasing logistics efficiency		BioF handling of biomass 1 (optimised logistics for selected systems and scales) &2 (integrated harvest and handling for multiproducts.			2		
1.5.1	predicting harvest and quantities							
1.5.2	improving storage efficacy							
1.5.3	improving batching and marketing							
2.0	MEETING DEMANDS ALONG THE VALUE CHAINS							
2.1	Increase efficiency of transformation processes							
2.1.1	Increasing efficiency of processing and opportunities for wider exploitation of crops products and by products.	4.4 Better understanding of the interaction between crop quality characters and processing – to identify areas for improvement and development						
		4.5 Development of pest and disease control measures to protect/enhance product quality						
2.2	Characterization of quality and standardization							
2.2.1	Harmonization of sampling and test methods to guarantee quality							
2.2.2	developing more efficient / rapid AC products characterization methods (analyses)							
2.2.3	promoting the elaboration of EU and international standards for AC products							

2.2.4	**developing certifications for AC production methods/ Standardising assessments between Member States.**							
2.2.5	**developing information networks**	4.8 Development of information transfer programme to increase production and use of EU-derived plant proteins						
2.3	**Ensuring food safety**	3.3 preventing safety risks in AC	PFF 1.2.2. Goal two: Produce, trace and control safe plant raw materials for feed and food / FFL Challenge 4 "assuring safe food that consumers can trust"	1	1			
2.3.1	**Preventing contamination**		FFL Challenge 4 Goals 1 & 2 "preventing and monitoring the behaviour and fate of relevant known and emerging biological / chemical hazards" + goal 3 "improving riskassessment and risk-benefit evaluation"		3			
2.3.2	**monitoring and ensuring food safety along the crop chains**		FFL Challenge 4 Goals 1 & 2 "preventing and monitoring the behaviour and fate of relevant known and emerging biological / chemical hazards" + goal 4 "developping to ensure food security in the food chain"		1			
2.4	**Meeting food and industrial quality standards**		PFF 3.2.1 improve plant productivity and quality	1				
2.4.1	**understanding and managing the determinants of quality along the crop chain**							
2.4.2	**Delivering quality / Better matching of market demand and delivery by crops = *master CROP MANAGEMENT impacts on quality efficiently***	4.9 " Contrôle of mycotoxins" (ex Development of early warning systems to predict incidence of specific disease problems that may have an influence on crop quality						
2.4.3	**Need to maintain confidence of consumers that any quality specification is effective (including GM free segregation method)**	4.3 Development of co-existence strategies for EU arable crops with GM and non-food crops.						
2.4.4	**breeding for quality**	4.1 Better understanding of the genetic determinants of quality traits to help develop better cultivars capable of delivering required quality in the face of abiotic stress						
2.5	**Maintain quality of products during storage**							

2.5.1	**Controlling ingress to grain/seed batches of different cultivars with different quality parameters/ Contamination with lower, or different quality seed/grain**							
2.5.2	**Prevent loss of quality and increased risk of deterioration in store as a result of reducing chemical armoury to control pest and disease/**							
2.6	**Increasing nutritional value**		PFF 3.2.1 improve plant productivity and quality / PFF 1.2.1. Goal one: Develop and produce sufficient, diversified and affordable high-quality plant	2				
2.6.1	**characterizing and improving the nutritional properties of AC raw products**	4.10 Optimise the digestibility of plant proteins fed in animal diets						
		3.2 Optimizing AC for optimal utilization of nutrients in human and animal nutrition and/or utilization of components of AC or by products of food processing for non-food applications	PFF 1.2.3. Goal three: Tailor plant raw materials for certain health benefits and specific consumer groups / FFF challenge 2	2	1			
2.6.2	**Reduce unfavorable impacts of processing on nutrition/ Intensive processing methods may reduce nutritive value**	4.2 Better understanding of the interaction between processing methods and nutritional quality of produce – to optimise bio-availability						
2.6.3	**preserve and develop nutritional properties**							
2.7	**Addressing consumer demand in nutrition and dietetics**		PFF 1.2.3. Goal three: Tailor plant raw materials for certain health benefits and specific consumer groups / FFF challenge 2	1	1			
2.7.1	**developing the role of AC products in health troubles prevention: elaborating balanced diets**	3.7 Science based integration of feed crops and related animal products in consumers' health concerns	FFF challenge 2 "delivering a healthy diet"/ goals 2 & 3		2			
2.7.2	**enhancing the role of AC products for health: identifying essential elements and understanding their roles and benefits**		FFF challenge 2 "delivering a healthy diet"// goal 1 "understanding brain function in relation to food"+?		2			
2.8	**Understanding and addressing purchaser demand**							

2.8.1	**understanding the needs and procedures of industrial purchasers**	3.8 Understanding the industrial needs and involving the industry in exploiting crops potential for bio based products						
2.8.2	**understanding the consumers' preferences and needs**	4.7 Better understanding of public concerns associated with GM technologies to help shape communication strategies	FFL Challenge 1 "ensuring that the healthy choice is the easy choice for the consumers"? + FFL Chal 2 "delivering a healthy diet' Goal 4 "understanding consumers' behavior in relation to health and nutrition		2			
2.8.3	**meeting consummers' expectations**		FFL Challenge 1?		1			
		4.6 Develop and improve carbon footprints for EU produce and develop agreed standard methods for their determination across Europe	FFL chal 5 goal5 understanding consumers and their behaviour regarding sustainable food production		1			
2.9	**Brand and quality standard protection / To ensure consumer confidence**		FFL Chal 4 goal 5 ? "understanding and addressing consumer concern with food safety issues" / FFL Chal 6 goal 6 integrating food chain management and the consumer		3			
2.10	**Increasing producer share of any added value**							
3.0	**NEW OUTLETS AND MARKETS**							
3.1	**Developing New food uses**		FFL Challenge 3 "developping value added food products with superior quality, convenience, availability and affordability"		1			
3.1.1	**identifying components of interest, properties and potential uses**		PFF 1.2.1. Goal one: Develop and produce sufficient, diversified and affordable high-quality plant raw materials for food products/ FFF challenge 2/goal 1 "understanding brain function in relation to food"+?	1	1			
3.1.2	**setting new processes for new products**		PFF 1.2.1. Goal one: Develop and produce sufficient, diversified and affordable high-quality plant raw materials for food products / FFL Chal3 Goal 2 "improving process and packaging design and process control"	1	1			
3.1.3	**enabling benefits and risks assessments for new products**		FFL Challenge 4 goal 3 "improving risk assessment and risk-benefit evaluation"		1			
3.1.4	**adapting species to new needs: breeding and genetics**	3.1 Optimizing AC for new healthy products	PFF 1.2.1. Goal one: Develop and produce sufficient, diversified and affordable high-quality plant raw materials for food products	1				
3.2	**Developing New feed uses**		PFF 1.2.4. Goal four: High-quality, sufficient, affordable and sustainable feed	1				
3.2.1	**identifying components of interest, properties and potential uses**							

3.2.2	setting new processes for new products	3.5 Strategies to enhance nutritional quality and processability of crop products and by-products fom food industry, bioenergy or biorefinery to secure supply to the European feed sector						
3.2.3	enabling benefits and risks assessments for new products							
3.2.4	adapting species to new needs: breeding and genetics							
3.3	Developing Non food/ non feed uses		PFF 2.2.1. Goal one: Biochemical production / PFF 2.2.2. Goal two: Bio-energy production /	2				
		3.9 Land use optimisation for Food, feed and NonFood/Nonfeed, and synergies between production and services/ how to optimize land use and synergies at different scales	BioF System analysis 3 (supply and demand of biomass feedstocks and the impacts of policy) and 4 (biomass availability and supply in prevailing market conditions / SusC: Analyse and develop value chain concepts and viability assessment of transformation chains (IAP p92)			1		1
3.3.1	identifying components of interest, properties and potential uses							
3.3.2	setting new processes for new products		PFF 2.2.2. Goal two: Bio-energy production / BioF Sugar & Starch 1 (maximum starch to EtOH yield accomplished), 2 (grain dry fractionnation standard practice), 3 (viable process for full diggestion of residuals in DDGS to EtOH) and 4 (technology in place for conversion of grain fibers to EtOH) / BioF Lignocellulose to EtOH 1 to 6/ BioF Thermochemical 1to 6 / BioF Biorefinery concepts (1 to 7) / SusChem Industrial Biotechnology: "novel enzymes and microorganisms/ converting and/or fractionning EU biomass feedstock"; "biocatalytic process design" / SusC: improvement of biorefining technologies (IAP p28) / SusC: More sustainable, more efficient and cheaper liquid fuels production (2nd generation biofuels) (IAP p 31) / SusC: developing eco-efficient processes for biomass- based liquid biofuels (imporved fermentation processes for organic fuesl/ biodiesel / biogas) (IAP p 34-35)	4		3		4
3.3.3	enabling benefits and risks assessments for new products	3.12 Ecocertification	BioF sugar and starch 5 (energy balance of cereal bases EtOH plants fully optimised) and 6 (maximum carbon sequestration through the process)/			2		

3.3.4	**adapting species and crops to new needs: breeding, genetics, new crops management**		PFF 2.2.2. Goal two: Bio-energy production / BioF feedstock 6(energy crops management techniques) and 7 (innovative feedstock concepts)	1		2		
3.4	**Global optimization of resources (land, biomass, energy) and choices for new productions to develop sustainable and productive territories**							
3.4.1	**whole crop utilization**	3.4 Whole crop utilization	SusCProcess ecoefficiency and integration: the biorefinery concept (IAP p 26)					1
		3.10 Sustainable Whole crop utilization for Non feed / non food, food and feed, and synergies between different outlets	SusC : define criteria for sustainability along the value chain					1
3.4.2	**Land use optimization for new and traditional products**	3.11 Agro-industrial parks and land use: closing the regional mass and energy cycles integrating agriocultural production, processing, mass flow and logistics and providing balanced services to society	Susc: new business models for biorefineries, linked withy rural development (IAP p27)					1
3.4.3	**optimization of logistics**	3.6 Improvement of competitiveness of crop production on the global feed and related markets: strategies for competitive EU feed production						
4.0	**SUSTAINABLE PRODUCTION and ENVIRONMENT ASPECTS**							
4.1	**Improving resource use efficiency: nutrients**							
4.1.1	**Understanding crop species nitrogen use physiology**		PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture/ PFF 4.2.4 Goal four: Systems biology and prediction of novel traits	2				
4.1.2	**Improve nitrogen fertilization practices on crops**							
4.1.3	**Breeding for crops species with improved N uptake and nitrogen efficiency**	1.21 Breeding for crops species with improved N uptake and nitrogen efficiency	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture / PFF 4.2.4 Goal four: Systems biology and prediction of novel traits	2				
	Developing N fixating organisms for non legume crops		PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
4.1.4	**Nitrogen optimization at cropping system scale / developing reduced nitrogen input and productive cropping systems/**	5-2.2 Global assessment of N emissions of cropping systems	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				

4.1.5	**Improving resource use efficiency: PK & other nutrients**	1.22 Developing reduced nitrogen input and productive cropping systems/ (nitrogen optimization at cropping system scale / Optimize legumes in Cropping systems)						
4.1.6	**Efficient use of slurry and manure in cropping systems**	1.23 Better use of manures: treatment , application, timing	WSST (p40)"Develop strategies and technologies for minimizing the use and losses to the environment of pesticides and nutrients, and especially for replacing mineral fertilizers by an environmentally efficient use of manure, wastewater treatment sludge and other bio-wastes (including the implementation of organic farming)" / (p44)"Comprehensive analysis , monitoring and global assesment of manure and biosolids management scenarios (economical, ecological and social issues)" / WSST (p44) "Environmentally safe slury storage, separation an drecycling technologies; also for anabling manure quality improvements and maximization of value of manure"				3	
4.1.7	**Integrate livestock and arable farming**	5-1.3 linking arable crops production to livestock farming (5- (2.4 + 1.3) Integrated assessment of the exchange of organic fertilisers from region with high livestock densities to arable region / Integration of arable and livestock farming)						
4.2	**Improving resource use efficiency: energy**							
4.2.1	**Assessing energy use in crop chains and at farming level**	1.20 Understanding and calculating energy costs in crop chains and at farm level / New methods and references for energy balance of cropping systems						
4.2.2	**Innovating for high energy efficiency of cropping systems**	1.19 Innovating for improved energy balance of cropping systems						
		2.7 Establish competitive crops rotations for bioenergy: Analyse the contribution of different crops and crop rotations to bioenergy yields and their economical and ecological impacts in selected regions of Europe						
		2.8 Economics of straw removal: identify different local consitions for straw removal in Europe and analyse their impact on supply costs						

4.2.3	**Innovating for high energy efficiency in transformation processes**							
4.2.4	**Improve energy efficiency of agricultural input production**							
4.2.5	**Efficient use of agricultural equipment**							
4.2.6	**Use of agro-fuels in the crop chains**							
4.2.7	**Develop competitive cropping systems for agro-fuels**							
4.3	**Improved resource use efficiency: water**		WSST (p40)"Improving integrated water management methods (e.g.DSS) and technologies from field plot to river basin scale"/ (p42) " Improve tools for imporved river basin management (water saving, less uncontrolled emissions and better yields), "water productivity"".				2	
4.3.1	**Breeding for high water use efficiency**		PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture / PFF 4.2.4 Goal four: Systems biology and prediction of novel traits	2				
		1.8 Improving crops water USE efficiency:Varietal evaluation & breeding						
4.3.2	**Improving water management in cropping practices**	1.9 Water efficient cropping systems						
		5-2.1 Designing and testing water efficient cropping systems in a multi-scale approach	WSST (p41): "improvement of on-farm environmental-economic water management methods, such as modelling" / "Develop or adapt specific tools (leak detectors, sensors, real time water monitoring)"/ "develop low-cost, turnkey site specific management methods for all types of farms, including new technologies and systems in irrigated areas" / (p43) "develop tactical DSS for irrigation and fertilization incluing weekly forecasting tools on water needs and availability"				4	
4.3.3	**Improving irrigation water at farm level**	1.10 Sustainable irrigation in relation to water and soil (drainage, Salinisation).	WSST (p42)"approach to minimize the secondary impacts of efficiency (e.g.salinisation, sealing)"				1	
4.3.4	**Improving irrigation water at irrigated bassin level**		WSST (p42): "Improve governance at water-shed level accounting for end users constraints".				1	

			WSST (p43) "Investigate the socio-economic and legal political barriers against implementation of a more efficient water management." / "Develop strategies for removing these barriers (such as cost recovery, financial supports, controlling revision of water rights, training, demonstration sites)"				2	
			wsst 5P""°/ 3 Develop technology networks for establishing and improving sustainable farming practices, including fardware and software applications (such as new IT technologies which facilitate effective communication between various stakeholders"				1	
4.4	**Maintaining diversity in genetic resources of crops**		PFF 3.2.3. Goal three: Enhance biodiversity	1				
4.4.1	**More systematic use of wild relatives in crop breeding programs (disease and drought tolerance)**							
4.4.2	**Conserving genetic resources of cultivated crops (e.g. gene banks)**							
4.5	**Enhancing biodiversity in agro-ecosystems**		PFF 3.2.3. Goal three: Enhance biodiversity	1				
4.5.1	**Understand biodiversity**							
4.5.2	**Measure biodiversity: indicators**							
4.5.3	**Efficient biodiversity enhancement**	5-3.1 Efficient biodiversity enhancement						
4.5.4	**Assess risks of GM crops**							
4.6	**Ensure an effective crop protection in the long term (integrated crop protection)**		PFF 3.2.1 improve plant productivity and quality/ PPF 4.2.1 Goal one: Genome sequences of European crops and major pathogens	2				
4.6.1	**Understanding the genetics of resistances**		PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
4.6.2	**Understanding and forecasting crop antagonist interaction (biology, attacks and wastes)**	1.13 Forecasting of pests and diseases taking into account cropping and management system and crop canopy sensibility	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
		1.14 Preserving the durability of crop protection tools						
4.6.3	**Innovating in plant protection products**		PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
4.6.4	**Integrated crop protection at cropping system level**	5-3.2 Effective crop protection strategies	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				

			WSST (p44) "Development of biological, low chemical or chemical free pest control methods" (in relation to reduction of emissions)				1	
4.6.5	**Deal with new and evolving plants pathogen problems**	5-3.3 Deal with new and emerging pathogens (pests, diseases, weeds)	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
4.7	**Minimize greenhouse gas emissions per unit of product**							
4.7.1	**Manage the carbon cycle**	2.5 Establishment of a common methodology for measurement of carbon release and to use this methodology to compare production systems for selected crops in selected regions of Europe						
4.7.2	**Minimize N2O emissions**		SusC:Waste treatment, soil and water remedaition: catalysts for efficient conversion of greenhouse gases with high global warming potential, in particular N2O and CH4, in diluted process streams (IAP p 90)					1
		1.11 Reducing greenhouse gas emissions of cropping systems						
4.8	**Maintain and improve soil quality**	5-1.4 Integrated soil protection (physical, chemical and biological aspects)/ tasks: 1/Avoid compaction, Reducing soil erosion 2/ Improve soil Chemical properties (OM, salinisation…) 3/ Improve soil biological properties by adequate cropping systems	WSST (p44) "Improved knowledge of soil sealing process and soil biogeochemistry, especially the fate (transfer, lifecycles,) of nutrients (nitartesn phosphates), agrochemicals and organics."				1	
4.8.1	**Maintain and improve soil physical properties**	1.5 Avoid compaction and reducing soil erosion						
4.8.2	**Maintain and improve soil chemical properties**	1.6 improve soil chemical properties						
4.8.3	**Maintain and improve soil biological properties**	1.7 improve soil biological properties						
4.9	**Reduce water pollution**		WSST (p40)"Develop strategies and technologies for minimizing the use and losses to the environment of pesticides and nutrients, and especially for replacing mineral fertilizers by an environmentally efficient use of manure, wastewater treatment sludge and other bio-wastes (including the implementation of organic farming)" / (p44): "Development of biological, low chemical or chemical free pest control methods"/				2	
4.9.1	**Minimize runoff**							

4.9.2	Minimize nitrate leaching		WSST (p44) "development of on-line monitoring of nutrients and pests technique" / "Environmentally safe slury storage, separation an drecycling technologies"				2	
4.9.3	Minimize phosphorus losses		WSST (p44) "development of on-line monitoring of nutrients and pests technique"				1	
4.9.4	Minimize leaching of agrochemicals		WSST (p44) "development of on-line monitoring of nutrients and pests technique"				1	
4.9.5	Minimize long term impact of agrochemicals							
4.10	Developping strategies to face climate diversity and climate change		PFF 3.2.1 improve plant productivity and quality / BioF feedstock 4 (definition of plants/crops ideotypes for EU regions) and 5 (develop arable land use strategy for energy crops)	1		2		
4.10.1	Improving crop plasticity to face climate diversity and global change							
4.10.2	Anticipating / forecasting the changes of climatic conditions and their effects on crops	1.18 Anticipating/forecasting the changes of climatic conditions and their effects on crops						
4.10.3	Developing climate change strategies in the agricultural sector	2.4 Economics of adaptation to climate change						
		5-2.3 Integrated assessment of management strategies for different climatic scenarios.						
			WSST (p42):"Improve modelling of the extreme hydro-meteorological events (drought and flood) on agricultural water management, and consequently water for food."				1	
4.11	Integrating different sustainability concerns in the design and implementation of innovative cropping systems		BioF feedstock3 (innovative cropping systems for the 4F agro-forestry systems)			1		
4.11.1	Design innovative and sustainable production systems which take account of the diversity of evaluation criteria concerning sustainability	1.12 Evaluation of different farm types concerning the sustainability of their cropping systems	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
		5-1.1 Environmental and economic optimisation of (low-input) cropping systems						
4.12	Developing common sustainability assessment methods	5-3.4 Scaling issues: find sustainable solutions on different scales	PFF 3.2.2. Goal two: Reduce and optimise the environmental impact of agriculture	1				
		5-3.5 Evaluate best region for crop production.						

			SusC: methodology Life cycle analysis (socio-eco-efficient solutions) (IAP p107)					1
4.12.1	**Developing sustainability assessment methods for arable cropping systems and farms**							
4.12.2	**Developing sustainability assessment methods for crop chains**		BioF Sugar &starch 5 (energy balance of cerea&ls based EtOHplants fully optimised) and 6 (maximum carbon sequestration through the process)/ BioF "further development of indicators and methods			3		
4.12.3	**Development of specific European experimentation networks**							
5.0	**SOCIETAL SUSTAINABILITY**		SusC: Life cycle analysis / (methodology) social life cycle assessment(IAP p 107)					1
5.1	**Improve efficiency in value chain and networking**							
5.1.1	**Promote cooperation along the chain to facilitate joint strategies**		FFL Chal 6 goal 5 "participation of small producers in complex food chain operations + goal 2 "stabilising markets and supporting food chain through the generation and preservation of trust		3			
5.1.2	**Developing new tools to share information**	6.5 Comparative analysis and identification of the innovation opportunities to increase efficiency in the arable crops chain and networks.						
		6.10 Value chain and networking/ Analyze trust along the network						
		6.11 Value chain and networking: Analyze value chain and market power.						
5.2	**Reinforcing entrepreneurship and innovation capacity of AC systems**		PFF 5.2.1 Goal one: Public and consumer involvement	1				
5.2.1	**Promote awareness of market trends in AC chains (clearly identify arable crops market trends)**	6.8 Analysis of farmer awareness of market trends and identification of knowledge gaps						
5.2.2	**Develop service and institution to stimulate enterprneurship in AC chain ((To find how it is possible) to stimulate and promote entrepreneurship in AC sector to improve the competitiveness of the sector)**	6.9 Analysis the factor of entrepreneurship at EU level						

5.3	Developing income with indirect relations to AC production: income from other activities							
5.3.1	Managing multifunctional and pluriactivity farming	2.9 Researching new activities and possibilities to the farmers in the new market situation, new tools for the rural development.						
5.4	Improving the integration of arable crops into rural territories and economies							
5.4.1	Defining contribution of AC to societal needs (Gaining a proactive role in supporting rural sustainability)	6.3 Deprivation in the quality of rural life: provision of public and social goods and services.						
		6.4 Connection between land consolidation and arable crops.						
5.4.2	New approaches to improve integration of AC in rural economy (Innovation in land use/ Support and manage the process of adoption of innovation to improve the competitiveness of AC systems)	6.6 Structure and interaction between arable crops and urban planning.						
		6.7 Open innovation						
5.5	Promote a consistent regulatory and governance system to strengthen the competitiveness of AC							
5.5.1	Identifying coherent policy framework for AC system	2.3 adopting consistent policies: designing improved contractual options to allow flexible access to land for farming in the new Member States						
		6.1 Definition of services for improving farmers' orientation, sensitiveness and adaptability to the market.						
		6.2 Designing EU policy for improving arable crops competitiveness in consideration of globalization process and the three main uses of crops: food, feed, energy.						
5.6	Achieving a positive public perception of arable crops systems		PFF 5.2.1 Goal one: Public and consumer involvement / PFF 5.2.2 Goal two: Ethics and food security	2				
5.6.1	developing a positive image of arable crops chains and crops products							

5.6.2	**developing a positive image of AC production systems**							
				46	25	22	23	11
		PFF: Plants For the Future	WSST: Water Supply and Sanitation Technology					
		FFL: Food For Life	SC: SUSCHEM Sustainable chemistry					
		BF: Biofuels						

Annex 5 : EUROCROP topics presenting potential overlapping or similarities with ongoing research projects / Full information: see WP3 report (Deliverable D3.4, Annex 4)

Challenge	RESEARCH TOPICS	related FP projects	Project Abstract	Valuation of analogies
STAKE 1				
1.1	1.1. Increasing yield potential of varieties by breeding for tolerance to abiotic and biotic stresses	FP6 RESISTVIR 006961 (CA) Coordination of research on genetic resistance to control plant pathogenci viruses and their vectors in European crops	ResistVir aims to improve co-ordination of research on genetic resistance to plant pathogenic viruses/vectors, in European crops. Objectives are among others toassemble information, co-ordinate cutting-edge European research, provide an on-line European database, Provide a framework to encourage complementary research programmes across the ERA.	No overlapping; ResistVir is about coordination of research on genetic resistance in Europe.Proposed research is about identification/production of appropriate genetic resources for breeding
1.3	2.2 Economics of farm size: economies of farm size under changing market and political conditions with focus to new member states	FP6 TERA 6469 (SSP-STREP) Territorial aspects of enterprise development in remote rural areas	TERA will investigate the problems caused by territoral factors such as geography, infrastructure and labour supply in remote rural areas in Europe. The project will:- Examine the economic factors that influence the creation and survival of enterprises./ - Assess the extent to which regional development policies and programmes take account of territorial factors./ - Recommend new policy initiatives to promote enterprise development.	No overlapping / TERA: more general study about economic activity and enterprise performance in remote rural areas. Proposed project is more specific on optimal farm size in new EU-member states.
1.4	2.8 / 1.15 Risk management and adaptation of arable farming under price volatility and climate change	FP6 INCOME STABILISATION 006613 (SSP) Design and economic impact of risk management tools for European agriculture	The strategic objective of the research project INCOME STABILISATION is to analyse the potential of different risk management tools for stabilising farm household incomes in the European Union.	similarities, but INCOME STABILISATION more concentrated on risk management tools.
STAKE 2				
2.3	3.3 preventing safety risks in AC	BIOTRACER (FP6: IP, improved bio traceability of unintended micro-organisms and their substances in food and feed chains)	The objective of BIOTRACER is to create tests and computer models for the improvement of tracing accidental and deliberate microbial contamination of feed and food, including bottled water. The BIOTRACER Integrated Project aims to improve the identification of micro-organisms in food and animal feed	Strong overlapping
2.4	4.3 Development of co-existence strategies for EU arable crops with GM and non-food crops.	FP6 CO-EXTRA (IP: GM an d non GM supply chains: their co-existence and traceability) / FP6 TRANSCONTAINER 023018 (STREP Developing efficient and stable biological containment systems for GM plants) / FP6 SIGMEA (SSP Sustainable introdcution of GMO into European Agriculture)	CO-Extra:The objective of Co-Extra is to provide all the stakeholders of the food and feed chains with a central decision-support system integrating the tools, methods, models and guidelines needed to deal with the imminent arrival of large quantities of GMOs, further to the lift of the current de facto ban on GMOs in the EU. Co-Extra will study and validate biological containment methods and model supply chain organisations and provide practical tools and methods for implementing co-existence. In parallel, Co-Extra will design and integrate GMO detection tools, develop sampling plans, and elaborate new techniques to meet the challenges raised by stacked genes and as yet unapproved or unexamined GMOs. Co-Extra will also study and propose the most appropriate information structure, content and flow management for ensuring reliable and cost-effective documentary traceability.	Very similar, but different focus

			TRANSCONTAINER: The Strategic Objectives of Transcontainer: The Strategic Objectives of Transcontainer: 1/ Promoting co-existence of GM and non-GM (including organic) agriculture in Europe by using stable, environmentally safe and commercially viable biological containment strategies in crops economically relevant for Europe, and improvement and simplification of rules for co-existence 2/ Assessing the economic, environment and consumer impact of implementing biological containment strategies in Europe 3/ Enhancing understanding and acceptance, by stakeholders and the general public, of co-existence through biological containment strategies by invoking dialogue with and between these groups, and by facilitating informed policy and public debates on their consequences for co-existence measures.4/ Enhancing understanding and acceptance, by stakeholders and the general public, of co-existence through biological containment strategies by invoking dialogue with and between these groups, and by facilitating informed policy and public debates on their consequences for co-existence measures.	
			SIGMEA: The overall objective of SIGMEA is to set up a science-based framework, including strategies, methods and tools for assessing ecological and economical impacts of GM crops and for an effective management of their development within European cropping systems.	
2.6	3.2 Optimizing AC for optimal utilization of nutrients in human and animal nutrition and/or utilization of components of AC or by products of food processing for non-food applications	GRAIN LEGUMES 506223 (IP) New strategies to improve grain legumes for food and feed	GRAINLEGUMES will mobilise and integrate European scientific research on grain legumes to solving the problems facing European farmers in producing consistent yield of grain legumes. Objectives: 1/ To identify optimal parameters for legumes in feed quality and safety, including GMOs while using legumes to develop healthy and sustainable agriculture. 2/ To investigate variation in grain legumes seed composition and the factors affecting it. 3/ To develop new genetic, genomic, post-genomic and bioinformatic tools to improve and sustain grain legume seed production and quality. 4/ To coordinate and integrate grain legume research, to provide training in emerging technological approaches, to disseminate the results and transfer technology to industry.	Very similar
2.8	4.7 Better understanding of public concerns associated with GM technologies to help shape communication strategies	FP6 GMO-COMPASS 006914 (SSA GMO communication and safety evaluation platform)	GMO-COMPASS aims at the establishment of a European consumer-oriented website providing easily comprehensible information on issues of safety evaluation of GMOs and GMO-products. GMO-COMPASS will support important goals in the EU-commission's strategy for consumer information: stronger presence and awareness of science-based facts in the public debate / - transparency in the safety evaluation regulatory practice of GMOs / - supporting more public trust in food safety of GMOs and the precautionary principle / - providing and facilitating a dialogue between consumers, scientific experts and stakeholders on risk perception and consumer expectations on food quality and safety of GMO.	Similarities, complementary. GMO-COMPASS created a website for consumer information. Proposed research aims at surveying EU consumer concerns on GMOs
STAKE 3				

3.1	3.1 Optimizing AC for new healthy products	FP6 GRAINLEGUMES 506223 New strategies to improve grain legumes for food and feed / FP6 HEALTHGRAIN 514008 (IP) exploiting bioactivity of European cereal grains for improved nutrition and health benefits/FP6 EU-SOL 016214 (IP) High quality solaneaous crops for consumers, processors and producers by exploration of natural biodiversity / FP6 QLIF 506358 (IP) improving quality and safety and reduction of costs in the European organic and low input supply chains	HEALTHGRAIN: The HEALTHGRAIN Integrated Project aims to improve the well-being and reduce the risk of metabolic syndrome related diseases in Europe by increasing the intake of protective compounds in whole grains or their fractions.The aim is to produce health promoting and safe cereal foods and ingredients of high eating quality, wjth the specific objectives of the research being: to study consumer expectations and attitudes, to provide new sources of high quality raw material and to develop technologies and processing methods for nutritionally optimised cereal foods.	Similar to HEALTHGRAIN and EU-SOL, different focal points. Proposed research focuses on optimization of AC for human health.
			EU-SOL: focused on improving the quality of potatoes and tomatoes	
3.2	3.5 Strategies to enhance nutritional quality and processability of crop products and by-products from food industry, bioenergy or biorefinery to secure supply to the European feed sector	FP6 GRAINLEGUMES 506223 New strategies to improve grain legumes for food and feed / FP6 HEALTHGRAIN 514008 (IP) exploiting bioactivity of European cereal grains for improved nutrition and health benefits/FP6 EU-SOL 016214 (IP) High quality solaneaous crop / FP6 AQUAMAX 016249 (IP) Sustainable aquafeeds to maximise the health benefits of farmed fish for consumers / FP6 REPLACE 506487 (SSA): plants and their extracts and other natural alternatives to antimicrobials in feed / FP6 FEED-SEG 043077 (SSA) Healthy feed for safety - dissemination of research results of EC-funded research en feed quality	GRAINLEGUMES: GLIP will mobilise and integrate European scientific research on grain legumes to solving the problems facing European farmers in producing consistent yield of grain legumes. (see row 24)	Slight overlapping
			HEALTHGRAIN: The HEALTHGRAIN Integrated Project aims to improve the well-being and reduce the risk of metabolic syndrome related diseases in Europe by increasing the intake of protective compounds in whole grains or their fractions.The aim is to produce health promoting and safe cereal foods and ingredients of high eating quality, wjth the specific objectives of the research being: to study consumer expectations and attitudes, to provide new sources of high quality raw material and to develop technologies and processing methods for nutritionally optimised cereal foods.	
			EU-SOL: focused on improving the quality of potatoes and tomatoes	
			AQUAMAX: The strategic goal of Aquamax is to replace as much as possible of the fish meal and fish oil currently used in fish feeds with sustainable, alternative feed resources that are as free of undesirable contaminants as possible, consistent with maximising the growth performance, feed conversion efficiency, health and welfare of the farmed fish, and maximising the health - promoting properties, safety, quality and acceptability of the final product to the consumer. 4 specific objectives: 1. Development of feeds based on sustainable alternatives to fish meal and fish oil. 2. Health benefits of fish consumption, with a focus on pregnant woman and allergic diseases. 3. Safety of fish farmed. 4. Perception of farmed fish by the public/consumers and the scientists.	
			REPLACE: This project will examine plants, plant extracts and other natural materials as safe alternatives to feed antimicrobials.	

			FEED-SEG: is based on an initiative to network the currently running EU-projects REPLACE, PIG for HEALTH and SAFEWASTES, which are all focusing on research to improve and to develop healthy feed for the safety of livestock and humans. The objective is to bridge the research results of these and other existing EU projects with the identification of new research topics, policies and tendencies in the future.	
STAKE 4				
4.1	1.21 Breeding for crop species with improved N uptake and nitrogen efficiency	related to 4.1.4: FP6 MICRO-N-FIX microbial fixation of atmospheric nitrogen for staple food crops	MICRO-N-FIX: aims to develop nitrogen fixing bacterial inoculants for use with wheat and maize.	Not overlapping / MICRO-N-FIX: very specific research on development of nitrogen fixing bacterial inoculants for use with wheat and maize. Proposed research searches for new crop varieties with better nutrient absorption.
4.1	1.22 Developing reduced nitrogen input and productive cropping systems: nitrogen optimisation at cropping system scale	FP6 MICROMAIZE 036314 management of plant beneficial microbes to balancer fertilizer inputs in maize monoculture. / FP6 RHIBAC 036397 Rhizobacteria for reduced fertilizer input s in wheat./	The MICROMAIZE project aims to develop innovative cultural practices for growing maize in European cropping conditions with reduced use of fertilizer. It will focus on three plant-beneficial microbes that work together in the soils around plant roots to help assimilate nitrogen and mobilise phosphate from the soil. The inoculation strategies developed will be validated in field trials.	Not overlapping, complementary research projects
			RHIBAC: aim is to research the mechanisms of plant growth promotion by rhizobacteria applied onto wheat. This approach may allow arable farmers to reduce their reliance on applied fertiliser, with benefits for the environment and sustainability of agriculture. Main objective: Development and demonstration of new PGPR inocula to promote growth in wheat and reduce requirement for chemical inputs, relevant for European or South America soils and wheat genotypes used by farmers in each region background.	
4.1	5-2.2 Global assessment of N emissions of cropping systems	FP6 NITROEUROPE (IP: the nitrogen cycle and its influence on the European greenhouse gas balance) / COST 832 (Quantifying the agricultural contribution to eutrophication), COST 836 (denitrification in agriculture, air and water pollution)	NitroEurope IP: What is the effect of reactive nitrogen (Nr) supply on net greenhouse gas budgets for Europe? The objectives are to: - establish robust datasets of N fluxes and net greenhouse-gas exchange (NGE) in relation to C-N cycling of representative European ecosystems, as a basis to investigate interactions and assess long-term change, / - quantify the effects of past and present global changes (climate, atmospheric composition, land-use/land-management) on CN cycling and NGE, / - simulate the observed fluxes of N and NGE, their interactions and responses to global change/land-management decisions, through refinement of plot-scale models, - quantify multiple N and C fluxes for contrasting European landscapes, including interactions between farm-scale management, atmospheric and water dispersion, and consideration of the implications for net fluxes and strategies, / - scale up Nr and NGE fluxes for terrestrial ecosystems to regional and European levels, considering spatial variability and allowing assessment of past, present and future changes, / - assess uncertainties in the European model results and use these together with independent measurement/inverse modeling approaches for verification of European N2O and CH4 inventories and refinement of IPCC approaches.	Similar/complementary to NITROEUROPE

4.3	1.9 Water efficient cropping systems through improved crop mix and irrigation management	FP6 SAFIR (STREP: Safe and high quality food production using poor quality waters and improved irrigation systems and management) /	SAFIR: the strategic objective of SAFIR is to develop irrigation management and water saving technology for production of high quality and safe vegetable crops using low quality water resources.	Complementary research projects. SAFIR: focused on vegetable crops and low quality water use
4.5	5-3.1 Efficient biodiversity enhancement	FP6 REBECA 022709 (SSP-CA) regulation of biological control agents	REBECA: The objective is to to elaborate proposals which can accelerate the regulation process for BCAs and make it more cost-effective without compromising the level of safety for human health and the environment.Objectives: - Review of the current legislation, guidelines and guidance documents at Member State and EU level and compare them with legislation in countries where the market introduction of BCAs has been more successful. / - Review of potential risks of BCAs and proposals on how regulation of BCAs can be balanced according to their potential hazards./ - Costs and benefits analysis related to different levels of regulation and evaluation of trade-offs./ - Propose alternative regulation strategies which reduced sets of data requirements according to potential hazards./ - Bring together stakeholders from industry, science, regulation authorities, policy and environment to form a network within Europe	No overlapping. REBECA is focused on BCAs and on the proposal to accelerate regulation. Proposed research aim are experiments and models using life cycle analysis to measure sustainability.
4.6	1.14 Preserving the durability of crop protection means	FP6 ENDURE 0341499 (NoE): European network for the durable exploitation of crop protection strategies	ENDURE is an initiative to reshape European research and development on pesticide use in crops for the implementation of sustainable pest control strategies. The project's operational goals are to: - Bring together research capacity and resources currently fragmented across Europe./ - Enhance the research-to-R&D innovation process by creating working relationships between researchers and practitioners in extension and farming,/ - Bring in industry, policy-makers and civil society to help define the research agenda. Pass on knowledge, know-how and resources through training, education and dissemination targeting farmers, advisors, researchezrs, policy makers and civil society- Endure by building a sustainable, coherent and transnational institution made up of leading European crop protection research, R&D, extension, and industry organizations.e research agenda./	No overlapping. ENDURE is about research coordination
	5-3.2 Integrated and novel approaches for effective crop protection strategies	BIOEXPLOIT (IP)(exploitation of the natural plant biodiversity for the pesticides free food production) / FP6 2E-BCAs IN CROPS 001687 (STREP)enhancement and exploitation of soil biocontrol agents for bio-constraints management in crops / FP6 REBECA 022709 (SSP-CA)		overlap with ENDURE (see above). Very similar contents
4.6			BIOEXPLOIT: The aim of this project is to force a break-through by developing efficient and rational breeding strategies using genomics and post-genomics tools to exploit natural host plant resistance.BIOEXPLOIT will focus on wheat and potato.	Complementary research projects
			REBECA: The objective is to to elaborate proposals which can accelerate the regulation process for BCAs and make it more cost-effective without compromising the level of safety for human health and the environment. (see row 53)	

		regulation of biological control agents / FP6 DIABR-ACT 022623 (SSP-SSA) Harmonise the strategies for fighting diabrotica virgifera	DIABR-ACT: the goal is to establish a harmonised and sustainable control strategy for continuously established and discontinuously emerging WCR populations.	
		COST FA0701 Arthopod symbiosis: from fundamental studies to pest and disease management / COST 842: biological control of pest insects and mites with special reference to entomophtorales / COST 849 parasitic plant management in sustainable agriculture / COST 850: biocontrol symbioses (symbiotic complexes for biological controle of pests) / COST 862 bacterial toxins for insects control / COST 872 exploiting genomics to understand plant nematode interactions		
4.6	5-3.3 Deal with new and emerging pathogens (pests, diseases, weeds)	FP6 PORTCHECK 502348 (SSP) Developemnt of generic "on site" molecular diagnotics for EU quarantine pests and pathogens / FP6 DIABR-ACT 022623 (SSP-SSA) Harmonise the strategies for fighting diabrotica virgifera / ERANET EUPHRESCO 036212 (CA) coordinationof European phytosanitary (quarantine plant health) research	PORT CHECK will deliver tools and procedures for the inspection of plant material at points of entry, using the latest molecular diagnostics technology.	Complementary to PORTCHECK and DIABR-ACT
			DIABR-ACT: the goal is to establish a harmonised and sustainable control strategy for continuously established and discontinuously emerging WCR populations. (see row 56)	
			ERANET EUPHRESCO: aims to increase cooperation and coordination of national phytosanitary (statutory plant health) research programmes at the EU level through networking of research activities and mutual opening of national programmes.	

4.8	5-1.4 Physical, chemical and biological aspects of integrated soil protection	FP6 RAMSOIL (SSP: Risk assessment methodologies for SOIL threats) / FP6 SNOWMAN 3219 (CA: Sustainable management of soil and groundwater under the pressure of soil pollution and soil contamination)	RAMSOIL: The general objective of the RAMSOIL project is to provide scientific guidelines on possibilities for EU wide parameter harmonization based on detailed information on current risk assessment methodologies of soil threats encountered within EU Member States.	Similarities to RAMSOIL, but complementary
			SNOWMAN: SNOWMAN understands itself as a network of European research funders and administrations providing the platform for soil and groundwater research bridging the gap between knowledge demand and supply.	
4.10	2.4 Economics of adaptation to climate change	FP6 ADAGIO 044210 (SSP-SSA: Adaptation of agriculture in european regions at environmental risk under climate change)	ADAGIO: Adaptation of agriculture in european regions at environmental risk under climate change: - Identifying most vulnerable regional issues through climate change. / - Identifying feasible potential adaptation measures. / - Integration into management strategies and agricultural policy. / - Improving awareness and user-orientation of adaptation strategies.	very similar researches
4.11	1.12 Evaluation of different farm types concerning the sustainability of their cropping systems	FP6 AE6 FOOT PRINT 006491 (SSP: Agri-environmental footprint: development of a common generic methodology for evaluating the effectiveness of European Agri-environmental schemes) / ITAES 502070 (SSP STREP: integrated tools to design and implement agri-environmenatl schemes)	FOOTPRINT: Our focus is the construction of a farm-level Agri-Environmental Footprint Index (AFI) that aggregates the measurement of appropriate agri-environmental indicators. - conceptual and practical development of a harmonised assessment system with which to assess the environmental performance of Europe's AESs./ ITAES: emphasises the trade-offs between environmental, economic, social and institutional impacts of agro-environmental schemes (AESs) and provide criteria to identify and guidance to design cost-effective schemes. Objectives: 1. The construction of an integrated tool to analyse the interaction between the institutional process and the environmental outcome. 2. The construction of an integrated tool to analyse and simulate farmers' environmental supply depending on a range of different governance mechanisms.	Similar projects, but different focus, could be complementary
STAKE 5				
5.2	6.9 Analyze factors serving to promote entrepreneurship at EU level	FP6 ESOF 006500 (SSP-STREP) developing the entrepeneurial skills of farmers	ESOF: examined the economic, social and cultural factors hindering or stimulating the development of entrepreneurial skills of farmers. This tool will be used to analyze market and environmental impacts from the adoption of non-food strategies.	very similar and overlapping researches
5.3	2.9 Researching new activities and possibilities for farmers in the new market situations, new tools for the rural development	FP6 ENFA 6581 (SSp) European non-food agriculture / FP6 COFAMI 006541 (SSP-STREP) Encouraging collective farmers marketting initiatives /	The ENFA project will establish a dynamic agricultural and forest sector model for the integrated economic and environmental assessment of non-food alternatives in European agriculture and forestry.	Possible similarities to ENFA. But proposed research focuses on optimization of farm size and on strategies for rural development policies.
			COFAMI: aims to identify the social, economic, cultural and political factors that limit/enable the formation and development of collective marketing initiatives.	
5.4	6.3 Deprivation and quality of life in rural areas: provision of public and social goods and services	FP6 SCARLED 44201 (SSP-STEP) Structural change in agriculture and rural livelihoods	SCARLED: Aims of the project are:1. to analyse the agricultural sector restructuring process and rural socio-economic transformation in the NMS8 plus Bulgaria and Romania, with a particular focus on five case countries (Bulgaria, Hungary, Poland, Romania, Slovenia) and 2. to analyse the patterns behind rural "success stories" in selected EU15 case countries during previous enlargements (e.g. in Austria, Ireland, the new German Bundesländer, Spain, and Sweden) to identify and codify best practices and to draw recommendations for the NMS plus Bulgaria and Romania.	Similar but complementary research

5.4	6.4 Connection between land consolidation and arable crops	FP6 TERA 6469 (SSP-STREP) Territorial aspects of enterprise development in remote rural areas	TERA will investigate the problems caused by territorial factors such as geography, infrastructure and labour supply in remote rural areas in Europe. The project will: - Examine the economic factors that influence the creation and survival of enterprises./ - Assess the extent to which regional development policies and programmes take account of territorial factors./ - Recommend new policy initiatives to promote enterprise development.	No similarities. Proposed research focus on land consolidation.
5.5	2.3 Adopting consistent policies: designing improved contractual options to allow flexible access to land for farming in the new Member States (MS)	FP6 TERA 6469 (SSP-STREP) Territorial aspects of enterprise development in remote rural areas	see above	No similarities/ Proposed research focuses on land markets and farm size.
5.5	6.2 Designing EU policy for improving arable crop competitiveness in consideration of globalization and the main uses of crops: food, feed, energy, biomaterials	FP6 CROSS COMPLIANCE (SSP-STREP) facilitating the CAP reform : compliance and competitiveness of European agriculture / FP6 TOP-MARD 501749 (SSP) Towards a policy model of multifunctional agriculture and rural development	CROSS COMPLIANCE:The primary focus of the project is to investigate the value-added resulting from introducing cross-compliance as a tool to improve compliance with existing standards. A second issue is the investigation into the costs implications and competition effects of compliance to EU standards on the world market in the specific context of cross-compliance.	Complementary concerning the objective of providing tools for policy. Different focus
			TOP-MARD: The main aim of the research is to develop the concept of multifunctionality as a rural development policy instrument that is sensitive to economic, social, cultural, environmental and geographical context.	

SIXTH FRAMEWORK PROGRAMME

Comité économique et social européen

Annex 6 Conference programme

English- French-German simultaneous interpretation

8:30 – 9:30 Registration

9:30 – 9:40 Welcome by Mr Martin WESTLAKE, General Secretary of EESC

9:40 – 9:55 Opening address by Mr Anastassios HANIOTIS, DG Agriculture, Directorate L: Economic analysis, perspectives and evaluations: Vision of the Commission on the EU Arable crops and agriculture worldwide stakes.

9:55 – 10:35 EuroCrop scenarios and priority challenges for arable crops, by Mr Etienne PILORGÉ, EuroCrop coordinator, CETIOM, France

10:35 – 10:55 Coffee break

10:55 – 11:25 How research will meet challenges: conclusions of scientific experts groups, by Mr Davide VIAGGI, WP3 coordinator, DEIAGRA, Alma Mater university of Bologna, Italy

11:25 – 11:45 Vision from European crop chains specific challenges and needs, by Mr Ryszard KOZLOWSKI, WP2 coordinator, Institute of Natural Fibres, Poznan, Poland

11:45 – 12:25 Debates and questions of the participants

12:30 – 14:00 Lunch buffet

14:00 – 15:30 Round table discussion with stakeholders.

Moderator: Mr Xavier BEULIN, chairman of the EuroCrop project, President of the French Oil and Protein Seeds farmers, President of CETIOM, with participation of:

- Mrs Anamarija SLABE, Vice-President of European Environmental Bureau (EEB), Institute for Sustainable Development, Slovenia
- Mr József KAPUVARI, President of Trade Union Federation of Food Industry Workers (EDOSZ), Hungary, member of EESC
- M. Povilas KUPRYS, Brussels Representative of the Association of Local Authorities in Lithuania (ALAL), member of EESC NAT
- Mr Henri RIEUX, President of FEDIOL, the EU Oil and Protein meal Industry
- Mr Klaus SCHUMACHER, member of the COCERAL presidium, Head of the Economics Department in Toepfer International, Germany
- Mr Paul TEMPLE, member of COPA-COGECA, President of the British National

Farmers Union

15:30 – 15:55 Synthesis lecture: arable crops sector in the EU economy and research challenges, by Mr Henri NALLET, former French Minister of Agriculture

15:55 – 16:15 Conclusion session: agriculture and arable crops in the European Research Area, by Mr Thimothy Hall, DG Research, head of Directorate E, Biotechnologies, agriculture, food

16:30 - 17:30 End of the conference

Tea time and post conference discussions

Annex 7 – Detailed description of selected research topics

EUROCROP TOPICS[1]
Draft 14 Jan 2009

<u>Comments provided by the following experts</u>:

- Sam Millar, Campden BRI, UK
- Stuart Swanston, SCRI, Invergowrie, UK
- Przemyslaw Baraniecki, INF, Poland
- Petr Misa, Agricultural Research Institute Kromeriz, Czech Republic
- Peter Kettlewell, Crop and Environment Research Centre, UK
- Thomas Nemecek, Agroscope Reckenholz-Tänikon Research Station ART, Switzerland
- Christian Bockstaller, INRA, France
- Aurora Sombrero, Instituto Tecnologico agrario de Castilla y Leon, Spain
- Etienne Pilorgé, CETIOM, France
- Davide Viaggi, University of Bologna, Italy
- Xavier Pinochet, CETIOM, France,
- Jacques Evrard, CETIOM, France
- Francis Flenet, CETIOM, France
- Rino Ghelfi, University of Bologna, Italy

[1] The original number of topics given by the working group is left together with the indication of the original WG in which the topic was developed. Comments about connections between topics, reported at the bottom of each topic, refer to this numbering.

STAKE 1: TECHNICAL AND ECONOMIC EFFICIENCY OF ARABLE CROP SYSTEMS

RESEARCH TOPIC
1.1 Increasing yield potential of varieties by breeding for tolerance to abiotic and biotic stresses
CHALLENGE
1.1 Increase level and stability of yields
RESEARCH GOAL
1.1.1 Increasing yield potential of varieties by breeding
WORKING GROUP
WG 3.1 (1.1)
BACKGROUND
The relative importance of the biotic and abiotic stresses varies depending on the geographical location and the agro-ecological conditions of the crop production. To extend crops into new areas or to make the product suitable for new uses or more valuable in existing markets, recent efforts in Europe have been carried out on autumn-sown crops. For each targeted region, a specific combination of criteria: early maturity, disease resistance, freezing resistance, early flowering, and a short cycle, suitability to no tilling or organic farming, etc. should be considered. Maintaining or enhancing seed quality is also a constant objective, either for visual criteria or nutritional and healthy criteria.
OBJECTIVE
Understand the biology of constraints to productivity so as to enable the identification or production of appropriate genetic resources for breeding.
CONTENT
Although disease resistance is a priority in many crop breeding programmes around the world, cultivars with complete resistance are usually not available. Complete resistance will likely never be a feasible objective given the evolution of new pathogens or new races of existing pathogens. Accordingly, partial resistance has to be managed. In particular, it must be combined with other partially efficient methods to achieve a satisfactory level of disease control. A comprehensive knowledge of the epidemiology of any disease is a prerequisite to devise optimal control strategies (crop rotation, disease development, fungicides, host resistance, inoculum sources, integrated pest management, sowing date, etc.). Breeding for new varieties adapted to Intercropping, which can enhance total grain yields by 20-30% in grain legume and cereal intercropping due to a better use of resources, improved weed control, reduced disease infections, etc. Furthermore, grain yields are generally more stable over the years and the quality of the cereals are positively influenced. Biotechnology can contribute by presenting the current state-of-the art in plant stress research, listing the genes most probably or proven to be involved in abiotic stress perception and stress response, and trying a synopsis of what is common in stress management of different crop species. Resistance to diseases is only one of the priorities in breeding programs for obtaining functional properties. Enhance yields depends on many coherent factors. Accordingly a variety of disciplines (basic scientists, molecular biologists, genomicists, physiologists and agronomists) must work together with representatives of international agricultural organisations to learn from a variety of stress response models and agronomic, eco-physiological and genomic models.
OUTPUT / DELIVERABLES
New knowledge on different stress responses of crops at agronomic and molecular level, establishing common pathways, as well as, on differences in stress handling, defining future research goals and designing products as spin-offs.
IMPACT
The sustainability of agriculture requires especially (i) energy efficient production and utilisation systems, (ii) a diversification of crops and a reduction in environment-damaging emissions, (iii) a local supply of safe and healthy raw materials for all uses and iv) consideration of nature and biodiversity.

PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
This topics is also suitable to be divided in two subtopics concerning, respectively biotic and a-biotic tolerance.

RESEARCH TOPIC

1.2 Improving control on Weeds/Pests/Diseases through better crop rotations, alternative crops and cropping systems

CHALLENGE

1.1 Increase level and stability of yields

RESEARCH GOAL

1.1.2 Increasing yield potential of varieties by management practices

WORKING GROUP

WG 3.1 (1.2)

BACKGROUND

Extensive crop production is characterised by a concentration of large areas managed with large machinery and a simplification of the decision making process, which in turn is resulting in cereal mono-cropping and chemical-intensive agriculture.

Sustainable alternatives to excessively simplified production systems are needed. Balanced and rational crop rotations are critical for modern European agriculture and are a basic tool of sustainable arable farming systems. For example, the introduction of conventional legumes in the crop rotation dominated by cereals permits a better use of machinery throughout the year, reducing production costs, and a lower use of fertilizers and pesticides thanks to their atmospheric nitrogen fixation capacity and the reduction of the disease, pest and weed cycles of narrow leaf crops, obtaining, apart from the cost reduction, an improvement of the product quality and the environment.

Well balanced crop rotations are even more important in minimum and no tillage cropping systems, which have many energy saving advantages but lack the conventional means for crop protection. With regard to energy crops, such as canola for biodiesel or cereal for ethanol, the use of legumes as previous crop or in association permits a substantial improvement of the energy balances and eco-balances of these biomass crops. Their use is essential in the sustainable production of renewable energy and may become practically indispensable considering continuous increase of population in the world, which implies that cereals should be assigned mainly to food purposes.

OBJECTIVE

The aim is to promote the development of alternative crops in Europe as a triple way of achieving competitiveness, quality, and energy savings and efficiency. Well balanced crop rotations optimize utilization of resources and stabilize production of food-fuel-energy-industrial crop production. The topic aims in particular to study crops which require low water/fertilisers input, have a high yield of grains and biomass (starch/sugars/lignocellulosics) for integrated multi-purpose processing and grow well in marginal lands in semi-arid and temperate regions.

CONTENT

A limiting factor for the widespread cultivation of alternative crops is the lack of varieties adapted to different growing conditions, including colder climates. Consequently, research should address the optimisation of crops for food and energy through breeding. Besides biomass yield, and relevant quality traits, genetic improvement/selection should concentrate on general agronomic traits (such as water and nutrient use efficiency). In addition, research should address agronomic practices, inclusion in the crop rotation involving legumes and minimum or no tillage cropping systems, and harvesting technologies leading to improved yield, quality, sustainability and competitiveness of crop production. The study should be complemented by environmental and economic analysis of crop rotations, including energy balance and life cycle assessment.

OUTPUT / DELIVERABLES

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IMPACT

Better crop rotations will help the agriculture sector deliver environmental benefits. Crops that fix nitrogen, for example, can help reduce CO_2 emissions from agriculture and be a cornerstone of the biofuel economy by playing an important role as part of a sustainable crop rotation for bio-fuel crops including cereals and oilseeds. Moreover, crops that require less fertilizer help to lower input costs for

farmers
The topic will allow the improvement of the quality of food and feed derived from cereal and oil crops by the reducing pesticide use thanks to the introduction of alternative crops such as legumes in the productive system.
Ultimately, this will achieve better agricultural systems which permit more sustainable and clean energy, animal feed and food production in Europe, as well as an increased production of environmental benefits, for instance higher biodiversity.

PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

Connected to1.17

RESEARCH TOPIC

1.3 Increasing yield stability through genetic resistances to crops enemies (weeds, pests and diseases) based on breeding

CHALLENGE

1.1 Increase level and stability of yields

RESEARCH GOAL

1.1.1 Increasing yield potential of varieties by breeding

WORKING GROUP

WG 3.1 (1.3)

BACKGROUND

A major limitation on crop production in Europe is the unreliability of yield during cultivation. This is predominantly caused by susceptibility to diseases and pests. A better understanding of the plants' responses to these stresses will allow the development of tools to tackle these problems, and ultimately contribute to stable yields for farmers, in spite of the fact that instability of yields is not solely due to biotic stresses. Genetic studies and gene expression profiles to identify key regulators of resistance to some of these diseases must be undertaken. In this endeavour, new genomic tools and resources, such as transcriptomic tools, proteomics and metabolomic platforms, genetic and physical maps as well as the development of tilling platforms in different models and crop species need to be implemented.

Plants have evolved a diverse array of resistance specificities to the majority of the diseases they encounter. Sources of resistance to the major crop diseases are being sought by assessing natural diversity in defined ecotypes. The action mechanisms of these resistance specificities are being characterised and the genes/QTLs responsible are being mapped.

A major challenge exists to ensure that weed management in crops remains effective in the face of increasingly herbicide-resistant weeds. By using a range of tools these weeds can undoubtedly be controlled. However, these solutions must be reliable, economically viable, and easily implemented by growers.

Crop yields are reduced by a number of biotic and abiotic constraints. However, several of these constraints can be addressed by genetic improvement. As there are natural resistances to many diseases, conventional breeding can improve yields substantially.

OBJECTIVE

To launch a collaborative Network in order to hasten the search for better control mechanisms for weeds and diseases, to develop a joint comparative approach and to identify priorities for collaborative research.

CONTENT

The network has to deal with: 1) Pathogen biology: better understanding of the mechanisms of infection (histopathology), pathotyping with standardised scoring and evaluation methods, and genome sequencing. 2) Plant resistance: links between the different results through a harmonisation of techniques for screening material, inoculation and symptoms measurements (parametric methods, exchanges of isolates, accessions and differential hosts, identifying and exchanging markers), link molecular and biological data, implement molecular markers in breeding and exploit tilling populations, and better integration of resistance into disease control management studies. 3) Epidemiology: histological studies of the infection process, sources of inoculum (role of soil, ascospores vs. pycniospores), effect of the cultural factors on epidemiological development, testing and application of models in different regions and pathosystems, addition of sub-modules related to specific disease to existing modelling tools. 4) Integrated disease management: Integration of knowledge on pathogen and plant phenology into agronomically sound control methods, more precise risk assessment, and develop decision-making tools and disseminate clear pragmatic messages adapted to regions. 5) Expression profiling (e.g. oligonucleotide microarrays, GeneChips, real-time RT-PCR, SAGE, 454 sequencing, proteomics, metabolomics), functional genomics (e.g. TILLING, fast neutron mutagenesis, and insertion mutagenesis), as well as bioinformatic platforms that include databases for the integration and visualization of genomic-related sequences, expressions, markers and mutant data. 6) Genetic transformation, transient and stable, for resistances to total herbicides or to insects, bacteria, virus or fungus is a very valuable tool to applications in agriculture and industry, specially in non food or feed products such as biofuel. For that it is needed optimization of genetic transformation protocols Transformation and as discussed in this workshop, as a research tool for large-scale genomic programs. Transgenic plants are needed in functional genomics to create insertion mutant libraries, to verify or elucidate the function of newly identified genes through for example silencing or over-expression, or to follow their expression through promoter-marker gene fusions. 7) Weed control by traditional herbicides has became less effective and more costly as major weed species develop resistances to these common herbicides. New and prospective weed control methods were described and direction for research provided.

OUTPUT / DELIVERABLES

Collaboration in crop research has now been well established both at trans-national and inter-disciplinary levels. A multidisciplinary approach is essential, with contributions from biochemistry, plant and crop physiology and agronomy, plant genomics and breeding, and from human nutrition and health to create a unified area all across Europe which enables mobility of researchers, better coordination of national and regional research programmes and the creation excellent networks of research institutions.

IMPACT

The network will allow the European plant scientific community to progress in understanding important molecular mechanisms underlying pest resistance. The knowledge generated by this collaboration is expected to be translated into improved plant production in adverse environmental conditions and higher stability of yield for Europe's producers and consumers.

PARTNERSHIP

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FUNDING INSTITUTION/S

-

OTHER REMARKS

Network ICP

RESEARCH TOPIC

1.4 Production of varieties tolerant to drought, N deficiency, weeds, pests and diseases through understanding crops reactions to stress and tools for breeding

CHALLENGE

1.1 Increase level and stability of yields

RESEARCH GOAL

1.1.3 Increasing yield stability through varieties and crops physiological plasticity

WORKING GROUP

WG 3.1 (1.4)

BACKGROUND

The European plant scientific community needs to progress in understanding important molecular mechanisms underlying pest resistance. The knowledge generated by this collaboration is expected to be translated into improved plant production in adverse environmental conditions and higher stability of yield for Europe's producers and consumers.

OBJECTIVE

Analyse the impacts of abiotic stress on growth and functioning of cropping plants and identify traits to be considered for physiological-based breeding in relation to biotic and abiotic stresses.

CONTENT

The development of genomic approaches will reveal molecular mechanisms involved in the regulation of plant physiological responses under stress. Key molecules and genes involved in stress responses can be identified analysing gene expression patterns and metabolomic changes induced by diverse environmental stresses. These approaches should evolve from the initial description level under specific conditions to more elaborate screenings defining traits and genes involved in crop adaptation strategies. In addition, exploiting genetic diversity is crucial to obtain both contrasted types and sources of tolerances. Genetic resources are in fact mutants already selected by specific environmental conditions, possibly making them more suitable for field conditions than laboratory mutants. Integrating molecular and genetic data into eco-physiological models is required in order to define the regulatory mechanisms involved in the control of plant growth and development under abiotic stress constraints and to create novel elite cultivars.

OUTPUT / DELIVERABLES

Parallel development of genomic approaches will reveal molecular mechanisms involved in the regulation of the plant physiological responses. Exploiting the data obtained for different plant species will highlight key molecules and genes involved in stress responses.

IMPACT

Improving crop performance under stress conditions will contribute to the development and use of species in different areas. This will bring new perspectives to the development of novel crop management techniques and to the identification of crucial breeding targets.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

New strategies have to be developed to combine the efforts of the individual breeding programs. This topic could be too broad to include such a wide range of stresses, and could focus on selected sources of stress. On the other hand, it could also widen the scope of responses, e.g. including physiology aspects.

RESEARCH TOPIC
1.16 Optimizing crop rotations in reduced or no tillage conditions
CHALLENGE
1.2 Technical and economic optimisation by innovating sustainable Cropping Systems
RESEARCH GOAL
1.2.4 Optimising cropping systems with reduced or no tillage
WORKING GROUP
WG 3.1 (1.16)
BACKGROUND
Conventional soil tillage systems fragments soil, enhances the release of soil nutrients for crop growth, kills weeds, and modifies the circulation of water and air within the soil. Intensive tillage can adversely affect soil structure and cause excessive break down of aggregates of soil. These systems cause increasing problems with erosion, a high demand of fuel/ha and high production cost in most countries of Europe. Cropping systems with reduced tillage or no tillage can help to solve those problems. There is a lack of information how to create those cropping systems and make them more competitive. Cropping systems with reduced tillage or not tillage are improved conservation of soil water through decreased evaporation and increases infiltration, and reduced fuel, labor, machinery requirements and save energy. In particular, aspects of the distribution of working hours over the growing season and the profit of the whole cropping systems including fixed costs especially after the integration of crops with lower cross margin need to be analyzed.
OBJECTIVE
Comparative analysis of different cropping systems, with a focus on no tillage and reduced tillage conditions, focusing in particular on the relationship between agronomic solutions and economic competitiveness.
CONTENT
On farm research comparing different cropping systems and exploitation of long-term trials and their results.
OUTPUT / DELIVERABLES
Economic rating of the different systems including the effects of the integration of crops with low gross margin.
IMPACT
Reduction of problems of erosion, high demand of fuel and high production cost.
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
-

RESEARCH TOPIC

1.17 Management of crop rotations aimed to prevent and control weed infestation, disease and pest infection

CHALLENGE

1.2 Technical and economic optimisation by innovating sustainable cropping systems

RESEARCH GOAL

1.2.6 Optimization and management of crop rotations

WORKING GROUP

WG 3.1 (1.17)

BACKGROUND

There are increasing problems with pesticide resistance against weeds, diseases and pests in most countries of Europe. Optimizing the crop rotations will be one of the keys to solve those problems.
The infestation with weeds, diseases and pests are usually higher in cereal dominated crop rotations and they are smaller in crop rotation with the alternating of e.g. tuber crops, grain legumes, OSR and cereals or winter and spring crops.
For example weeds are often well adapted to the growing cycle of the crops. In some regions of the EU the number of ripe seeds/m^2 of *Apera spica venti* is much higher after growing winter wheat instead of winter barley. This grass needs a longer growing season so that many seeds are destroyed by the early harvest of winter barley.
Short term economic reasons drive farmers to choose the crop year by year, without taking into account the effects in time on weeds, diseases and pests over the whole cropping systems.

OBJECTIVE

Comparative analysis of different cropping systems focusing on the effects on the infestation with weeds, diseases and pests.

CONTENT

On-farm research comparing different cropping systems and exploitation of long-term trials and their results.

OUTPUT / DELIVERABLES

Contents will involve: a) Rating the different systems based on the effects on the infestation with weeds, diseases and pests; b) developing instruments to assess the whole systems including effects on weeds, diseases and pests, as well as economic and social parameters.

IMPACT

Reduction of the application of pesticides, higher diversity of crops in agriculture, higher competitiveness on markets.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

Connected to 1.2

RESEARCH TOPIC
5-1.2 Use of new technologies/methods to increase the efficiency of crop management
CHALLENGE
1.2 Technical and economic optimisation by innovating sustainable Cropping Systems; **4.11 Integrating different sustainability concerns in the design and implementation of innovative cropping systems**
RESEARCH GOAL
Developing precision farming systems
WORKING GROUP
WG 3.5 (5-1.2)
BACKGROUND
In recent years new technologies have become available (GPS, communication technologies, remote sensing, GIS, image analysis, robotics), which offer the potential of improving the efficiency of input use (fertilisers, pesticides, water, fuel, seed), and to reduce cropping system emissions. Generally, they are used sparingly, either because they are too expensive, or because more technological development is needed to make them really useful to, and usable by, farmers.
OBJECTIVE
To develop, adapt and improve technologies for use in agriculture in order to reduce input use and emissions (system optimisation in crop management).
CONTENT
The research should include development of technology, testing in field experiments, assessment of soil heterogeneity, use of geo-statistical analysis methods and remote sensing instruments. On-farm research and practical testing with farmers and advisors should demonstrate the practicability and usefulness of the methods. Measurement and modelling of emissions are required to demonstrate the response and the potential advantages for the environment due to the application of the new methods.
OUTPUT / DELIVERABLES
Adapted and improved technology, evaluation of potential environmental and economic benefits, experience with usage on farm. Remote sensing technology can also be used for selecting regions for cropping systems.
IMPACT
-
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
-

RESEARCH TOPIC
2.1 Production systems and rotations: impact of increasing commodity and inputs prices on production systems
CHALLENGE
1.3 Adaptation of production systems and crop rotations according to changes in farming framework conditions
RESEARCH GOAL
1.3.1 Setting up of tools and strategies to support adaptation to change
WORKING GROUP
WG 3.2 (2.1)
BACKGROUND
The on-going liberalisation of the European agricultural markets, the challenges of world markets, increasing demand for agricultural commodities and continued high energy prices have a tremendous impact on the cost structure of farms, and therefore on farming systems. Along with changes in general political (environmental issues) requirements, farmers will need to decide to what extent they toned to adapt their production system, how to optimise crop rotations and whether or not to introduce new crops into their crop mixes.
OBJECTIVE
Evaluate the production potential in Europe according to increasing demand for agricultural products for food, as well as for non-food (bio energy) purposes. This includes an assessment of the possible steps for intensifying agricultural production in different regions of Europe according to the regional circumstances. It is likely that in certain regions intensification (increased inputs, conversion of land use) will include environmental impacts. Furthermore, changes in the profitability of arable crops due to different market developments will alter production systems and the rotations on farms. An economic analysis of possible production systems and rotations (under consideration of new technologies such as water management systems) will give valuable information to farmers about the various options of action and reliable advice to politicians a for the future design of agricultural and environmental programmes.
CONTENT
The project should cover different aspects:(a) Analyses on regional level (NUTS I-III) about: (i) Share of arable land on total farm land; (ii) distribution of arable crops within the rotation; (iii) development of intensities in arable farming.(b) Farm models (“Typical farm”- methodology or extensions of existing LP farm models) to analyse the impact of changes in prices and policies on the production intensity and on the production system.(c) Case studies to evaluate some special aspects regarding the introduction of new crops (perennial crops, short rotation coppice), certain aspects of changes in production systems (e.g. irrigation).(d) Integration of the results and draw conclusions for the future design and the competitiveness of Europeans arable farming, needs for action due to policy regulations and appropriate recommendations to policy-making.
OUTPUT / DELIVERABLES
A set of regional analyses and a comprehensive picture of European crop patterns (status quo and model outcomes), case studies and political advice.
IMPACT
Understanding of the impact of increasing commodity and input prices on production systems and the different consequences for selected regions in Europe. This will allow: a) on-farm level to optimise farm rotations and production systems; b) at EU level to contribute to an improved design of the Common Agricultural Policy (CAP).
PARTNERSHIP
European universities, private or public agricultural research institutions, national administration.
FUNDING INSTITUTION/S
EU, national level

OTHER REMARKS
Connected to 2.8 & 1.15

RESEARCH TOPIC

2.2 Economics of farm size: economies of farm size under changing market and policy conditions with focus on new member states

CHALLENGE

1.3 Adaptation of production systems and crop rotations according to changes in farming framework conditions

RESEARCH GOAL

1.3.2 Analysis of specific regional actions to adapt to change

WORKING GROUP

WG 3.2 (2.2)

BACKGROUND

Changes in the political and economic system also have major impacts on the agricultural sector. New markets, land reform, changes in institutional settings and legal requirements give a new framework for farmers and arable farms to adapt farm size and production systems.

OBJECTIVE

Analyse chances and limits of different farm sizes, diversification options and optimal production systems in the New Member States (NMS) (Bulgaria, Romania) and comparable transition countries. Identify economic factors determining farm sizes in a short and long run perspective under different market situations and changing political framework conditions in Eastern European member states.

CONTENT

Contents will include: a) Farm size measures; b) existing theories of farm size developments, technical efficiency, productivity, short term perspective vs. long term perspective; c) transferability to Eastern European farm systems. The project should in particular evaluate the relationship between legal status/farm type/production system and farm size in NMS.

OUTPUT / DELIVERABLES

Overview on farm size measures, existing studies and theories; set of factors determining farm sizes (short/long term) in NMS; conclusions for policy programmes.

IMPACT

Increase competitiveness of arable farming in NMS

PARTNERSHIP

EC, national research institutions (Institutes, Universities) of the considered MS

FUNDING INSTITUTION/S

EU

OTHER REMARKS

The project may have various links to aspects of land markets. In addition, farm restructuring and structural change could also be of great interest in Western EU countries.

RESEARCH TOPIC

2.8 & 1.15 Risk management and adaptation of arable farming under price volatility and climate change

CHALLENGE

1.4 Managing risks for EU farmers

RESEARCH GOAL

1.4.1 Find strategies to manage risk factors

WORKING GROUP

WG 3.2 (2.8) & WG 3.1 (1.15)

BACKGROUND

Farming and arable crops are sectors with very high risks. Risks are related to farm incomes (due to input/output price volatility), to quantity and quality of production (due to weather volatility and climatic changes) and to farm assets – real estates and human capital (due to climatic changes and other unexpected events). Price volatility can increase owing to expected WTO agreements (especially market access improvements) and possible changes of the the Common agricultural policy (CAP) (e. g. reduction of direct payments). Climatic changes are inevitable, contributing to more frequent catastrophic events (floods, droughts) and continuing basic changes in climatic and soil conditions.

OBJECTIVE

To find general solutions for arable farming and farms to minimize individual categories of risks by improving farm practices, investment, business orientation and management tools.

CONTENT

The project includes: a) The identification and classification of risks related to arable farming under new/expected conditions; b) the assessment of the significance of risks, their size and evaluation; c) the analysis of instruments for risk reduction, e.g. insurance; d) decision support systems for a rapid adaptation to economic context and risk management.

OUTPUT / DELIVERABLES

General instruments, measures and advice on how to minimize individual categories of risks for arable farming. Suggestions for policy makers regarding how to link agricultural policies with private activities in this field, considering risks related with functioning of insurance markets. Related decision support systems.

IMPACT

Better economic situation and improved flexibility of farms producing arable crops.

PARTNERSHIP

Public research institutes; larger private insurance companies.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Connected to 2.1

STAKE 2: MEETING DEMANDS ALONG THE VALUE CHAINS

RESEARCH TOPIC

4.4 Better understanding of the interaction between crop quality characters and processing, to identify areas for improvement and development

CHALLENGE

2.1 Increase efficiency of transformation processes

RESEARCH GOAL

2.1.1 Increasing efficiency of processing and opportunities for wider exploitation of crops products and by products

WORKING GROUP

WG 3.4 (4.4)

BACKGROUND

While harvest traits are useful in generating buyer specifications, a key area of interest is how the variable quality of arable crop raw materials (mainly determined by genetic and ecophysiologic factors) affects final use (i.e. carbohydrates and storage proteins constituents) and how this responds to processing, dough strengths etc). Antinutritional factors, which may affect quality of final products, have also to be taken in account. More particularly, a main hypothesis actually issued from structural biology studies is that the supramolecular organisation of biopolymers in vivo (carbohydrates as well as proteins) is a key factor for explaining the techno-functional properties of the constituents of plant raw materials and also for controlling their genetic and ecophysiologic variabilities.There is a need for variability in end use performance to be verified to help direct growers and crop breeders to improve the traits of interest and to explore the interactions with the transformation processes.

OBJECTIVE

Develop a better understanding of the impacts of crop quality characteristics (and how agronomic inputs affect these traits) on down-stream processing operations and gain an improved knowledge of how specific processing operations can affect the quality characteristics of final products.

CONTENT

The content of the study will include: a) scrutinizing the structural organizations of the plants components; b) Studying the relationships between these structural organizations and the optimum transformation processes to be developed; c) Clarifying the evolution of the components and functional properties in processed plant products.

OUTPUT / DELIVERABLES

Better information exchange and interactions between breeding companies, cropping management, transformation companies and end users for improvement of plants added value through final products more adapted to the consumers (humans, animals) and through the development of new valorization.

IMPACT

Improve the competitiveness of European crops by the control of quality from crops to end uses and by setting new final products through new specific technologies.

PARTNERSHIP

Breeders, plant transformation industries, breeders, pilot plants.

FUNDING INSTITUTION/S

-

OTHER REMARKS

Needs both strategic underpinning and industrial funding.

RESEARCH TOPIC
4.5 Development of pest and disease control measures to protect and enhance product quality
CHALLENGE
2.1 Increase efficiency of transformation processes
RESEARCH GOAL
2.1.1 Increasing efficiency of processing and opportunities for wider exploitation of crops products and by products
WORKING GROUP
WG 3.4 (4.5)
BACKGROUND
Pest and disease problems can quickly undermine quality aspects, causing both direct damage and indirect damage (micotoxins) or acting as contaminants or hindrance to processing. Increasing unpredictable climate may exacerbate problems.
OBJECTIVE
Develop key forecasting tools and strategies for the most problematic culprits
CONTENT
Co-ordination of EU R&D activities in the sector to develop an analysis of key sector needs and priorities and develop cross-border monitoring schemes.
OUTPUT / DELIVERABLES
A range of early warning systems to identify need for early crop management strategies and need to develop EU-wide integrated strategies to tackle and track cross-border dispersal and movement.
IMPACT
More consistent quality of supply. Feedback to ensure better targeting of inputs to crops where quality is more likely to be achieved.
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
Need for both fundamental and industry funding

RESEARCH TOPIC
4.8 Development of information transfer programmes to increase production and use of EU-derived plant proteins
CHALLENGE
2.1 Increase efficiency of transformation processes
RESEARCH GOAL
2.1.1 Increasing efficiency of processing and opportunities for wider exploitation of crops and by-products
WORKING GROUP
WG 3.4 (4.8)
BACKGROUND
Proteins are in short supply in the EU and better use could be made of EU-sourced materials using EU-grown pulse crops. In part, this is seen to be because growers are not aware of the full benefits provided by legumes, in terms of residual nitrogen value, and resulting positive impacts on GHG reduction (as little or no nitrogen applied (a major source of GHG emissions in crop production). In addition. Better transfer of existing knowledge could also help to reduce risks and improve profitability of legumes.
OBJECTIVE
To increase uptake of pulse legumes by growers, by providing information on value of pulse crops to growers.
CONTENT
Development of technology transfer activities to promote growing of legumes in EU and promote good management practices to optimise benefits for the rotation.
OUTPUT / DELIVERABLES
A range of materials and technology transfer activities designed for, and aimed at, growers.
IMPACT
Increase in EU legume production.
PARTNERSHIP
-
FUNDING INSTITUTION/S
EU
OTHER REMARKS
Likely to require EU funding to move forward.

RESEARCH TOPIC

3.3 Preventing safety risks in arable crops

CHALLENGE

2.3 Ensuring food safety

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.3)

BACKGROUND

Safety is one of the main concerns for the food and feed chains, and is a key competitiveness factor which is essential for consumer confidence. Many factors arising from genetic, agronomic and climatic conditions may affect allergenicity and other risk factors (micotoxins, heavy metals, pesticides and other residues). The remedial approaches which consist of the discarding of contaminated portions of crops must be surpassed by developing new cultivars and new cropping systems which in turn minimize safety issues. Concerning the grains and seeds storage, the traditional methods, essentially for protection against insects, have reached their limits because more and more active compounds are forbidden on the European market in accordance with the REACH regulation.

OBJECTIVE

To elaborate decision support systems to predict and prevent the presence and manifestation of contaminants at the field level, and all the along the subsequent chains (food and feed). Setting of new systems for protecting of grains and seeds in storage.

CONTENT

Better understanding of the molecular mechanisms involved in contamination/risks at the field level. Identification and impact of modulating factors (biotic and abiotic conditions for diseases development). Comprehensive approach to understanding the development of “hot spot” contaminations in the field. Modelling contaminant behaviour along the arable crop food/feed chain. Methods to follow up the management of survey plans.

OUTPUT / DELIVERABLES

This will include: a) Sampling methods and rapid detection/quantification methods for risk factors in the food/feed chain; b) decision support systems able to be used for monitoring the entire food/feed chains; c) new innovative cropping systems with low input able to reduce safety risks; d) new cultivars with lower allergenicity and/or which are resistant to safety risks; e) Setting of new systems for protecting of grains and seeds in storage.

IMPACT

Improved cultivars and cropping systems able to ensure maximum marketability of arable crops by virtue of increased safety.

PARTNERSHIP

Public/private institutions, breeders, agronomists, growers, storing industry, food and feed industry.

FUNDING INSTITUTION/S

European, Regional.

OTHER REMARKS

Connected to 4.1

RESEARCH TOPIC

4.1 Better understanding of the genetic determinants of quality traits to help develop better cultivars capable of delivering required quality in the face of abiotic stress

CHALLENGE

2.4 Meeting food and industrial quality standards

RESEARCH GOAL

2.4.4 Breeding for quality

WORKING GROUP

WG 3.4 (4.1)

BACKGROUND

Ensuring that European crops continue to consistently deliver end market quality demands is essential to maintaining competitiveness and reducing waste. A complex of genetic factors may control quality traits. There is a need for better understanding of the genetic determinants of quality and to develop (cost effective) tools and markers needed to assist breeding efforts associated with improving complex quality traits. There is also a need to study the possibilities for 'allele mining' from exotic germplasm to open up the way for GM modification using native genes to add additional diversity for use in selections. This represents basic work required to better understand the determinants of key quality traits in arable crops, to help develop cultivars that are more robust in terms of delivering quality demands

OBJECTIVE

Develop programmes to better understand the genetic parameters underpinning key quality traits in arable crops and the genomic and associated markers to help identify targets for breeding efforts. Develop other methods for improving phenotypic selection should be considered.

CONTENT

Identify the key priority quality traits of interest (i.e. premium-led) or where delivery of consistent quality is a regular problem. Develop variety trait mapping populations and identify the genetic traits associated with such populations.

OUTPUT / DELIVERABLES

Delivery of a range of quality mapping populations and breeding lines to help breeders develop cultivars with reliable quality parameters.

IMPACT

Dramatic improvement in breeding material for quality aspects available to breeders, which can be protected by licence.

PARTNERSHIP

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FUNDING INSTITUTION/S

-

OTHER REMARKS

Will take time to deliver, but should be achievable in 2015 timeframe with new genomic techniques to work alongside breeding methods; outputs should be made public to help foster development: key priority identified in Pulse crop Genetic Improvement Network Project; historically, breeding has proved the most effective route to improved quality.
Connected to 3.3

RESEARCH TOPIC

4.3 Development of co-existence strategies for EU arable crops with GM and non-food crops

CHALLENGE

2.4 Meeting food and industrial quality standards

RESEARCH GOAL

2.4.3 Maintain confidence of consumers that any quality specification is effective (including GM free segregation method)

WORKING GROUP

WG 3.4 (4.3)

BACKGROUND

While there are few GM products currently grown in the EU, or used in food products, there is a sizable community within the agricultural sector that sees such technologies as being essential to deal with climatic and other challenges facing society. As such we must prepare for the potential wide scale development of such technologies and prepare strategies to deal with co-existence of GM and non-GM crops to ensure consumer choice is maintained. There is a need to ensure practices and detection methods are developed to protect the integrity of non-GM supplies, which are likely to attract higher premiums.

OBJECTIVE

Develop risk assessment and detection tools to help maintain the integrity of non-GM supply chains.

CONTENT

Risk analysis work is required to identify the scales of risk involved in the specific supply chains involved. Alongside this, appropriate detection methods are required to ensure appropriate levels of sampling are carried out to ensure adequate purity without increasing handling times significantly

OUTPUT / DELIVERABLES

Risk analysis tools and rapid detection tools

IMPACT

Maintain consumer confidence

PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

Ongoing EU-funded SIGMEA and Co-Extra projects should help develop the research outline and priority areas. Industry should have a keen interests in supporting such work. The effect that climate change and resource availability might have on people's perception of GMOs, i.e. in the face of adversity people's concerns about GMOs become secondary to their concerns about not getting enough of the food they are used to getting. This may be particularly true if marginal cultivation areas become unsuited to cultivation. GM will be able to deliver improved performance of arable crops in marginal areas and research should therefore be focussed on securing this.

RESEARCH TOPIC
3.2 Optimising AC for optimal utilisation of nutrients in human and animal nutrition and/or utilisation of components of AC or by-products of food processing for non-food applications
CHALLENGE
2.6 Increasing nutritional value
RESEARCH GOAL
WORKING GROUP
WG 3.3 (3.2)
BACKGROUND
Consumer awareness with respect to quality (safe, tasty and easy to use), nutritional value and health aspects of foods is growing. These are important drivers for product development and require adapted AC systems. The same applies to animal feed. In addition, AC have a growing potential to be used as raw materials for green chemicals, energy carriers. For their optimal use it is important that these components are accessible and extractable.
OBJECTIVE
To optimize composition of AC with respect to bioavailability or extractability of nutrients or other important components.
CONTENT
The nutrients in ACs are often poorly bio-available for the consumer. Their bio-availability can be improved by changing their characteristics through breeding and agronomic techniques. The same approach can also be used to increase the content of components of non-food applications and their extraction.
OUTPUT / DELIVERABLES
Adapted crops in which nutrients and other important components are more available and extractable.
IMPACT
Better utilisation of nutrients in human and animal nutrition and improved efficiency for industrial extraction of important components for non-food uses. For the farmer this means a more profitable crop, for industry a alternative, renewable resource for green chemicals.
PARTNERSHIP
Partnerships with nutritionists, food processors, chemical industry and agronomists etc
FUNDING INSTITUTION/S
Because of the broad impact on the society European funding is desirable.
OTHER REMARKS
IP matters need special attention. Connected to 3.5, 3.7, 4.2 and 4.10

RESEARCH TOPIC

4.2 Better understanding of the interaction between processing methods and nutritional quality of produce in order to optimise bio-availability

CHALLENGE

2.6 Increasing nutritional value

RESEARCH GOAL

2.6.2 Reduce unfavourable impacts of processing on nutrition

WORKING GROUP

WG 3.4 (4.2)

BACKGROUND

There is increasing awareness of the value of specific nutritional or beneficial characteristics of food associated with the presence of minor compounds (antioxidants, plant lipids etc) or form of materials in food products. There is a desire to maintain the value of such potential to develop added value opportunities. Where there is significant processing of raw materials (heating, freezing, milling crushing, extrusion, etc) there are concerns that the value of minor or other nutritional components as proteins can be diminished (for example, the impacts of freezing on the nutritional value of peas or the opposite effects of heating treatments during crushing of oilseeds: lowering of antinutritional compounds as glucosinolates vs lowering of the proteins digestibilty). A better understanding of the interaction of processing on such parameters could help improve nutritional qualities by processing raw materials in different ways.

OBJECTIVE

To better understand the impacts of processing on the bio-availability of compounds of nutritional or health benefit. To set new process flowsheets leading to new products with high added value.

CONTENT

Work with industry and food scientists in partnership projects to examine the impacts of processing on common arable commodities to ensure work is focussed on key areas of interest and that knowledge is transferred directly to industry to speed up adoption of information and knowledge gained.

OUTPUT / DELIVERABLES

A better understanding of the interactions for a range of key processed products.

IMPACT

Improved nutritional quality of food, development of potential added value outlets.
Opportunity to develop oils with minor compounds and proteins with high digestible value.

PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

A key area for industry funding for pull though – as this is where the money is in agriculture. Any findings also need to be fed back into breeding efforts to help improve desirable traits in the chain. This area could also be broadened to include agronomy and the environment e.g. there is evidence that irrigation/ water stress can have a effect on nutrients.
Connected to 3.2, 3.5, 3.7, and 4.10

RESEARCH TOPIC

4.10 Optimise the digestibility of plant proteins in animal diets

CHALLENGE

2.6 Increasing nutritional value

RESEARCH GOAL

2.6.1 Characterizing and improving the nutritional properties of AC raw products

WORKING GROUP

WG 3.4 (4.10)

BACKGROUND

The low digestibility of proteins induces important nitrogen losses with bad environmental consequences. Some transformation processes can increase these negative effects. The value of proteins to the livestock sector could be increased if the digestibility of protein components could be increased (tannins and other components as phenolic compounds or phytic acid, bind to proteins making them indigestible, fiber, hemicelluloses, lignin, polysaccharides in cell walls, interference with antinutritional factors). Increasing the digestible protein value would add to overall value of legumes, cereals and oilseed meal and develop a new quality parameter in the marketplace.

OBJECTIVE

To increase digestibility of European plant protein sources.

CONTENT

Identify and confirm the compounds responsible for the low utilization level of proteins.
Development of breeding work to reduce undesirable protein binding traits and increase digestibility of protein constituents.
Identify and set process parameters for improving the content and digestibility of proteins, including specific associations of enzymes.

OUTPUT / DELIVERABLES

Improved animal utilisation, reduced pollution and development of added value crop by-products.

IMPACT

Impacts include: a) Increased crop value; b) Enlarged uses of plants rich in proteins by animal feeding; c) Improve EU protein sufficiency; d) Reduction of nitrogen losses

PARTNERSHIP

Breeders, plant transformation companies enzymes companies, pilot plants, animal feeding companies.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Requires EU input, and some input from the feed industry and enzyme industries.
Connected to 3.2, 3.5, 3.7, and 4.2

RESEARCH TOPIC

3.7 Science-based integration of feed crops and related animal products in consumer health concerns

CHALLENGE

2.7 Addressing consumer demand in nutrition and dietetics; 3.2 Developing new feed uses

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.7)

BACKGROUND

Consumers are aware of the influence of food on personal health. However, health concerns related to food are often driven by marketing messages or political factors rather than scientific evidence. Our understanding of the nutritional properties of animal products, especially in complex diets, on human health is still limited. Knowledge of critical metabolites or health promoting compounds in animal products and the influence of breeding and production conditions thereon is an important driver for product development.

OBJECTIVE

To identify health-promoting ingredients in feedstuffs and to develop optimised feed formulations that contribute both to dietary needs of animals and to healthy animal products. To increase knowledge about nutritional properties of animal products in complex diets and impacts on human health. Assessment of improved monitoring systems for both feedstuffs and animal products can contribute to food safety.

CONTENT

Desirable, less desirable or problematic components in animal products must be identified from nutritional research and food monitoring. Scientific knowledge of the impact of animal products as part of complex diets on consumer health will be gained. In parallel, further understanding of the role of feed formulation on the quality of animal products will lead to new feed formulations with positive impacts on the nutritional properties of animal products. This also includes research on formulations with positive effects on the general health status of animals, resulting in reduced medication. To minimise risks from contaminants or pathogens along the chain, assessing methodologies will be further developed to assist quality monitoring from farm to fork. Dissemination of scientific knowledge will inform relevant actors and the public.

OUTPUT / DELIVERABLES

Healthier animal products due to improved feed composition.

IMPACT

Availability of safe and healthy animal products for the consumer. Production of farm products with increased profitability.

PARTNERSHIP

Partnerships with veterinarians, nutritionists, agronomists as well as feed and food processors.

FUNDING INSTITUTION

Because of the broad impact on agronomists, feed and food industries and the consumer, European funding is desirable (i.e. large scale integrating project).

OTHER REMARKS

Connected to 3.2, 3.5, 4.2 and 4.10

RESEARCH TOPIC
4.6 Develop and improve carbon footprints for EU produce and develop agreed standard methods for their determination across Europe
CHALLENGE
2.8 Understanding and addressing purchaser demand
RESEARCH GOAL
2.8.3 Meeting consumers' expectations
WORKING GROUP
WG 3.4 (4.6)
BACKGROUND
Increasingly the carbon footprint of products will be used as a buying tool by retailers and others in the sector. Such assessments are subject to many assumptions and there is a need to ensure commonality in approaches to avoid misleading claims
OBJECTIVE
Development of a common agreed methodology for carbon accounting of food products
CONTENT
Development of agreed methods, boundaries for analysis, and accounting tools to ensure appropriate analysis
OUTPUT / DELIVERABLES
Agreed approach and system for reporting product carbon footprints.
IMPACT
Agreed approach and system for reporting product carbon footprints
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
Will need some fundamental work to develop carbon footprint for some parameters of analysis, but the bulk of the work should be funded by industry and supply chain actors.

RESEARCH TOPIC

4.7 Better understanding of public concerns associated with GM technologies to help shape communication strategies

CHALLENGE

2.8 Understanding and addressing purchaser demand

RESEARCH GOAL

2.8.2 Understanding the consumers' preferences and needs

WORKING GROUP

WG 3.4 (4.7)

BACKGROUND

Consumer fears over GM technologies are seen to be hampering the wider use of such technologies in Europe, and may place additional burdens on industry in dealing with co-existence issues to ensure product purity (for current dominant non-GM markets). There is a need to better understand the general public's areas of concern, and to provide informed, balanced advice and comments.

OBJECTIVE

To better understand the EU general public's concerns over GM issues

CONTENT

Engagement and consultation through market surveys and meetings to ascertain views and assertions. To rationalise this into a list of key concerns and provide balanced information notes in response.

OUTPUT / DELIVERABLES

Wide publication of balanced view document addressing widely held concerns in the general public – including identifying areas of doubt.

IMPACT

Development of engagement in the GM debate

PARTNERSHIP

-

FUNDING INSTITUTION/S

EU

OTHER REMARKS

-

STAKE 3: NEW OUTLETS AND MARKETS

RESEARCH TOPIC
3.4 Whole crop utilization
CHALLENGE
3.1 Developing new food uses; 3.2 Developing new feed uses; 3.3 Developing Non-food/Non-feed uses
RESEARCH GOAL
WORKING GROUP
WG 3.3 (3.4)
BACKGROUND
Plant breeding and agronomy, aimed principally at improving productivity and food or beverage quality, have given far less priority to biomass or to co-product utilisation. Reduced dependence on fossil fuel-derived products and greater need for locally-sourced fuel and fibre will place additional demands on the crops that can be grown in specific areas. This creates a challenge to meet continued, or growing, demand for healthy food, whilst seeking to reduce inputs and also to optimise the crop to meet other market requirements.
OBJECTIVE
To consider which crops/varieties should be exploited, within given environmental and climatic conditions, and in what manner, to make more effective use of the whole crop and to meet a wider range of processor and consumer requirements.
CONTENT
Gaining better understanding of how arable crop species may be developed and exploited to enable a wider range of market requirements to be met, either through utilisation of the whole crop, through co-development of a range of products or through optimisation of by-product utilisation. Knowledge of the genetic control of relevant traits and understanding of how agronomic approaches can optimise expression of these traits would be obtained. Ways of reducing aspects of input, particularly energy, would also be considered.
OUTPUT / DELIVERABLES
Resolving genuine or perceived conflicts, e.g. food versus fuel, in utilisation of arable crops; better understanding of the genetic and agronomic control of a range of traits; improved range of products meeting a wider range of markets; higher productivity and added value along the chain; greater flexibility to respond to changing market demand.
IMPACT
Improved flexibility and ability to react to changes in market demand and consequent implications for arable crop production.
PARTNERSHIP
Public/private institutions, industry, growers, plant breeders, agronomists
FUNDING INSTITUTION/S
European, Regional
OTHER REMARKS
By improving genetic and agronomic knowledge within arable crops, this project would enable the optimisation of traits relevant to feed and non-food use in addition to food use. It would, therefore, complement and enhance projects in areas such as nutritional quality or bio-refinery development. Connected to 3.10

RESEARCH TOPIC

3.10 Sustainable whole crop use optimisation for non-food/non-feed, food and feed, and synergies between different outlets

CHALLENGE

3.1 Developing new food uses; 3.2 Developing new feed uses; 3.3 Developing Non-food/Non-feed uses

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.10)

BACKGROUND

Crop choice and processing has been optimised on a single product base, but there is now a transition to the use of whole crops and cropping systems for different outlets. This transition should be considered in the light of the visions for combinations of processing technologies, in which the whole feedstock is converted into different outlets with varying economic value. However, the complete harvest of the whole biomass, maybe also roots, resulting in less residues left in the field, must be developed in a context of sustainable land use considering the future soil fertility and environmental impact (nutrient and GHG emissions, carbon sequestration, water use, soil impoverishment, biodiversity etc.), since soil fertility is the resource base for the vision of a bio-based economy.

OBJECTIVE

To optimize the added value from a quantity of biomass in a sustainable way

CONTENT

New crops and technologies may be developed using: 1. advanced plant breeding methods and reconsidering older varieties bred with less specificity for a single products, but perhaps a higher biomass yield (genetic variability) 2. new cultivation techniques and cropping systems taking into account the sustainability issues in a given environment (e.g. new crops may provide new ecosystems services);3. linking the logistics and processing of biomass (harvest, separation, storage etc) to local production of biomass, and 4. assessing the sustainability during the development of new technologies.

OUTPUT / DELIVERABLES

Plant species and cultivars suited for whole crop processing. New processing systems (Biorefineries) and supply systems. Business models and new environment and climate friendly products.

IMPACT

New opportunities for rural development with new business opportunities, positive effect on some environment parameters and energy use in agriculture with whole crop use. Opportunity for growing new crops which can have much greater impact on the environment via multi-functionality than most annual crops.

PARTNERSHIP

Universities, plant breeders, chemical companies, energy companies.

FUNDING INSTITUTION

European, Regional

OTHER REMARKS

Connected to 3.4

RESEARCH TOPIC

3.11 Agro-industrial parks and land use: closing the regional mass and energy cycles integrating agricultural production, processing, mass flow and logistics and providing balanced services to society

CHALLENGE

3.1 Developing new food uses; 3.2 Developing new feed uses; 3.3 Developing Non-food/Non-feed uses

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.11)

BACKGROUND

Agro-industrial parks are in essence clusters of enterprises (farms and factories) at a regional level that integrate plant and animal production in such a manner that an optimum situation develops regarding the use of the production system as such (land use and landscape) and all (bio-)mass, water and energy produced in the system (area), while minimizing external inputs and environmental effects. Optimizing the use of tangible and intangible products of such a production system includes the use of, for example, cultural, recreational and educational purposes, but also the use of side products such as (residual) biomass for energy or clean water from stored excess rainfall.
For developing such systems the local resources and requirements in terms of soil, climate, vegetation, traditional use, inhabitants, rural and urban aspects but also conditions for access and logistics (nearby cities, harbors) must be considered. In the modern economy, and likewise in agriculture, the scale of production is very important for viable economic activities. Concentrating production of one type and main products in a certain area will lead to a stream of side-products (primary and secondary residues) and side-effects (landscape level, ecology, logistics) that do have an optimal scale as well. Combining different agricultural activities such as animal farming and arable farming with horticulture may give a different optimum if interdependences are taken for granted. For example, residues from animal farming like manure may be combined with biomass residues from arable farming in fermentors to produce energy (biogas) for housing or horticulture. Similarly the wish to locally produce feed concentrates will help to reduce transport and change the availability of other biomass residues.
Beyond the whole-crop-use as defined in bio-refinery systems we propose to develop integrated production and processing systems where different crops and cropping systems, different animal production systems and different processing activities (agricultural and non-agricultural) are combined in a regional setting. Similarly, the systems should deliver balanced services to society such as opportunities for recreational or educational activities but also reduce the transport, energy use and other undesirable environmental effects.

OBJECTIVE

Improving the sustainability of non food and food production (long-term approach). Enhancing/ optimising synergies between agricultural production and (processing) industries in a territory considering energy and mass flows (short – medium term approach)

CONTENT

Industrial ecology (on agriculture + industry system). Definition of the considered system. Optimising the links between different actors of the system. Multi-criteria approach and scenario optimization.

OUTPUT / DELIVERABLES

New sustainable production cycles including non agricultural outputs: heat, drinking water. Improved balances (energy, economic, ecology …) in wider systems.

IMPACT

The growing concern about the sustainability of the current production systems combined with the steeply rising demand for food, feed and renewable resources for non-food products requires a redesign of production systems. This does hold especially in the EU as consumers demand products that are traceable and unequivocally reliable concerning origin, production process and high quality. This concern, the market development and the consequent demand come in conflict with optimum use of resources. The present research topic aims at developing schemes for the design of new and integrated production systems meeting the complex demands and made specific for regions and conditions. It will add to economic and social competitiveness stimulating the economy while protecting the regional specificity and livelihood.

PARTNERSHIP
Primary production (farmers and farmers organisations),and bio-refinery experts, processing companies, marketing analysts, logistics and social sciences, environmental sciences, regional authorities, and local or regional communities.
FUNDING INSTITUTION
European, Regional …
OTHER REMARKS
Connected to 2.7, 2.9, 3.9, 5-3.4, 5-3.5, 6.1, 6.2 and 6.3

RESEARCH TOPIC

3.6 Improvement of competitiveness of crop production on the global feed and related markets: strategies for competitive EU feed production

CHALLENGE

3.1 Developing new food uses; 3.2 Developing new feed uses; 3.3 Developing Non-food/Non-feed uses; 1.5 Increasing logistics efficiency

RESEARCH GOAL

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WORKING GROUP

WG 3.3 (3.6)

BACKGROUND

The EU is highly dependent on the import of protein rich raw materials for feed production. Studies on the organisation and logistics of feed production are less developed compared with other AC-related products. The sources of raw materials for feed production are under-utilised. Two main issues are identified: feeders are losing their competitive position and producers are moving away from cereals. Research perspective: meet existing/new market opportunities; improve domestic value-added opportunities; increase cereal productivity and production profitability.

OBJECTIVE

Devising options for improved crop growing technologies, allocation and logistics within the EU in relation to global markets. Competitive issues are related to: the market growth, sector profitability/ costs and regulations.

CONTENT

Moving forward to address cereal competitiveness within link optimisation NFNF/F/f.Strategically: (1) Differentiation (value): Functionality to Markets; Traits (best in class); (2) demand optimization (growth and value): domestically; internationally; (3) crop productivity and reduced (unit) production costs (growth & efficiency): yields; yield stability and traits (abiotic & biotic).

OUTPUT / DELIVERABLES

Enhanced crop platform and portfolio. Strategically focused Food, Feed & Industrial Growth.

IMPACT

The possibility of a more balanced import / export basis and optimized differentiation. Gaining a level of consensus to a more refined strategic direction: Step 1 – Gaining support for an industry framework. Step 2 – Addressing regulatory barriers. Step 3 – Initiating policy support to drive the strategy.

PARTNERSHIP

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FOUNDING INSTITUTION

European, Regional

OTHER REMARKS

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RESEARCH TOPIC

3.1 Optimising AC for the development of new healthy products

CHALLENGE

3.1 Developing new food uses

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.1)

BACKGROUND

Consumer awareness with respect to quality (safety, taste and ease of use) and health aspects of foods is growing. These are important drivers for product development and require adapted AC systems.

OBJECTIVE

To optimise the composition of AC with respect to health modulating compounds through breeding and agronomic techniques.

CONTENT

By way of nutritional research, new plant components have been identified as positive or negative health modulating components . To meet the recommended intake of components having a positive effect on the human organism ,it is important to increase their levels in selected crops and, in addition, when necessary also try to make them readily bio available. For example, there is a need for improved levels of dietary fibre, certain anti-oxidants, higher levels of specific micro-minerals, components effecting satiety etc. Other crops contain anti-nutritional or allergenic components which have a negative impact on human health. The levels of these components should be reduced to zero.

OUTPUT / DELIVERABLES

Adapted crops the composition of which is more healthy.

IMPACT

Availability of a healthier crops for consumers, and more profitable crops for farmers.

PARTNERSHIP

Partnerships with nutritionists, food processors and agronomists etc.

FUNDING INSTITUTION/S

Because of the broad impact on the consumer European funding is desirable.

OTHER REMARKS

IP matters need special attention.

RESEARCH TOPIC

3.5 Strategies to enhance nutritional quality and processability of crop products and by-products from food industry, bioenergy or biorefinery to secure supply to the European feed sector

CHALLENGE

3.2 Developing new feed uses

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.5)

BACKGROUND

The ability of feed to respond to different needs in relation to animal growth, nutritional quality, environmental quality, animal welfare etc depends on the characteristics of raw materials and their variability. New materials from by-products, food industry etc. are available. This can also allow reduction of land requirements for feed production.

OBJECTIVE

Development of raw materials with improved accessibility of nutrients (genetics, technology)
Development of fast methodologies to assess quality of raw materials and accessibility of nutrients

CONTENT

The research should address the technologies to process by-products as well as the technologies to process the main products and their effects on by-product quality. Methodologies to assess quality should particularly address the needs of farm feeding.

OUTPUT / DELIVERABLES

Improved processes leading to the production of raw materials and fast methodologies for quality assessment of raw materials.

IMPACT

Availability of improved raw materials would contribute to the competitiveness of both animal and arable crop production.

PARTNERSHIP

Public research, feed formulation companies, food industry, extension services

FOUNDING INSTITUTION

European, Regional

OTHER REMARKS

Connected to 3.2, 3.7, 4.2 and 4.10

RESEARCH TOPIC

3.9 Land use optimisation for Non-food/Non-feed, Food and Feed, and synergies between production and services in the EU, regional and farm scales

CHALLENGE

3.3 Developing Non-food/Non-feed uses

RESEARCH GOAL

WORKING GROUP

WG 3.3 (3.9)

BACKGROUND

Land availability will be one of the main limiting factors to meet the needs for European food and feed taking into account the growing demand for raw materials for other industries (e.g. bio-energy) and environmental services. Better management of agricultural and rural space, taking into account varied properties of land and climatic factors in different geographical locations (including growing transportation costs) may improve farmers' financial performance and increase the competitiveness of EU agriculture.

OBJECTIVE

To develop quantitative models and evaluation criteria for different spaces and time scales for production systems in order to manage competing claims from farmers, policy makers, industries and societies. To obtain the maximum added value from a territory, and to provide synergies between economic, environmental and social goals.

CONTENT

Different scale models (farm, region, EU level), evaluation criteria for agricultural land use. Scenarios for market and agricultural policy developments and climatic changes. Looking for synergy between different land uses. Specific applications: areas and agricultural systems for producing clean water.

IMPACT

Re-allocation of resources, better utilization of marginal lands (e.g. of poor quality soils), focused policy incentives and measures.

PARTNERSHIP

Research centres, other public/private institutions, farmers' associations, processing industries.

FUNDING INSTITUTION

European, Regional

OTHER REMARKS

Connected to 2.7, 2.9, 3.11, 5-3.4, 5-3.5, 6.1, 6.2 and 6.3

STAKE 4: SUSTAINABLE PRODUCTION AND ENVIRONMENTAL ASPECTS

RESEARCH TOPIC

1.21 Breeding for crop species with improved N uptake and nitrogen efficiency

CHALLENGE

4.1 Improving resource use efficiency: nutrients

RESEARCH GOAL

4.1.3 Breeding for crops species with improved N uptake and nitrogen efficiency

WORKING GROUP

WG 3.1 (1.21)

BACKGROUND

Improving fertilizers use efficiency is a very important objective in agro-ecosystem management. This is particular interesting in the case of nitrogen. Tillage, crop rotation and applied nitrogen have a large and variable effect on different indicators of nitrogen use. Nitrogen efficiency component and indexes are useful for monitoring cropping system, nitrogen use, assessing nitrogen management strategies and identifying key areas for improvement in nitrogen use efficiency (NUE).

OBJECTIVE

Search for new crops varieties, more efficient for nutrient use, in particular for nitrogen, through breeding. Improving yield of crops in system with low nitrogen supply (e.g. organic farming).

CONTENT

The project will include: a) Research and trials for improving nutrient fertilizer use efficiency and mainly NUE. b) Evaluation of major sources and sinks of nitrogen through balance of this element in soil and crops. c) Study of nitrogen use efficiency component derived from plant physiological processes.

OUTPUT / DELIVERABLES

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IMPACT

Reduction of environmental impact for inappropriate use of fertilizers. Reduction of ground water contamination. Less costly crop fertilization.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

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RESEARCH TOPIC

1.22 Developing reduced nitrogen input and productive cropping systems: nitrogen optimisation at cropping system scale

CHALLENGE

4.1 Improving resource use efficiency: nutrients

RESEARCH GOAL

4.1.4 Developing N fixating organisms for non legume crops

WORKING GROUP

WG 3.1 (1.22)

BACKGROUND

The ability of legumes to fix atmospheric N2 will allow reducing the use of mineral nitrogen fertilizers in the agro ecosystem. The use of legumes as precedent crops or as intercrops will allow improving the energy and greenhouse gas balances of the crops. A positive energetic balance is a very important condition to use these crops in a sustainable production.

The legume crops could be introduced in the rotation as another crop, in between crops or in an intercrop with the energy crop. There is the need to design novel cropping systems that optimize the contribution of legumes to the system as a whole, embracing forage, pastures and legume arable crops.

OBJECTIVE

To obtain references of agronomic practices when incorporating grain legumes in the rotation or association, that bring as the same time profitability and sustainability, mainly in relation to the reduction of energy consumption and greenhouse gas emissions (GHGE). Disseminate among farmers the proposed low energy impact production systems.

CONTENT

The project will study in particular: the impacts of: a) The legume crop in the crop rotation; b) The legume crop as an intercrop between two crops; c) The legume crop alternating with rapeseed.

OUTPUT / DELIVERABLES

Evaluation and quality records of energy saving and GHGE reduction by introducing grain legume in cropping systems. Evaluations of reduction of N mineral fertilizer when using grain legume in the rotation. Assessment of regional strategies of GHE reduction in agriculture by introducing grain legume in crop rotation. Assessment of potential drawbacks: a) possible increase of N_2O emissions due to crop residues; b) additional risk for nitrate leaching due to soil mineral nitrogen harvest. The consequences on crop protection strategies should be taken into account, for example if a grain legume needs more insecticides than a cereal.

IMPACT

Reduction of GHGE and mineral nitrogen use. Reduction of energy dependence by limiting nitrogen use.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

Connected to 1.19,1.20 and 5-2.2

RESEARCH TOPIC
1.23 Better use of manures: treatment, application, timing
CHALLENGE
4.1 Improving resource use efficiency: nutrients
RESEARCH GOAL
4.1.6 Improving resource use efficiency: PK & other nutrients
WORKING GROUP
WG 3.1 (1.23)
BACKGROUND
Crop production needs especially land, water and nitrogen. Machinery might be adequate in each case. Producing 1t of barley in a semi-arid dry land requires 3.8 Gj/t in a cereal monoculture system, decreasing to 2.9 Gj/t when grain legumes are introduced in the rotation or to 2.1 Gj/t when organic residues are used as fertilizers. The power cost is optimised when grain legume and organic residues are used both and producing 1t of barley only requires 1.8Gj/t. Nitrogen is responsible of 76-81% of green house gas emissions in cereal or rape seed crops. Nitrogen makes up 60% of the energy cost in the production of biofuels from cereals, sunflower or rape seed. Organic matter produced by livestock should be used as manure as it allows reducing consumption of mineral fertilizers which consumer a significant amount of energy.
OBJECTIVE
Develop ways of using manure as fertilizer in order to allow the reduction of consumption of mineral fertilizers.
CONTENT
The project should focus in particular on improved techniques and practices for the use of pig slurry and dairy manure as fertilizers. Effect on soil, properties (pH, organic matter) should also assessed. As a lot has already done in this matter, the first step would be to create a database with past experiments
OUTPUT / DELIVERABLES
Evaluation and quality records of energy saving and greenhouse gas emissions (GHGE) reduction when organic manure is used as fertilizer. Reduction of N mineral fertilizer when using organic manure in the rotation.
IMPACT
Reduction of N mineral fertilizer, improved energy balances and reduction of GHE emissions.
PARTNERSHIP
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FUNDING INSTITUTION/S
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OTHER REMARKS
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RESEARCH TOPIC
5-2.2 Global assessment of N emissions of cropping systems
CHALLENGE
4.1 Improving resource use efficiency: nutrients
RESEARCH GOAL
4.1.4 Developing N fixating organisms for non-legume crops
WORKING GROUP
WG 3.5 (5-2.2)
BACKGROUND
In the past, a great deal of work was performed on the relationship between management and one pathway of nitrogen loss (e.g. NO_3, NH_3, N_2O etc.). However, there are some trade-offs between the reduction of different kinds of N emissions: e.g. reducing NH_3 emissions by increasing N in soil leading to higher NO_3 leaching. A experimental dataset on those trade-offs is needed, especially on N_2O.
OBJECTIVE
To gain more knowledge on the interactions between the different N emission sources.
CONTENT
Field experiments comparing the different N emissions (N_2O, NO_3, NH_3) of cropping systems designed to reduce N use (introduction of legume), to reduce mineral N use (with organic nitrogen), and N leaching (with catch crop) in a dynamic way along the rotation in pluriannual experiments. Create a network of pluriannual experiments in different climatic and management conditions (with or without irrigation, more and less intensive). The experiment should be completed by an assessment of N emission for organic source of nitrogen. Energy and organic balances could also be assessed.
OUTPUT / DELIVERABLES
Knowledge about the trade-off i) for future work on optimisation of cropping systems to reduce all source of emission, ii) to improve N models. A set of data to calibrate/validate N-models
IMPACT
Better understanding of N cycling in arable crops, enabling to take targeted measures to reduce N losses and to increase N use efficiency
PARTNERSHIP
Partnership: research organisations, networks between experimental and modelling researchers.
FUNDING INSTITUTION/S
EU
OTHER REMARKS
The project should build on the results of the integrated EU-Project Nitro-Europe. Connected to 1.19,1.20 and 1.22

RESEARCH TOPIC
5-1.3 Linking arable crop production to livestock farming
CHALLENGE
4.1 Improving resource use efficiency: nutrients
RESEARCH GOAL
4.1.7 Efficient use of slurry and manure in cropping systems
WORKING GROUP
WG 3.5 (5-1.3)
BACKGROUND
In the last decades a trend toward a specialisation of farms and production regions either in arable farming or in livestock production in Europe led to nutrient overload and high losses of N and P in animal production regions and to intensive use of mineral fertilisers in arable cropping regions. These problems can be solved by either bringing animal and crop production closer together or by exchanging manure. Both options have various effects on the sustainability that should be evaluated.
OBJECTIVE
Quantify the production and beneficial environmental effects of different options to link arable to livestock farming at farm and regional level. Assess different scenarios (increasing fossil fuel prices, higher prices for fertilisers, pesticides, transports). Propose innovative solutions.
CONTENT
Coupled modelling approach with regional and field models for case studies in the EU.Economic (costs, economy of production) and environmental assessment (energy use, N emissions, reduction of mineral P, K use, etc.).Pilot test farms, use of modelling, GIS, select case study regions with high or low integration, demonstrate the environmental and economic effects. Practical aspects should be integrated in the research: how to transfer slurry, technical and logistic aspects, technical feasibility (slurry pipeline?).
OUTPUT / DELIVERABLES
Quantitative assessment of environmental benefits, effects on the total production and economic return. Proposals for higher integration of arable and livestock farming at farm and regional level. Models for regional economic and environmental optimisation of the production. Find optimal levels of fertilizer exchange. Give recommendations for the organisation of the exchange.
IMPACT
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PARTNERSHIP
Partnership: Research organisations from EU countries with exchange possibilities (France, Spain, etc.), advisory services.
FUNDING INSTITUTION/S
EU
OTHER REMARKS
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RESEARCH TOPIC

1.19 Innovating for improved energy efficiency of cropping systems

CHALLENGE

4.2 Improving resource use efficiency: energy

RESEARCH GOAL

4.2.2 Innovating for high energy efficiency of cropping systems

WORKING GROUP

WG 3.1 (1.19)

BACKGROUND

Energetic worldwide consumption increases while stocks in fossil energy decrease; agriculture for food uses must innovate in cropping systems which decrease fossil energy need with constant food productivity. Agriculture for energetic uses must ameliorate its energetic efficiency and its net production of energy.

The two main items mobilizing not renewable energy are N fertilization and mechanization, including for irrigation. Energy cost of these items can be decreased. Nitrogen makes up 60% of energy costs used in producing biofuels from cereals, sunflower or rapeseed, and is responsible for 76-81% of greenhouse gas emissions in cereal or rapeseed crops.

Main possibilities for energy costs reduction are known: using co-product of farm or organic residues as fertilizers, optimizing the crop rotations introducing grain legumes, reducing soil tillage to limit consumption of fossil fuel, improving fertilization methods (such as splitting fertilisers doses to better fit the crops needs in time).

On the other side, maximizing the energy product needs to maintain production levels in sustainable ways.

OBJECTIVE

The objective is to devise strategies to reduce energy costs in the production of major crops such as wheat, oilseed crops, corn, sugar beet and rice, using a wide variety of tools and strategies, in particular by a global cropping system approach: a) testing new crop rotations and their practicability, e.g. introducing grain legumes or others crops of diversification in the rotation, b) Decreasing nitrogen fertilizer application introducing grain legumes in the rotation, testing effects of organic residues or other organic nitrogen substitute; c) Defining and certifying energy balances and reduction of green house gas for the main cropping systems, whatever the final use of the products might be food or other uses such as biofuels, green chemistry, etc.

CONTENT

The project will establish an UE trial network addressing the following issues: a) Direct drilling and conservation tillage; b) Effect of introduction of grain legumes and other diversification crops in the rotations; c) Incorporating organic residues as nitrogen source for rapeseed crops; d) Use and appraisal of the different stubbles; e) Developing new tools and strategies for nitrogen application; f) Working out new models of certification and appraisal for crop energy balance and greenhouse emissions (GHGE). Assessment of potential drawbacks such as: a) possible increase of N_2O emissions due to crop residues; b) additional risk for nitrate leaching due to soil mineral nitrogen harvest. The consequences on crop protection strategies should be taken into account, for example if a grain legume needs more insecticides than a cereal.

OUTPUT / DELIVERABLES

Models of certification for energy GHGE of the different crops.
Energy cost reference table for major crops in different types of cropping systems
Regional strategic motions to reduce GHGE working on crop production systems.
Models of cropping systems with high energy balance.

IMPACT

Validated quality records for crops and production systems will facilitate decision making at regional and national level, in order to control GHGE and fossil energy use in agriculture.
Impacts on GH gas emissions are expected.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

Connected to 1.20,1.22 and 5-2.2

RESEARCH TOPIC

1.20 Understanding and calculating energy costs in crop chains and at farm level through new methods and references for energy balance of cropping systems

CHALLENGE

4.2 Improving resource use efficiency: energy

RESEARCH GOAL

4.2.1 Assessing energy use in crop chains and at farming level

WORKING GROUP

WG 3.1 (1.20)

BACKGROUND

Energy parameters are meaningful indicators for assessing energy use or comparing the environmental impacts from agricultural practices. Energy parameters can be used to assess the efficiency of production systems and to make comparisons among systems. To evaluate the sustainability of agriculture, the energy efficiency of the system must be considered. All inputs and outputs of a cropping system can be expressed in terms of energy. Hence, energy input and output are two important factors for determining the energy efficiency and environmental impact of crop production. However, energy utilization and output differs widely among crops, production systems and management intensity. Differences in management practices such as farm technology, tillage and crop rotation or intensity, have considerable effects on energy input and energy efficiency of crop production systems.
It is very important to create tools that allow studying energy balance of the different farm types. Energy saving must be thought at global level of farming system taking into account its sustainability.

OBJECTIVE

Identify strategies to optimize energy and green house emissions (GHGE) balance for the different farm types through: a) Studying and evaluating different typified farms; b) Developing new tools and strategies to evaluate energy and GHGE balance; c) Taking into account economic balance and social impact in the global evaluation.

CONTENT

The project will go through the following steps: a) Verifying and updating, if necessary, existing tools; b) Select typified/typical farms; c) Calculating energy, GHGE and economic balance and evaluating social impact; d) Assessing different proposals and their impacts when applied at regional or national level. Step a) will b e crucial and will respond to the need of a standardized set of coefficients between countries integrating latest technology progress (fertilizer production, improvement of engine performance).

OUTPUT / DELIVERABLES

Certified systems of calculating GHGE produced by farms.
Assessment of regional strategy of GHGE reduction by different and more sustainable types of farm.

IMPACT

Certified system of calculating GHE produced by farms and validated farm quality records will allow an improved assessment of regional/ national strategies of GHGE reduction and fossil energy rational use in agriculture.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

Connected to 1.19, 1.22 and 5-2.2

RESEARCH TOPIC

2.7 Establish competitive crop rotations for bioenergy: analyse the contribution of different crops and crop rotations to bioenergy yields and their economic and ecological impacts in selected regions of Europe

CHALLENGE

4.2 Improving resource use efficiency: energy

RESEARCH GOAL

4.2.2 Innovating for high energy efficiency of cropping systems

WORKING GROUP

WG 3.2 (2.7)

BACKGROUND

In response to climate change and energy security concerns, bioenergy is considered to be an alternative energy source for the future. To meet the EU targets on bioenergy and CO_2-mitigation, a variety of feedstocks are considered, while their ecologic impact is not known well. Large scale production of bioenergy crops could also have significant impacts on the agricultural sector in terms of production location, as well as farm income.

OBJECTIVE

The first objective is to identify energy crops and energy crop rotations which can deliver high energy yields in a sustainable way. The second objective is to analyse their competitiveness and impacts on farm income in different regions of the EU.

CONTENT

First a common methodology to measure the sustainability of energy crop systems would be determined. The yield performance of energy cropping systems would be analyzed under representative environmental conditions of Europe. Considering the common defined methodology their sustainability would be measured, taking also into account negative environmental effects. In addition the competitiveness of the energy cropping systems with respect to food production and their impact on farm income would be analysed.

OUTPUT / DELIVERABLES

Measures of sustainability and competitiveness of arable energy crop systems.

IMPACT

The project will facilitate the move of energy crop rotations to the most competitive regions. As a consequence the costs of bioenergy could be reduced and resources could be used efficiently. This will improve competitiveness of sustainable energy crop rotations, yielding additional farm income.

PARTNERSHIP

Research institutions across the EU,

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Connected to 3.9 and 3.11

RESEARCH TOPIC

2.6 Economics of straw removal: identify different local conditions for straw removal in Europe and analyse their impact on supply costs

CHALLENGE

4.2 Improving resource use efficiency: energy

RESEARCH GOAL

4.2.2 Innovating for high energy efficiency of cropping systems

WORKING GROUP

WG 3.2 (2.6)

BACKGROUND

Cereal straw, a by-product in the production of agricultural crops, is of renewed interest as a potential source of bioenergy in the EU. It is considered as a feedstock for combined heating and power generation as well as second generation fuels. However, the consequences of a systematic straw removal under different environmental conditions and their impact on costs have not yet been sufficiently analysed..

OBJECTIVE

The first objective is to identify the effects of intensive straw removal on attributes like soil organic matter under different local conditions. The effect on the use of mineral fertilizer (P, K) and loss of reorganisation potential of N before winter should be also assessed. The second objective is to identify adaptation strategies for farmers to increase demand for straw.

CONTENT

The potential of straw removal would be different for different regions across the EU. Therefore, initially the natural conditions which determine this potential would be identified. Thereafter,, adaptation strategies for farmers to increased demand for straw (e.g. substitution of organic matter, varieties with higher straw yields, changing crop rotations) would be determined. The identified strategies will be considered for the calculation of costs of providing straw as a bioenergy feedstock. Subsequently, their impact on the competiveness of straw-based bioenergy would be analysed. Expert opinions and industry involvement would be sought alongside scientific input.

OUTPUT / DELIVERABLES

Estimations of costs of straw removal for energy purposes in different regions of the EU.

IMPACT

The knowledge of the cost of straw removal for bioenergy production will permit an analysis of the competitiveness of straw-based bioenergy lines. The most cost effective locations could be identified.

PARTNERSHIP

Research institutions across the EU.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

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RESEARCH TOPIC

1.8 Improving water use efficiency of crops: varietal evaluation and breeding

CHALLENGE

4.3 Improved resource use efficiency: water

RESEARCH GOAL

4.3.1 Breeding for high water use efficiency

WORKING GROUP

WG 3.1 (1.8)

BACKGROUND

Large differences occur in unitary use of water between one area and another for the same or similar crops. These differences are due to a variety of causes, including varying irrigation habits, agricultural and biological features, or differences in irrigation water costs.
There is a direct relationship between crop transpiration and its yield. Plant transpiration is affected by factors such as plant type and variety, plant canopy, stomata behaviour and atmospheric carbon dioxide concentrations.
Changes in crop management and development of new varieties might produce greater yield per unit of water used.

OBJECTIVE

Search for new plant varieties through the breeding of more drought resistant and less water consuming plant types.

CONTENT

The project would include laboratories, greenhouses and field studies to identify plants and varieties that are more efficient photosynthesizers.
The influence of factors such as carbon dioxide, temperature, light intensity, tissue water content and endogenous internal rhythms of the plant on evapotranspiration and stomata opening should be investigated.

OUTPUT / DELIVERABLES

More drought resistant plant varieties which maintain a high growth rate.

IMPACT

Improved plant-water status. Reduction of water use of arable crops.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

Mediterranean and some continental regions are most affected due to summer droughts. This topic is becoming also increasingly relevant to temperate climates due to global warming.

RESEARCH TOPIC

1.9 Water efficient cropping systems through improved crop mix and irrigation management

CHALLENGE

4.3 Improved resource use efficiency: water

RESEARCH GOAL

4.3.1 Breeding for high water use efficiency

WORKING GROUP

WG 3.1 (1.9)

BACKGROUND

The changing trends of certain meteorological variables such as temperature, and its relationship to the increase in atmospheric greenhouse gases, chiefly carbon dioxide, requires taking into account the effects of climate change in hydrological planning. To this end, future predictions regarding resources and demands must be sufficiently flexible to include the projections of highly contrasted climatic models.

Until now, precipitation, which is a fundamental variable affecting water resources, has fluctuated greatly, thus suggesting that extreme climatic events such as drought and floods will occur more frequently in the future.

Under conditions of drought, particular crop practices such as deficit irrigation or the planting of drought-tolerant crops should be implemented

OBJECTIVE

To investigate suitable crop rotations, crop sequences or optimal irrigation scheduling, in water resources systems with water scarcity and the threat of climate change.

CONTENT

Given the limited availability of water resources, traditional policies allowing for a generous supply of irrigation water cannot be maintained. The change in irrigation practices towards what is known as a *management model based on demand* is a matter of great concern.

The most important issues that will determine water use in the future are those concerning sustainable irrigation. It is essential that the application of modern irrigation techniques be compatible with environmental concerns. When water resources are scarce, deficit irrigation methods are very useful as water is applied only at specific critical stages during crop growth.

New technologies using less water may be attractive for the farmers if they can produce a savings in the application of other agricultural inputs. In this case, the adoption of water saving technologies would not depend solely upon the cost of water.

The project will develop soil-water-plant-atmosphere models adapted to different environmental situations, as well as mathematical models capable of representing farming systems based on analytical and statistical principles, usable to simulate the operation of an irrigation system. An initial part of the work would consist in evaluating the need to build new models versus the option to improve/calibrate existing ones.

Study of both irrigation practices and the role of production, can also be included, contributing to understanding the effects of irrigation and suggest practices to improve water use. The work should take into account the difficulty to extrapolate results to different areas.

OUTPUT / DELIVERABLES

Use of soil-water-plant–atmosphere models to improve water use efficiency. Cropping systems adapted to reduced water availability.

IMPACT

Changes in irrigation practices towards water demand management and towards new technologies to save irrigation water.

PARTNERSHIP

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FUNDING INSTITUTION/S
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OTHER REMARKS
Saving irrigation water has been a necessary research topic in Mediterranean type climates and is becoming an increasing concern for continental and temperate regions.

RESEARCH TOPIC

1.10 Sustainable irrigation in relation to water and soil (drainage, salinisation)

CHALLENGE

4.3 Improved resource use efficiency: water

RESEARCH GOAL

4.3.3 Improving irrigation water at farm level

WORKING GROUP

WG 3.1 (1.10)

BACKGROUND

Technological progress has lead to the implementation of irrigation techniques which, in many cases, have a negative impact on the environment and natural resources.
However, the view that the single purpose of irrigation is to increase production no longer holds true. Irrigation must also be viewed as an element the purpose of which is to conserve the environment, water and soil. Thus, for example, the productive function of irrigation should not be implanted indiscriminately without bearing in mind its possible effects on the deterioration of ecosystems. It is essential that crop water requirements be calculated in a correct manner in order to deliver the accurate water supply to crops. Likewise, the proper scheduling of irrigation enables us to know when and how much water should be delivered.

OBJECTIVE

Design more sustainable irrigations systems to avoid soil salinisation and to prevent groundwater contamination.

CONTENT

Incorporate new techniques for calculating evapo-transpiration in order to estimate crop water requirements in a more precise manner. Three aspects must be known: crop development, the physical characteristics of the soil and the atmospheric demand. This should be complemented by the identification and analysis of drainage problems.
Programmes that pursue a more efficient use of water should also be assessed for the environmental and socioeconomic impacts they may have.

OUTPUT / DELIVERABLES

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IMPACT

Reduction of soil and water contamination. Best estimation of crop evapo-transpiration. Increased programming of irrigation with the aid of irrigation advisory services.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

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RESEARCH TOPIC
5-2.1 Designing and testing water efficient cropping systems in a multi-scale approach
CHALLENGE
4.3 Improved resource use efficiency: water
RESEARCH GOAL
4.3.2 Improving water management in cropping practices
WORKING GROUP
WG 3.5 (5-2.1)
BACKGROUND
There is a need to explore different strategies to improve water efficiency at the level of cropping systems (not only for one crop) in the context of climate change (increase of dry and warm years, etc.). In the past, work was done at the field level. Innovation should be assessed at different levels, from field to watershed level, to take into account water availability from the source and allocation to other uses. Models can be interesting tools to test these innovative strategies.
OBJECTIVE
Designing efficient cropping systems adapted to reduced water availability.
CONTENT
A collection of innovation possibilities and construction of innovative systems (not only in a “top-down” approach). Designing innovative cropping systems based on: combination of winter and summer crop, early sowing dates, selection of drought-resistant varieties, double cropping, (reduced tillage), etc. Evaluate solutions (cropping systems) with modelling for different climatic scenarios. Test and compare the best solutions at field. An integrated assessment (sustainability) at the watershed level, taking into account water use for other purposes.
OUTPUT / DELIVERABLES
Proposal of innovative cropping systems, adapted to reduced water availability. Reduction of water use of arable crops.
IMPACT
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PARTNERSHIP
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FUNDING INSTITUTION/S
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OTHER REMARKS
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RESEARCH TOPIC

5-3.1 Efficient biodiversity enhancement

CHALLENGE

4.5 Enhancing biodiversity in agro-ecosystems

RESEARCH GOAL

4.5.3 Efficient biodiversity enhancement

WORKING GROUP

WG 3.5 (5-3.1)

BACKGROUND

Although arable crops represent a large geographical area, they are characterised by low levels of biodiversity. In contrast, non-crop habitats can have a high biodiversity. The way in which biodiversity determines the sustainability of arable cropping systems is poorly understood. Biodiversity varies between intensive and extensive systems, but also between different EU countries.

OBJECTIVE

To assess how biodiversity within the crop contributes to its sustainability. To assess how biodiversity within the landscape contributes to the sustainability of the crop. Which strategy should be applied to achieve a suitable level of biodiversity at crop and landscape levels (intensive production combined with nature compensation areas versus extensive production/low input)? To what extent do regional characteristics (landscapes) at different scales influence the above? The contribution of biodiversity to sustainability, the valuation of biodiversity have to be addressed also though ecosystemic functions/services (e.g. pest regulations).

CONTENT

The project should be based on: a) a combination of experimental and modelling approaches; compared to other fields of research, in this case there is still a strong need of model development; b) use life cycle analysis to measure crop sustainability and an economic evaluation of biodiversity; c) comparative studies in regions of contrasting landscapes and farming systems.

OUTPUT / DELIVERABLES

Identify the value of non-crop land in arable production. Quantify the value of biodiversity within and around crops. To integrate arable cropping into national biodiversity strategies. Information on the relative merits of intensive versus extensive cropping systems. Improved model on the relationship between biodiversity and cropping systems/landscape management.

IMPACT

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PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

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RESEARCH TOPIC

1.13 Forecasting of pests and diseases taking into account cropping and management systems and crop canopy sensibility

CHALLENGE

4.6 Ensure effective crop protection in the long term (integrated crop protection)

RESEARCH GOAL

4.6.2 Understanding and forecasting crop antagonist interaction (biology, attacks and wastes)

WORKING GROUP

WG 3.1 (1.13)

BACKGROUND

The biology of most of the major pests and diseases is well known. Forecasting their development and predicting their damage to crop yields and quality remains a question that could retain attention. Many remedies, very often of a chemical nature, have been synthesized and used in crop protection, with globally positive effects on the production, but also with negative side-effects such as environment pollution, residues in crop products, production cost increases through overuse, development of resistances, disequilibrium in ecosystems, etc.

It is well known that many, if not all, of the components of cropping techniques and of farming systems sometimes have significant impacts on the potential presence and harm of pests and diseases.

With the increase of computer techniques, probabilistic approaches in weather forecasting and more generally in complex phenomena forecast, have done a lot of progress.

OBJECTIVE

To better integrate the knowledge on farming and cropping methods and on their impacts on the potential harm from pests and diseases into the choice and management of farming systems and cropping practices.

CONTENT

The project focus is on collecting and analysing quantitative data of crop protection techniques and of farming practices, and of their interactions relating to their effectiveness in controlling pests and diseases and in improving yields and product quality.

A further step is to develop tools to exploit quantitative knowledge on both economical and ecological potentials of gradually more integrated crop protection systems.

OUTPUT / DELIVERABLES

Integrated crop protection systems acceptable both for their economical and ecological effectiveness.

More "naturally" less risky farming systems (i.e. including deep adaptations such as more mixed farming systems if necessary).

Forecasting tools including mathematical modelling in time, of complex interactions between bioagressor’s biology and farming practices.

IMPACT

Less use of agrochemicals and their better integration into a more "prophylactic – reasonable" concept of "crop protection".

PARTNERSHIP

Agronomists with epidemiologists, plant pathologists but also modellers, risk analysts.

FUNDING INSTITUTION/S

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OTHER REMARKS

Connected to 1.18, 2.4, 4.2, 5-2.3 and 5-3.3

RESEARCH TOPIC

1.14 Preserving the durability of crop protection means

CHALLENGE

4.6 Ensure effective crop protection in the long term (integrated crop protection)

RESEARCH GOAL

4.6.2 Understanding and forecasting crop antagonist interaction (biology, attacks and wastes)

WORKING GROUP

WG 3.1 (1.14)

BACKGROUND

The evolution of pathogens and pests is both natural and induced by selection pressure farming practices, notably by the agrochemical uses, or varietal choice.
The use of more integrated crop protection systems seems to be more appropriate in order to slow down the global evolution of pathogens and pests and to better take advantage of the genetic characteristics of crop varieties.
Attempts to develop more integrated systems have generally given good results, but have not always been "cost effective" enough In a context of rapid evolution of pathogens, these systems have sometimes been disappointing and have required regular adaptation.

OBJECTIVE

Develop knowledge to preserve the durability of crop protection methods (plant genetic resistance, biological effectiveness of ecologically good agrochemicals, avoiding the overuse of agrochemicals) and avoiding or suppressing the appearance of important pathogens and pests.

CONTENT

Contents include: a) Experimental method in "natural conditions". b) Better knowledge of crop genotype "resistance" levels, its origin and genetic determinism. c) Promotion of the less risky types regarding tolerance or resistance losses. d) develop quick and cheap tools to characterize bioagressors populations behaviours.

OUTPUT / DELIVERABLES

Recommended lists of varieties taking into account not only current tolerance but also the risks of tolerance losses.
Recommended strategies of genotypes use to lower breakdown risks (alternance, mixture, …) for the main diseases.
Recommendations on the use of agrochemicals taking more into account the risks of resistance development.

IMPACT

Improved ecological and economic performance of agro-ecosystems and increased fine-tuning of crop production by more stable crop-pathogens equilibriums. Increase durability of controlled strategies.

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS

Connected to 5-3.2

RESEARCH TOPIC
5-3.2 Integrated and novel approaches for effective crop protection strategies
CHALLENGE
4.6 Ensure an effective crop protection in the long term (integrated crop protection)
RESEARCH GOAL
4.6.4 Integrated crop protection at cropping system level
WORKING GROUP
WG 3.5 (5-3.2)
BACKGROUND
There is a high degree of dependence on conventional chemistry for crop protection. Alternative approaches are rare or socially unacceptable (GMOs) at present. The situation varies between crops. Previous research is constrained by farmer acceptance and more radical, fully integrated approaches are seldom explored. Barriers exist between research specialities.
OBJECTIVE
To improve communication and research between different research specialities and thereby developing more fully integrated approaches. To investigate novel approaches to crop rotations, breeding programmes, intercropping, application systems, bio-control and bio molecules.
CONTENT
Establish interdisciplinary research groups to develop integrated systems. Identify common reactions in weeds, pests and diseases to intervention/management systems. Ensure adoption through the use of pilot farm networks. Support experimental novel and integrated research approaches.
OUTPUT / DELIVERABLES
Development of more sustainable farming systems that are less dependent on chemicals and better accepted by farmers and society.
IMPACT
-
PARTNERSHIP
Research groups should include people from social sciences able to study and identify bottleneck of farmers acceptance of innovative strategies.
FUNDING INSTITUTION/S
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OTHER REMARKS
The objectives of this topics are already addressed by the Endure Network. Connected to 1.14

RESEARCH TOPIC
5-3.3 Deal with new and emerging pathogens (pests, diseases, weeds)
CHALLENGE
4.6 Ensure an effective crop protection in the long term (integrated crop protection)
RESEARCH GOAL
4.6.5 Deal with new and evolving plants pathogen problems
WORKING GROUP
WG 3.5 (5-3.3)
BACKGROUND
Climate change or other factors may lead to new pathogens invading Europe. Existing pathogens may change and become more prevalent. Cropping may have to change because of associated pathogens. There is a need to consider plant protection in a dynamically changing environment. Ecosystem functioning may be damaged.
OBJECTIVE
Develop forecasting technologies to identify possible threatening pathogens. Adapt current crop protection strategies to the new pathogens. Be able to respond quickly to new pathogens before they become too widely established. Understand the impact of climate change on natural control.
CONTENT
Modelling using GIS, climate change and pathogen distribution patterns. Monitor pathogens and ecosystem functioning where changes are expected, to ensure early warning. Establish a European network to monitor pathogen distributions and provide information on control. Develop robust integrated crop management for arable crops that is able to withstand new pathogens. Investigate bio-control techniques for new pathogens prior to invasion/occurrence.
OUTPUT / DELIVERABLES
Develop a forecasting system that is able to identify new pathogens. Find ways to be able to respond quickly to new threats. Development of sustainable crop management strategies.
IMPACT
-
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
The proposal could be coupled with "5-3.2 Effective crop protection strategies". Also link to " Implementation of reduced tillage systems" (5-2.3). Further connections to 1.13, 1.18, 4.2 and 2.4

RESEARCH TOPIC

1.11 Reducing the greenhouse gas emissions of cropping systems

CHALLENGE

4.7 Minimize greenhouse gas emissions per unit of product

RESEARCH GOAL

4.7.2 Minimize N2O emissions

WORKING GROUP

WG 3.1 (1.11)

BACKGROUND

The two major greenhouse gases in European cropping systems are CO_2 and N_2O. The CO_2 gas is emitted due to the consumption of fossil energy which is necessary for the production of the inputs (fertilizers…) and for transportations and cultural operations. The variation of soil C also plays an important role in the effect of cropping systems on greenhouse gases. It may increase or the decrease the emissions, depending on the management of the cropping system. For instance, conservation tillage has a potential for converting many soils from sources of atmospheric carbon to sink for this element. The N_2O emissions result from the production of mineral N fertilizer, and from the soils due to both denitrification and nitrification. Soil emissions of N_2O are highly dependent on soil nitrate content, soil water content, soil temperature and on soil characteristics. N_2O attributed to the cropping systems is the difference between natural emissions and the actual emissions due to the application of N to the cultivated soils. Both direct (directly from the soils to which N is applied) and indirect emissions (through two indirect pathways: the deposition of N volatilized from the cultivated soils and the leaching or runoff of N applied to these soils) must be taken into account.

OBJECTIVE

To better understand the effect of cropping systems on greenhouse gas emissions in order to be able to optimize crop management and cropping systems in the objective of reducing these emissions.

CONTENT

A global approach accounting for the multiple sources of greenhouse gases is necessary, because the ways to decrease the emission from one source may increase the emissions from other sources. For instance, the replacement of deep tillage by shallow tillage decreases fuel consumption and tends to increase soil C content, but on the other hand it often results in increased direct N_2O emission. Hence, trade-offs must be found.
Simulation of the effect of crop management on greenhouse gas emissions, N volatilization (NH_3 and NO_X) and of NO_3^- leaching using crop models is the best way to develop a global approach. The simulation of indirect N_2O emission with a model at the landscape level would also be helpful. Such models already exist, but they must be validated and probably improved in the European conditions. Experimental databases are necessary to validate the models. There is not enough experimental data, especially on the effect of crop management on direct N_2O emissions. The main factors are N fertilizer management, tillage, irrigation, and the application of organic matter. The effect of the amount of N fertilizer has already been studied, but the results are highly variable. The main part of this variability probably results from environmental conditions. However, the timing of N application and the N form also play a role. This must be investigated. The variability of the effect of shallow tillage compared with deep tillage on N_2O direct emissions must also be studied, as well as the effect of the timing and the amount of irrigation interacting with tillage and N fertilizer management. Little is known on the effect of organic matter, because of the diversity of forms of this product. A typological approach is necessary. The emission under legume crops must also be further investigated. The experimental data could also be used to derive emission factors, which can be used to optimize cropping systems instead of modelling. With this approach it would not be possible to investigate all combinations of factors, but on the other hand it should be more robust.

OUTPUT / DELIVERABLES

Cropping systems with low greenhouse gas emissions
Tools (models and emission factors) to study the effect of cropping systems on greenhouse gas emissions
Experimental databases on the effect of the main crop management factors on greenhouse gas emissions, especially direct N_2O emissions

IMPACT

Less greenhouse gas emitted by cropping systems, per land unit or per unit of output (MJ or other unit).

PARTNERSHIP

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FUNDING INSTITUTION/S

RESEARCH TOPIC

2.5 Establishment of a common methodology for the quantification of the carbon footprint to compare production systems in selected regions of Europe

CHALLENGE

4.7 Minimize greenhouse gas emissions per unit of product

RESEARCH GOAL

4.7.1 Manage the carbon cycle

WORKING GROUP

WG 3.2 (2.5)

BACKGROUND

Differing climatic, soil and management conditions across Europe give rise to differing levels of carbon footprints for in the production of a tonne of a given crop (or its component energy, protein or oil). As carbon footprint has increased in importance to public policy, numerous carbon accounting systems have been devised.

OBJECTIVE

The first objective is to establish a methodology for the quantification of the carbon footprint that can be applied consistently across Europe. The second objective is to apply this methodology to assess the carbon footprint from a range of selected crops and production systems, taking into account that crop production systems could vary in use of cultivation systems, fertilisers and sprays.

CONTENT

An initial literature review would determine the latest thinking on methodology for the assessment of the carbon footprint, based on the ISO 14040 and 14064 standards. Building on current thinking, a pragmatic methodology would be devised for use across the EU. Expert opinions and industry involvement would be sought alongside scientific input. The methodology would take account the constraints on data availability and would use common assumptions as appropriate. The methodology would be used to quantify the carbon footprint from an agreed range of crops and production systems in selected EU regions. These would be selected to represent the most significant sources of carbon loss. Crop production activity has interactions with other agricultural activity such as livestock production and with the food chain and these would be considered.

OUTPUT / DELIVERABLES

A commonly agreed methodology for the quantification of the carbon footprint from crop production systems.

IMPACT

The project will facilitate the move to lower carbon footprint approaches to crop production, through changes to policy and in commercial practice.

PARTNERSHIP

Research institutions across the EU

FUNDING INSTITUTION/S

EU

OTHER REMARKS

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RESEARCH TOPIC

1.5 Avoiding compaction and reducing soil erosion

CHALLENGE

4.8 Maintain and improve soil quality

RESEARCH GOAL

4.8.1 Maintain and improve soil physical properties

WORKING GROUP

WG 3.1 (1.5)

BACKGROUND

The physical properties of soils are crucial in successful agricultural production. On the one hand, soil has to offer an environment providing optimal availability of water, air and heat to plant roots, which can be achieved only by the existence of a sufficiently dimensioned pore system; on the other hand, the soil in the field has to carry many tonnes of weight during agricultural activities, particularly during harvest. The increase of scale has led to machinery with higher capacities, which means heavier weight. The choice of high value crops has also led to the need for field activities irrespective of the weather (=soil moisture). As a result, the pressure exerted on the soil has caused severe compaction. Compaction of the arable layer in most cases can be repaired or alleviated by tillage, but the main damage is done in the subsoil. Subsoil compaction reduces rooting, limits drainage of excess water and may have an effect on the nutrient balance. Being extremely difficult to repair, it is a matter of prevention. Compaction can also lead to erosion on sloping land: compacted surface of soil reduces the risk of direct erosion because soil is less easily eroded, but the infiltration of water is reduced when soil is compacted at surface or in the deeper layer, so that runoff risk is increased. The generation of runoff at field level can be also a source of erosion downstream in a water catchment. Erosion can also be caused by excessive pulverization of the soil, e.g. when needed to prepare a fine seedbed, or as a result of frequent mechanical weeding operations.

OBJECTIVE

Develop farming / field operation methods (including technical solutions such as machinery) causing reduced compaction or erosion Develop optimised cropping systems with the goal of improving the physical properties of soil.

CONTENT

Two main approaches can be used: (a) reducing the load on the soil, and (b) reducing the intensity of field activities. In terms of machinery, this implies more and wider (low pressure) tyres on tractors and implements, looking at alternative machines In terms of intensity, this implies reduction of the number of operations (reduced tillage, protection by crop residues), or clear zoning between traffic (thet can become pathways of preferential transfer of water and pollutants) and production area in the fields (e.g. controlled traffic)

OUTPUT / DELIVERABLES

New machinery, either high capacity ones with low ground pressure systems, or smaller and lighter machinery with lower capacity, allowing synergies with reducing the labour inputs e.g. with autonomous guidance,. Farming systems allowing a continuous protection of the soil surface, and/or a surface soil structure which is less susceptible to erosive forces. Farming systems using precision guidance allowing a separation between traffic and production zones

IMPACT

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PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

The Technology in this field develops quickly, hence requiring continuous attention on the part of scientists.

RESEARCH TOPIC

1.6 Develop crop and farming systems capable of improving soil chemical properties (organic matter, salinisation)

CHALLENGE

4.8 Maintain and improve soil quality

RESEARCH GOAL

4.8.2 Maintain and improve soil chemical properties

WORKING GROUP

WG 3.1 (1.6)

BACKGROUND

Organic matter (OM, humus) contributes to plant growth through its effect on the physical, chemical, and biological properties of the soil. It has a nutritional function in that it serves as a source of N, P for plant growth.
It promotes good soil structure, improving aeration and retention of moisture and increasing buffering and exchange capacity of soils. Humus also plays an indirect role in soil through its effect on the uptake of micronutrients by plants, and the performance of herbicides and other agricultural chemicals.
OM has a direct and indirect effect on the availability of nutrients. In addition to serving as a source of N, P, S through its mineralisation by soil microorganisms, organic matter influences the supply of nutrients from other sources (for example, organic matter is required as an energy source for N-fixing bacteria).
Humus has a profound effect on the structure of many soils. The deterioration of structure (soils become hard, compact and cloddy) that accompanies intensive tillage is usually less severe in soils adequately supplied with humus. Humus usually increases the ability of the soil to resist erosion. It leads to higher water holding capacity and a better infiltration capacity.
OM is lost from the soil by decomposition (food for soil fauna), oxidation and erosion. In order to increase or maintain OM levels, a constant supply of organic material is necessary. This can be in the form of e.g. green, or farmyard manure. Crop residues and specially grown cover crops are the most common source of OM. Cover crops have the additional advantage of providing protection of the soil surface against adverse weather conditions (heavy rainfall, intensive sunlight and strong wind).
A somehow disconnected but additional problem is salinisation. Limited supplies and/or poor quality of irrigation water, coupled with inadequate drainage or high evaporation levels, may lead to salinisation problems, lowering production potentials and/or limiting the number of crops that can be grown.

OBJECTIVE

The project should address two main objectives: a) to develop crop production systems with a balanced return of organic material to the soil (taking also into account that huge amounts of OM are also not friendly for environment, due to GHG etc.); b) to develop farming systems with adequate irrigation and drainage management to avoid build-up of salts in the groundwater.

CONTENT

The project will investigate the effects of residues of various crops on the OM levels of soil, the possibilities and constraints of leaving high amounts of crop residue on the field. Assess the needs for new or adapted machinery to deal with high amounts of residue. Make an inventory of the most suitable types of cover crops as they can be included in the rotations. Investigate the minimum amounts of residue or cover needed to keep erosion risk at an acceptable level. Improved irrigation techniques to deal with salinisation will be also developed.
In the research approaches, a distinction must be made between conventional and organic farming as the influence of chemical fertilizers on the soil chemical properties is high.

OUTPUT / DELIVERABLES

Conservation agriculture systems which are suitable in view of the crops, soils, climate and mechanisation levels in various locations in Europe.

PARTNERSHIP
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FUNDING INSTITUTION/S
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OTHER REMARKS
The outputs of this project have to be assessed with a method developed in the research topic 5-1.4

RESEARCH TOPIC

1.7 Improve soil biological properties: increasing soil biodiversity by adequate cropping systems

CHALLENGE

4.8 Maintain and improve soil quality

RESEARCH GOAL

4.8.3 Maintain and improve soil biological properties

WORKING GROUP

WG 3.1 (1.7)

BACKGROUND

Biodiversity is usually defined as the variety and variability of living organisms and the ecosystems in which they occur. The variety of life in the *soil* encompasses not only plants and animals but also the invertebrates and micro-organisms that are interdependent on one another and the higher plants they support.

Organic matter serves as a source of energy for both macro- and microfaunal organisms. Numbers of bacteria, actinomycetes and fungi in the soil are related in a general way to humus content. Earthworms and other faunal organisms are strongly affected by the quantity of plant residue material returned to the soil.

Farm management practices do alter soil (below-ground) *biodiversity* and *ecosystem function*. The data from many studies indicate that reducing the intensity of use of mechanical and manufactured inputs and (re)-discovering cost-effective ways to integrate biological inputs, will benefit below–ground biodiversity, particularly in lowland grassland and cropping systems. Benefits are seen from both organic and integrated systems, though the evidence base is not strong enough to conclusively distinguish the benefits of these approaches from one another in lowland arable systems. On the other hand, the most recent reviews largely show positive impacts of organic farming in comparison with conventional systems: soil organisms are generally more abundant in organic agriculture systems, but heterogeneity among studies is large. Positive impacts on earthworms, microarthropods (mites and collembola) and fungal populations were confirmed, whereas effects on bacterial biomass and activity were unclear.

OBJECTIVE

To develop cropping systems ensuring increasing soil biodiversity, while maintaining an economically viable farming system.

CONTENT

The project should: a) Use modern methods for measuring/evaluating soil biodiversity (DNA, extraction of chemical compounds, biomass respiration). b) Measure soil biodiversity under a range of cropping systems in order to characterise these systems in terms of sustainability. c) Investigate the role of various crops, crop residues, cover crops and manures on the improvement of diversity. d) Investigate to what degree the application of chemicals may lead to damage to soil biodiversity.

OUTPUT / DELIVERABLES

Sustainable, site-adapted cropping systems which will ensure increased soil biodiversity and improved ecosystem functions.

IMPACT

Impact will include benefits for farmers (increased productivity, sustainability), and for society (ecosystem functions, nature conservation, public health)

PARTNERSHIP

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FUNDING INSTITUTION/S

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OTHER REMARKS
Activities addressing this issue may benefit from support from groups outside the sphere of agriculture. The outputs of this project have to be assessed with a method developed in the research topic 5-1.4

RESEARCH TOPIC
5-1.4 Physical, chemical and biological aspects of integrated soil protection
CHALLENGE
4.8 Maintain and improve soil quality
RESEARCH GOAL
4.8.1 Maintain and improve soil physical properties; 4.8.2 Maintain and improve soil chemical properties; 4.8.3 Maintain and improve soil biological properties
WORKING GROUP
WG 3.5 (5-1.4)
BACKGROUND
A deterioration of soil quality has been observed in several European regions in the last decades related to intensive farming system. Current threats for soil quality are e.g. a loss of organic matter, soil erosion, soil compaction, soil pollution and loss of biological activity. There is a lack of a harmonised methodology for the assessment of soil quality. Moreover, carbon sequestration in agricultural soils has been raised as a way to mitigate climate change.
OBJECTIVE
Assess the impacts of different cropping systems and management practices (reduced tillage, fertilisation, use of machinery, pesticides) on soil quality properties and nutrient and pesticide losses. Optimisation of cropping systems with the goal of improving soil properties.
CONTENT
Develop a methodology for the assessment of soil quality properties in relation to management. Apply the methodology to assess different cropping systems and management practices (crop rotation, catch crops, under-sowing, tillage, fertilisation, management of crop residues, plant protection).
OUTPUT / DELIVERABLES
Harmonised methodology to assess soil quality properties. Recommendations for cropping systems and management practices preserving soil quality at the long term.Practices that optimise C sequestration in relation to the N cycle.
IMPACT
Better protection of soil quality at the long term
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
This project is very important as a support for topics 1.6 and 1.7.

RESEARCH TOPIC

5-2.3 Integrated assessment of management strategies for different climatic scenarios

CHALLENGE

4.10 Developing strategies to face climate diversity and climate change

RESEARCH GOAL

4.10.3 Developing climate change strategies in the agricultural sector

WORKING GROUP

WG 3.5 (5-2.3)

BACKGROUND

There is a great of evidence of climate change. The question for farmers is how and when to adapt their cropping systems. Scientists have developed different regional climate models yielding various climatic projections. The consequences of the uncertainty linked to those projections should be assessed in terms of yield variability, economic performance, environmental impacts (NO_3 leaching, erosion, etc.), for different management strategies and timing of adaptation.

OBJECTIVE

Assess the consequences on yield and environmental impacts, of different levels of management adaptation and timing for uncertain climate change projections.

CONTENT

Use different regional climatic models giving a range of projections (on the level of temperature increase, rainfall distribution, and their variability). Use those models, coupled with a crop model, to assess the yield variation and the risk linked to different management strategies (e.g. no change, winter crop rotations, escaping strategies, adaptation of irrigation, N fertilisation, etc.).

OUTPUT / DELIVERABLES

-

IMPACT

-

PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

Connected to 1.13, 1.18, 2.4, 4.2 and 5-3.3

RESEARCH TOPIC

1.18 Anticipating/forecasting the changes of climatic conditions and their effects on crops

CHALLENGE

4.10 Developing strategies to face climate diversity and climate change

RESEARCH GOAL

4.10.2 Anticipating / forecasting the changes of climatic conditions and their effects on crops

WORKING GROUP

WG 3.1 (1.18)

BACKGROUND

Studies on climate change in Europe indicate consistent increases in projected temperature and different patterns of precipitation with widespread increases in northern Europe and rather small decreases over southern Europe. These changes in climate patterns are expected to greatly affect all components of European agricultural ecosystems (e.g. crop suitability, yield and production, livestock, etc.).

In northern areas, climate change may produce positive effects on agriculture allowing the introduction of new crop species and varieties, higher crop production and expansion of suitable areas for crop cultivation. The disadvantages may be an increase in the need for plant protection, the risk of nutrient leaching and depletion of soil organic matter. In southern areas the disadvantages will predominate. The possible increase in water shortages and extreme weather events may cause lower harvestable yields, higher yield variability and a reduction in suitable areas for traditional crops.

Changes in climatic suitability will lead to invasion of weeds, pests and diseases adapted to warmer climatic conditions. The speed at which such events occur depends on climatic change, the dispersal rate of the species, and on measures taken to combat non-indigenous species.
Adaptation strategies need to be introduced to reduce negative effects and exploit possible positive effects of climate change. Both short-term adjustments (e.g. changes in crop species, cultivars and sowing dates) and long-term adaptations (e.g. land allocation and farming system) should be considered.

OBJECTIVE

To identify strategies for the adaptation of farming systems to climate change, taking into account a broad view of agronomic aspects at the farm level. This includes: a) to asses agronomic strategies including both short-term adjustments and long-term adaptations; b) to adapt current crop protection strategies to the new pathogens; c) new technologies to identify possible threatening pest and pathogens.

CONTENT

The project will develop and use agroecological models (specifically accounting for temperature increase, rainfall scarcity and distribution, yield variations), in order to a) Search for individual management strategies (changes in varieties, sowing dates and fertiliser and pesticide use); b) Look for Integrated crop management for arable crops.
The project will also establish a European network to monitor pest and pathogen distributions for information and control.

OUTPUT / DELIVERABLES

Anticipation of the changes of climatic conditions and their effects on crops. Development of sustainable crop management strategies

IMPACT

-

PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

Connected to 1.13, 2.4, 4.2, 5-2.3 and 5-3.3

RESEARCH TOPIC
2.4 Economics of adaptation to climate change
CHALLENGE
4.10 Developing strategies to face climate diversity and climate change
RESEARCH GOAL
4.10.3 Developing climate change strategies in the agricultural sector
WORKING GROUP
WG 3.2 (2.4)
BACKGROUND
Evidence indicates that changes in climate are already underway and are expected to be more significant in the future. The impacts of such climate change on agricultural systems range from an expansion of areas suitable for cultivation of some crops in Northern Europe, as temperatures increase, to changes in rainfall patterns and more frequent drought episodes in southern Europe, and will most likely lead to economic costs. In this context, understanding the implications of climate change for agricultural systems and developing adequate adaptive responses becomes essential to mitigate damages and/or realising opportunities linked to climate change.
OBJECTIVE
The objective of the research is to assess the impacts of climate change on agricultural systems throughout Europe, as well as the economic costs of these impacts, in order to identify the main areas of concern and to develop adequate adaptation (and mitigation) strategies.
CONTENT
The project should first carry out a regional assessment of potential impacts of climate change in the agricultural sector (impacts vary across regions and therefore climate change scenarios should be derived from regional climate models). Thereafter, different adaptation options should be identified (both short-term autonomous adaptations and potential long-term adaptations should be explored). Finally, the economic costs and benefits of adaptation should be evaluated.
OUTPUT / DELIVERABLES
A set of feasible adaptation strategies to be fed into national/EU policy
IMPACT
Improve the cost-effectiveness of adaptation policies; reduce negative impacts of climate change
PARTNERSHIP
Research institutions and public administrations.
FUNDING INSTITUTION/S
EU.
OTHER REMARKS
Could be connected to other research topics in the field of agricultural and environmental policies. Connected to 1.13, 1.18, 4.2, 5-2.3 and 5-3.3

RESEARCH TOPIC

1.12 Evaluation of different farm types concerning the sustainability of their cropping systems

CHALLENGE

4.11 Integrating different sustainability concerns in the design and implementation of innovative cropping systems

RESEARCH GOAL

4.11.1 Design innovative and sustainable production systems which take account of the diversity of evaluation criteria concerning sustainability

WORKING GROUP

WG 3.1 (1.12)

BACKGROUND

To develop innovative sustainable production systems it is necessary to evaluate different farm types in the most important climate regions of Europe. To design sustainable cropping systems for the future, we need to develop cropping systems by using inputs more efficiently.
There is a lack of long-term experiments on cropping systems that enable to study such questions under different pedo-climatic conditions.
Indicators to evaluate the sustainability and environment friendliness could include: Plant protection, Nitrogen balance, Balance of other nutrients (P, K), Soil humus balance, Risk of soil erosion, Risk of soil compaction, Biodiversity, Balance of energy, Balance of greenhouse gases, Groundwater replenishment, Profitability, Employment, Labour quality.

OBJECTIVE

Identify strategies to enhance the sustainability of different cropping systems through analysing critical points of common farming practices and seek economically optimal strategies for cropping system management.

CONTENT

The project would be based principally on: a) Data acquisition from different regions, farm types, cropping systems; b) long-term experiments of different cropping systems should be done.

OUTPUT / DELIVERABLES

A scale/framework to evaluate different cropping systems with regard to sustainability.
Recommendations for farmers and stakeholders.

IMPACT

Enhancement of the sustainability and environmental friendliness of agricultural production

PARTNERSHIP

-

FUNDING INSTITUTION/S

-

OTHER REMARKS

-

RESEARCH TOPIC
5-1.1 Environmental and economic optimization of (low-input) cropping systems
CHALLENGE
4.11 Integrating different sustainability concerns in the design and implementation of innovative cropping systems
RESEARCH GOAL
4.11.1 Design innovative and sustainable production systems which take account of the diversity of evaluation criteria concerning sustainability
WORKING GROUP
WG 3.5 (5-1.1)
BACKGROUND
Intensive cropping systems developed after World War II rely heavily on the use of non-renewable resources and have lead to significant pollution of soil and water by pesticides and nutrients, as well as a decrease in biodiversity. Current cropping systems signify a considerable or increasing risk for the environment. To design sustainable cropping systems for the future, we need to develop cropping systems that save resources (fossil fuels, P and K) by using inputs more efficiently. Furthermore, these systems should prevent or reduce the pollution of soil and water by pesticides, P, or N and have less harmful impacts on biodiversity. There is a lack of long-term experiments on cropping systems that enable to study such questions under different pedo-climatic conditions.
OBJECTIVE
To define environmentally and economically optimal strategies for cropping system management, to provide tools for decision makers in order to increase eco-efficiency.
CONTENT
The cropping system development should be done by means of long-term experiments (farming system and polyfactorial experiments), on-farm research to test the practicability of the improved system and the acceptance by farmers. These systems need to be analysed by modelling and their environmental impacts should be assessed. An interdisciplinary approach is required. Specific transition problems of Eastern European agriculture should also be addressed.
OUTPUT / DELIVERABLES
Recommendations for policy makers and farmers, system models showing the environmental consequences of management strategies, more efficient use of agricultural inputs, knowledge transfer to farmers.
IMPACT
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PARTNERSHIP
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FUNDING INSTITUTION/S
-
OTHER REMARKS
-

RESEARCH TOPIC
5-3.4 Scaling issues: find sustainable solutions on different scales
CHALLENGE
4.12 Developing common sustainability assessment methods
RESEARCH GOAL
4.12.1 Developing sustainability assessment methods for arable cropping systems and farms **4.12.2 Developing sustainability assessment methods for crop chains**
WORKING GROUP
WG 3.5 (5-3.4)
BACKGROUND
Information requirements and strategies vary according to scale (e.g. farmer / government, individual crops / crop rotations). Scale is rarely taken into account when new crop management approaches are developed and implemented.
OBJECTIVE
To determine how scale will influence any potential changes in crop management. To determine how crop management solutions will fit among different scales. Demonstrate how crop management solutions can be implemented taking scale into account. Inform how different affected stakeholders can work in an integrated manner. Determine how sustainability is affected by scale.
CONTENT
Investigate how sustainability measures respond at different scales. Develop predictive modelling tools to estimate how variables will respond at different scales and test in typical situations for different regions that have inherently different landscapes. All stakeholders have to be integrated into the new processes.
OUTPUT / DELIVERABLES
Better understanding of the role of stakeholders at different scales. Information on how tools for integrated farming operate at different scales.
IMPACT
-
PARTNERSHIP
-
FUNDING INSTITUTION/S
-
OTHER REMARKS
The study could build on the results of the project “Seamless”. Connected to 2.9, 3.9, 3.11, 5-3.5, 6.1, 6.2 and 6.3

RESEARCH TOPIC

5-3.5 Evaluate the best regions for crop production

CHALLENGE

4.12 Developing common sustainability assessment methods

RESEARCH GOAL

4.12.2 Developing sustainability assessment methods for crop chains

WORKING GROUP

WG 3.5 (5-3.5)

BACKGROUND

Production patterns of arable crops are a result of economic, technical, and historic reasons but may not be the most suitable locations environmentally. Climate change will affect suitability of areas to particular cropping patterns.

OBJECTIVE

Develop production patterns of crops that are based upon all aspects of sustainability and to identify how climate change will affect production patterns across Europe.

CONTENT

Identify most suitable areas where each crop can be produced in a sustainable way taking economic, technical, and environmental factors into account, based upon a multi-criteria approach under different climate scenarios. Investigate transportation of materials and subsequent sustainability.

OUTPUT / DELIVERABLES

Reduce the environmental impact of arable cropping. Improve the sustainability of arable cropping in different regions. Find more robust production systems that can better withstand climate change. Understand how supply chain and transportation of raw materials will be affected.

IMPACT

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PARTNERSHIP

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FUNDING INSTITUTION/S

-

OTHER REMARKS

Connected to 2.9, 3.9, 3.11, 5-3.4, 6.1, 6.2 and 6.3

STAKE 5: PROMOTE A CONSISTENT REGULATORY AND GOVERNANCE SYSTEM TO STRENGTHEN THE COMPETITVENESS OF AC

RESEARCH TOPIC
6.5 Comparative analysis and identification of the innovation opportunities and barriers to increasing efficiency in the arable crop chains and networks
CHALLENGE
5.1 Improve efficiency in value chain and networking
RESEARCH GOAL
5.1.2 Developing new tools for information sharing
WORKING GROUP
WG 3.6 (6.5)
BACKGROUND
'Value chain' and 'networks' are concepts that have assumed particular importance in the strategic analysis of agro-industries. The study of the characteristics of networks that contribute to efficiency play an important role in determining the strengths and weaknesses of the arable crop system in order to improve their competitiveness.
OBJECTIVE
The aim of the research is to identify organisational solutions able to improve the competitiveness of arable crops in traditional and new markets through a comparative analysis of innovation, demo-actions and best practices in crop chains and networks. One main goal is how to promote profit sharing partnership with farmers or farmer organizations.
CONTENT
The project will be a cross country comparison (UE27) of crop chain solutions according to their performance. The comparison is extended also to best practices in non-EU countries and will take into account global/transnational networks. The factor for comparison will include transaction costs, trust, market power, value distribution along the crop chain and risk management solutions. Special attention will be paid to the connections between the farm level processor. The identification of reliable expectations among the actors, with the recognition of the economic risk and profit sharing, the establishment of clear targets on a long term perspective, may contribute to mitigate the perception of the threat that the operators have joining a network.
OUTPUT / DELIVERABLES
The strengths and weaknesses of the arable crop value chain in the different EU-27 countries, as well as a set of differentiated strategies to improve competitiveness.
IMPACT
Contribute to the adoption of improved network strategies to enhance competitiveness in the arable crop sector.
PARTNERSHIP
Farmers' associations, academic institutions and firms involved in arable crop networks; collaboration with non-EU companies or institutions is envisaged.
FUNDING INSTITUTION/S
EU
OTHER REMARKS
Could be connected to other research topics in the fields of relationships, cooperation, entrepreneurship.

RESEARCH TOPIC

6.10 Analyze trust throughout value chains and networks related to arable crops

CHALLENGE

5.1 Improve efficiency in value chain and networking

RESEARCH GOAL

5.1.2 Developing new tools to share information

WORKING GROUP

WG 3.6 (6.10)

BACKGROUND

Trust allows a reduction in risk and therefore cost, but importantly also the development of effective and sustainable partnerships. Trust must include the open exchange of information, the possibility to have non-conflictual dispute resolution and respect for the objectives of all parties. Farmers often show limited access to information, thus a network should be designed to reduce information asymmetries and enhance market transparency. The capacity of innovation necessary for networking initiatives is more likely to obtain success in areas and rural territories with traditionally well-built social and economic ties and trust-based relations. Well performing supply chain management relations must be based on trust, on share of exceeding profit, but also on share of unforeseen loss. Farmers are expected to be no longer just suppliers with limited risk, but rather they have to adopt a win-win relationship approach in their business relations. Public sector and the local development agencies have a key role to play in creating trust. Improving trust among the business network will have an important role to minimize uncertainty and risk and to improve the competitiveness of all the actors involved in the arable crop business networks.

OBJECTIVE

The topic of the research is to identify the trust factors in arable crop business networks, how it is possible to improve these among the actors involved, and how to manage risk in business to business relationships with an eye to improving the competitiveness.

CONTENT

The project will be a cross-country comparison UE-27 of the perceived risk and the solutions to improve trust in arable crop business networks.

OUTPUT / DELIVERABLES

A set of feasible solutions to improve trust in business relationships.

IMPACT

Minimize perceived risks in business to business relationships as well as transaction costs, and improve the competitiveness of arable crop actors involved in the network.

PARTNERSHIP

Academic institutions and firms involved in arable crop networks.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Could be connected to other research topics in the fields of relationships, cooperation, entrepreneurship.

RESEARCH TOPIC

6.11 Value chains and networking: analyze value chains and market power

CHALLENGE

5.1 Improve efficiency in value chain and networking

RESEARCH GOAL

5.1.2 Developing new tools to share information

WORKING GROUP

WG 3.6 (6.11)

BACKGROUND

The ‘value chain’ is a concept that has assumed particular importance in the strategic analysis of industries. The study of the characteristics of stakeholders involved in the value chain and the analysis of the value created along the chain/network play an important role in determining the strengths and weaknesses of the arable crop networks in order to improve competitiveness. The capability of firms to compete on markets is increasingly linked to the development of integration relationships among firms operating at different stages of the production chain. Contract relationships and management of asymmetric information are key determinants of incentives and performances. Thus the value created by an integrated production system arises both from the efficiency of the single firms and the development of cooperative relationships. Transport and logistics are key-drivers for agro-food value chains that are facing intensified global competition and market power of food retailers.

OBJECTIVE

Through the analysis of the characteristics of stakeholders involved in arable crop value chains/networks and their ability to create value, the aim is to find solutions able to improve the competitiveness of arable crops in traditional and new markets. The rationalization of the transport systems, the development of efficient and effective logistics services which can comply with the needs of the different actors (producers, distributors, transport and logistics operators) aim at reducing transport costs, meeting rising standards and ensuring higher value added for producers by moving away from interchangeable suppliers to a complex and “strategic” partners.

CONTENT

The project will be a comparison of the arable crop value chain in the EU-27 countries. The structural, organizational and economic analysis of the value chain, as well as the study of traditional and new potential markets for arable crop production, will be a focus of this project.

OUTPUT / DELIVERABLES

The strengths and weaknesses of arable crop value chains in the different EU-27 countries, as well as a set of differentiated strategies to improve competitiveness.

IMPACT

Define possible strategies to sustain competitiveness.

PARTNERSHIP

Research institutions and public administrations.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Could be connected to other research topics in the field of networking, entrepreneurship.

RESEARCH TOPIC

6.8 Analysis of farmer awareness of market trends and identification of knowledge gaps

CHALLENGE

5.2 Reinforcing entrepreneurship and innovation capacity of AC systems

RESEARCH GOAL

5.2.1 Promote awareness of market trends in AC chains (clearly identify arable crops market trends)

WORKING GROUP

WG 3.6 (6.8)

BACKGROUND

The change in the focus of the CAP towards lower and decoupled incentives and more environmental types of support, the globalization processes and limited financial resources, need a better knowledge of market trends for farmers in order to adopt products and practices which meet the characteristics of customer demand. It is important for EU farmers to adapt their crops and practices taking into account those being produced by their competitors. To improve the transparency of the market, as well as the ability to reach an efficient system of transfer of information it is a pre-requirement to gain a sustainable competitive advantage.

OBJECTIVE

Ensure that farmers have access to clearer market information hence enabling them to take informed decisions regarding the adoption of products and practices. In order to improve the awareness of market trends, as well as the needs of the different actors involved among arable crop networks, the study provides an analysis of the information flow and the best ways to provide a clear and transparent diffusion of information among the actors in arable crop chains.

CONTENT

The project should carry out a cross-country comparisons of EU(27) farmers on how their decisions regarding products and practices are dependent on market trends (national, EU, and international level). The research will seek to define the kind and the flow of information in the arable crop networks and examine the most efficient ways to close knowledge gaps . In this perspective, a thorough analysis of international agricultural market trends will be able to analyse the impact of this kind of knowledge regarding the flexibility and reactivity of arable crop networks.

OUTPUT / DELIVERABLES

Research should aim to improve the awareness of arable crop farmers; define the impact of knowledge of arable crop farmers on competitiveness; study new means of information diffusion across arable crop networks.

IMPACT

Improve an informed decision making process for EU arable crop farmers

PARTNERSHIP

Private and public research institutions, public administrations, farmers associations (i.e. COPA-COGECA, etc.), marketing boards, food sector industry associations, consumer bodies (i.e. BEUC).

FUNDING INSTITUTION/S

EU, associations

OTHER REMARKS

This topic is linked with topic 6.1 and 6.2 and could possibly be connected to other research topics, such as the contribution of arable crops to societal demands and public goods.

RESEARCH TOPIC
6.9 Analyze factors serving to promote entrepreneurship at EU level
CHALLENGE
5.2 Reinforcing entrepreneurship and innovation capacity of AC systems
RESEARCH GOAL
5.2.2 Develop service and institution to stimulate entrepreneurship in AC chain
WORKING GROUP
WG 3.6 (6.9)
BACKGROUND
Entrepreneurship is considered a central force in improving the competitiveness in some sectors. In the last decade rural area development has attracted the attention of policy makers in part due to the important role played by the agricultural sector, and because of important constraints such as the strong trend of migration of youth away from family farms. In particular, this negative balance of in-out migration in the agricultural sector is frequently based on socio-cultural and economic aspects such as the perceived reduction of economic opportunities and income opportunities for the future of younger members of rural families, as well as the perceived inability of rural life to improve entrepreneurship or to offer suitable opportunities for career training In another perspective, frequently the agricultural sector is perceived by the "non-agricultural" new generation as an activity unable to enhance entrepreneurship. The identification of entrepreneurship factors for arable crop farmers and how it is possible to stimulate the process of their improvement represents a way to increase the awareness of the central role of the entrepreneur to assure the sector competitiveness.
OBJECTIVE
Identify factors which serve to promote entrepreneurship and how it is possible to promote entrepreneurship in arable crop sectors with an eye to improving the competitiveness of the sector.
CONTENT
Undertake a study of agricultural entrepreneurship based on performance level and decision-making of various types of EU agricultural enterprises. By highlighting the factors that affect the level of entrepreneurship, the research will be able to identify the best ways address the related knowledge gaps of arable crop farmers. The project will be a multi-country comparison (EU27) to identify different needs in the various UE regions.
OUTPUT / DELIVERABLES
Identify the main factors affecting entrepreneurship and how it is possible to stimulate and promote entrepreneurship in the arable crop sector.
IMPACT
Improve entrepreneurship of EU farming and, as a result, its efficiency and performance.
PARTNERSHIP
Private and public research institutions, public administrations, farmers associations (i.e. COPA-COGECA, etc.)
FUNDING INSTITUTION/S
EU
OTHER REMARKS
Could possibly be connected to other research topics, such as Open Innovation, Vocational Training, Implication of Ageing on arable crops.

RESEARCH TOPIC

2.9 Researching new activities and possibilities for farmers in new market situations and new tools for rural development.

CHALLENGE

5.3 Developing income with indirect relations to AC production: income from other activities

RESEARCH GOAL

5.3.1 Managing multifunctional and pluri-activity farming

WORKING GROUP

WG 3.2 (2.9)

BACKGROUND

Due to the opening of European markets and the decrease in direct payments and other subsidies the plight of smaller farms is getting worse in the European Union, particularly in the new member states,.

OBJECTIVE

The objective of the research is to find ways for farmers to cope in the new market situation and policy context, and set up new strategies for EU decision-makers to help these farmers by way of suitable rural development policies.

CONTENT

The project should first define an optimum size for competitive farms under given conditions (geographical, markets, etc). Subsequently, it will analyse possible production systems, intensities and diversification options for the farms. Finally, it will set up different strategies for the farms under the given asset endowment and evaluate these strategies.

OUTPUT / DELIVERABLES

New strategies/activities for adaptation and new tools for rural development measures.

IMPACT

Accelerate adaptation of AC farms

PARTNERSHIP

Research institutions and public administrations

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Connected to 3.9, 3.11, 5-3.4, 5-3.5, 6.3, 6.1 and 6.2

RESEARCH TOPIC

6.3 Deprivation and quality of life in rural areas: provision of public and social goods and services

CHALLENGE

5.4 Improving the integration of arable crops into rural territories and economies

RESEARCH GOAL

5.4.1 Defining contribution of AC to societal needs (gaining a proactive role in supporting rural sustainability)

WORKING GROUP

WG 3.6 (6.3)

BACKGROUND

The structure of the farm (e.g. size), the strategic choices adopted by the family (e.g. mix of cultivations, part-time and off-farm labour), the household profile (e.g. age of farmer, level of instruction, non-farm income and employment), the general economic situation of cropping areas, and the characteristics of rural life (e.g. access to public services) play an important role in the sustainability perspectives of arable crop farms. The opportunity to verify the quality of life in rural areas through a socio-economic perspective, represent an important point of view to recognize the needs of rural family. In general, rural areas in Europe are facing major changes due to ageing populations and out-migration, but also challenges due to in-migration. In order to create viable rural communities that are able to counteract this trend, farm households must undertake a proactive role in economic, environmental and social networking at the local and regional level. Research gaps also exist with respect to knowledge of activities with regional potential. In some hilly and mountainous areas, due to land abandonment, degradation of rural landscapes emerges with unpredictable environmental outcomes and with negative externalities mainly evident in the lowlands. In some areas, breeding cattle have been increasingly disappearing; animals not requiring steady human herders (goat and sheep) are increasing.

OBJECTIVE

The objective of the research is to identify the structural patterns of farm activities that lead to sustainable relationships between farm households and the rural framework. The research will support the definition of rural household needs and seek to improve their quality of life. Both the role of farm-household attitudes in affecting the ability of AC to fulfil societal demands and the impacts of AC on the farm-households themselves have to be analyzed and classified, as well as their impacts on the attractiveness of rural regions for economic activities and related sectors. Small scale farming, that provides better stewardships of natural resources, conserving biodiversity and better safe guarding the sustainability of landscape, needs to be sustained with return of income opportunities. The income generated can be used to offset the losses of income arising from the decline in agricultural income.

CONTENT

The project should carry out a multi-country comparison (EU27) of the level of deprivation in rural areas and of needs for the improvement of quality of life. The research at the European level will identify the potential from a spatial and sectoral perspective. Due to the lack of primary data, extended case study research will be necessary. This will include surveys and participatory approaches in order to achieve improved knowledge covering regional particularities.

OUTPUT / DELIVERABLES

The research will aim at developing: Good practice descriptions; generic approaches/ typologies for identifying the characteristics of farm household related activities /structures that better support rural sustainability; a handbook for gaining a proactive role in supporting rural sustainability.

IMPACT

Improve quality of life in rural areas and attract in-migration of new entrepreneurship from the perspective of the agricultural sector in arable crop areas.

PARTNERSHIP
Research institutions, public administrations, regional stakeholders and regional networks.
FUNDING INSTITUTION/S
EU
OTHER REMARKS
Could be connected to other research topics in the field of improving and fomenting entrepreneurship, services and institutions to empower rural areas, information and communication technologies (ICT). Connected to 2.9, 3.9, 3.11, 5-3.4, 5-3.5, 6.1 and 6.2.

RESEARCH TOPIC
6.4 Connection between land consolidation and arable crops
CHALLENGE
5.4 Improving the integration of arable crops into rural territories and economies
RESEARCH GOAL
5.4.1 Defining contribution of AC to societal needs (gaining a proactive role in supporting rural sustainability)
WORKING GROUP
WG 3.6 (6.4)
BACKGROUND
Land resources are subject to competition by agricultural and non-agricultural uses. Land consolidation is a specific precondition for the competitiveness of arable crops. The opportunity to improve the ability of dealing with market dynamics is an important factor in achieving economic sustainability. Due to traditional, legal, and planning system related constraints, farms in different parts of Europe face different obstacles to taking an active role in improving their competitive potential.
OBJECTIVE
The objective of the research is to analyse the situation of land consolidation in terms of ownership, spatial configuration, investment activities, the role of contract farming and collective projects and other region specific framework conditions at the European level. Emphasis will be put on farm structure conditions and the basic factor endowments that allow for improving competitiveness in new member states, remote areas and regions specifically concerned by land consolidation problems.
CONTENT
The project should carry out an analysis on land consolidation in EU-27 with regard to land use change and farm structure changes.
OUTPUT / DELIVERABLES
Analyse problems of land consolidation in the EU; framework of determinants to solve problems (e.g. legal problems, spatial planning systems, farm economic situations, land ownership, land rent markets, investment behaviour of different farm types, impacts of policies); case study research, surveys (competition between agricultural actors and actors from other sectors); identification of fields for policy action.
IMPACT
Identify fields for public and private actions
PARTNERSHIP
Research institutions and public administrations
FUNDING INSTITUTION/S
EU
OTHER REMARKS
Could be connected to other research topics in the field of improving and fomenting entrepreneurship, services and institutions to empower farmers.

RESEARCH TOPIC
6.6 Structure and interaction between arable crops and urban planning
CHALLENGE
5.4 Improving the integration of arable crops into rural territories and economies
RESEARCH GOAL
5.4.2 New approaches to improve integration of AC in rural economy (Innovation in land use/ Support and manage the process of adoption of innovation to improve the competitiveness of AC systems)
WORKING GROUP
WG 3.6 (6.6)
BACKGROUND
In recent years, the rural–urban fringe has become the setting of the most intense and heterogeneous change in various EU27 countries. The various demands for land in and around cities are becoming increasingly acute. While in the past the growth of cities has been driven by increasing urban population, however, in Europe today, even where there is little or no population pressure, a variety of factors are still driving 'urban sprawl'. These are rooted in the desire to realise new lifestyles in suburban environments, outside the inner city. Urban sprawl is synonymous with unplanned incremental urban development, characterised by a low density mix of land uses on the urban fringe. The full range of impacts of sprawl are considered including impacts in respect of environmental resources, natural and protected areas, rural environments, the quality of urban life and health, as well as socio-economic impacts, i.e. gas emissions that cause climate change, and elevated air and noise pollution levels. These impacts threaten both the natural and rural environments, raising greenhouse exceed the agreed human safety limits. The impacts of sprawl on natural areas, biodiversity and on fragmented ecosystem networks are significant. In a social perspective increasingly ageing population and smaller households are expected to continue in the coming decades, with impact on scarce resources. In a farmer perspective, some problem are related to the availability of land.. How it is possible to reduce this conflict and improve a virtuous integration of arable crops in urban planning?
OBJECTIVE
The objective of the research is to analyse the relationships and interactions in the rural–urban fringe on the European scale to highlight the social, economic and environmental implications for arable crop competitiveness. The research should be able to highlight the opportunities and threats related to rural-urban space interaction to define the role of arable crops in this specific context. The integration of arable crop activities in the planning of rural-urban zones is an opportunity to discover new economic activities to jointly solve the needs of farmers and of the changing society demand. Creating high quality urban areas and viable agricultural land uses require close coordination between different policies and initiatives, and better cooperation between different levels of administration. Particular focus can be given to the key EU policy frameworks which can make major contributions to policies to combat urban sprawl (i.e. transport, cohesion, etc.).
CONTENT
The project will undertake an identification of rural–urban fringe in a spatial perspective and an analysis of the interaction among rural and urban spaces from a socio-economic point of view in EU-27 regions. Paying attention to local vocations in the different regions, this analysis will identify the best solutions for improving the sustainable competitiveness of arable crops and defining the methods and kinds of arable crops suitable for the integration in rural-urban areas. A number of relevant territorial concepts, including ecological corridors and buffer zones, constitute an important factor for combining economic objectives with nature and landscape conservation.
OUTPUT / DELIVERABLES
A feasibility project aimed at integrating arable crops into rural-urban fringe area planning .
IMPACT

The project will encourage local authorities in alternative and innovative choice in urban planning and will help to reach the needs of citizens and operators.

PARTNERSHIP

Research institutions, public administration, civil society organisation.

FUNDING INSTITUTION/S

EU, National government, regional administrations.

OTHER REMARKS

This topic is linked with EU projects related to the sustainability of urban environments and to the development of the rural areas.

RESEARCH TOPIC

6.7 Open innovation

CHALLENGE

5.4 Improving the integration of arable crops into rural territories and economies

RESEARCH GOAL

5.4.2 New approaches to improve integration of AC in rural economy (Innovation in land use/ Support and manage the process of adoption of innovation to improve the competitiveness of AC systems)

WORKING GROUP

WG 3.6 (6.7)

BACKGROUND

Innovation and the ability to manage and improve innovation constitute a means of competing in a global commodity market in which cost is one of the major concerns. The lack of personal skill in management of innovation, the shortfall of capacity and the limited possibilities to finance new innovations result in the need for investment in professional skills and support during the process of adoption of innovations to increase the competitiveness and the growth of arable crop farms.

OBJECTIVE

The objective of the research is to analyse the most important potential innovations able to increase the future of competitiveness of arable crops, as well as the best way to manage the process of diffusion of innovations among farm households.

CONTENT

The project should carry out a multi-country comparison (EU27) on the ability to manage the process of adoption of innovations in farm households. The project should be able to define the socio-economic factors that influence the process of adoption of innovation, and should be able to recognise the best solutions to solve the problem of low level ability to manage this process.

OUTPUT / DELIVERABLES

Research aimed at developing best practices and specific programs of training for farmers to improve their ability to manage the adoption of innovation.

IMPACT

Improve the diffusion of innovation and the ability of arable crop farmers to manage the process of adoption of innovation oriented toward competitive advantages .

PARTNERSHIP

Research institutions, public administrations, regional stakeholders and regional networks.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

This topic is linked with EU projects related to services and institutions to empower farmers, vocational training and EU skill certification.

RESEARCH TOPIC

2.3 Adopting consistent policies: designing improved contractual options to allow flexible access to land for farming in the new Member States (MS)

CHALLENGE

5.5 Promote a consistent regulatory and governance system to strengthen the competitiveness of AC

RESEARCH GOAL

5.5.1 Identifying coherent policy framework for AC system

WORKING GROUP

WG 3.2 (2.3)

BACKGROUND

Land markets have a major impact on farm economic development in some areas, especially in the new member states (NMS) (i.e. Bulgaria, Romania). Access to farm land is limited and land markets are not yet transparent, even though this is the raison d'être of the structural changes in farming and rural areas. Several other Eastern European member states (Poland, Czech Republic) still haven't completed the process of land reform and farm restructuring.

OBJECTIVE

The objective of the research is to study the economics of land markets and assess the consequences for farm size in selected regions, in order to support an improved design of future agricultural policy with respect to AC farming, allowing it to become more competitive at the EU and international level.

CONTENT

The project should first carry out a cross-country comparison of the economics of land market and evaluate the consequences for farm structures and farm size. Then economic differences connected to farm size should help local government and the EU Commission to design proper agricultural policy to support land market reforms and land allocation to farms. The options should be evaluated according to different farm systems and expected reforms in EU MS and at EU level.

OUTPUT / DELIVERABLES

An overview on land market developments in the EU, a set of economic analyses of farm size by class and proposed contractual and institutional changes for an improved regulation of land markets.

IMPACT

Accelerate increase of farm competitiveness at the EU member state, EU and international level.

PARTNERSHIP

Research institutions and public administrations.

FUNDING INSTITUTION/S

EU

OTHER REMARKS

Could be connected to other research topics in the field of land, labour and capital. In addition, it could also be of great interest in Western EU countries.

RESEARCH TOPIC
6.1 Definition of services for improving farmers' orientation, sensitiveness and adaptability to the market
CHALLENGE
5.5 Promote a consistent regulatory and governance system to strengthen the competitiveness of AC
RESEARCH GOAL
5.5.1 Identifying a coherent policy framework for AC systems
WORKING GROUP
WG 3.6 (6.1)
BACKGROUND
The change in the focus of the CAP towards lower and decoupled incentives and more environmental types of support, globalization in processes and limited resources in future agricultural policy programmes will force farmers to adapt to new market mechanisms. The need for farmers to have a stronger market orientation leads to the definition and design of a number of services which can be of support in dealing with these new contextual conditions.
OBJECTIVE
The objective of the research is to identify and define support services for farmers aimed at improving knowledge and the ability to react efficiently and effectively to future market challenges. An aspect of strategic importance will be the coherent multilevel governance among the public and private players, that provide services and advice to the participants. The first choice to be addressed involve the identification of the subjects of interventions advice. Moving away from a minimal approach, entrusting the task to accompany farmers to an ever greater adherence to the principles of cross compliance, boosting the supporting role in operational decisions and production. The aim is promoting quality and innovation, organizational and logistics aspects.
CONTENT
EU multi-country policy analysis, service needs analysis of AC farmers, analysis of current provisions of market-oriented services for arable crop competitiveness in EU countries, such as access to credit, the rural financial system, information services related to market competitiveness, private and public extension services, vocational training, innovative production systems.
OUTPUT / DELIVERABLES
Definition and design of market-oriented services to farmers and AC competitiveness improvement.
IMPACT
Improvement of farmers competitiveness and market knowledge through institutional support services.
PARTNERSHIP
Research institutions, farmers' associations, local governments, public and private advisory services, banking and non banking institutions.
FUNDING INSTITUTION/S
Public administrations at EU, national, regional and local levels.
OTHER REMARKS
This research can also be connected to innovation, globalisation, risk management, rural sustainability, ageing population, farm structure, vocational training, quality standard schemes and their harmonisation via an internationally recognised standard (Ifs, Brc, etc.). Connected to 2.9, 3.9, 3.11, 5-3.4, 5-3.5, 6.2 and 6.3

RESEARCH TOPIC

6.2 Designing EU policy for improving arable crop competitiveness in consideration of globalization and the main uses of crops: food, feed, energy, biomaterials.

CHALLENGE

5.5 Promote a consistent regulatory and governance system to strengthen the competitiveness of AC

RESEARCH GOAL

5.5.1 Identifying a coherent policy framework for AC systems

WORKING GROUP

WG 3.6 (6.2)

BACKGROUND

Globalisation processes and limited resources are leading to an increasing demand for arable crop production, mainly from Asian countries. The number of sectors and decision makers involved in the governance of policy making and implementation of arable crop policies could create economic, social and territorial inconsistencies. The need for coherent multi-level governance in arable crop resource management requires better policy design.

OBJECTIVE

The objective of the research is to identify a consistent policy framework in increasing AC competitiveness taking into consideration the cross-sectoral nature of AC and the high number of actors involved in policy making and implementation.

CONTENT

Analysis of the territorial, agricultural, industrial dimensions, energy and water consumption, waste management involved in AC production at the EU, national, regional and local level. The above study should be compared with the analysis of multi-level governance and coordination of decision makers at different dimensions. The analysis should be placed within the wider framework of CAP policy design in the future years.

OUTPUT / DELIVERABLES

Definition and design of cross sector policy approaches to AC competitiveness.

IMPACT

Improvement of AC competitiveness through adequate EU CAP policy and a better balance of the different sectoral and multi-level policies.

PARTNERSHIP

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FUNDING INSTITUTION/S

EU, national and regional governments.

OTHER REMARKS

Connection with food security, food safety, globalisation, market trends, consumer demand, value chains, energy, water and waste management, territorial policies, networking, governance.
Connected to 2.9, 3.9, 3.11, 5-3.4, 5-3.5, 6.1 and 6.3