European network for the durable exploitation of crop protection strategies

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Abstract

The overall objective of this Network (acronym ENDURE) is to reshape European research and development on pesticide use in crops and establish Europe as a leader in the development and implementation of sustainable pest management strategies.

We will create a coordinated structure that takes advantage of alternative technologies, builds on advances and complementary expertise in agricultural sciences, ecology, behaviour, genetics, economics and social sciences and connects researchers to other stakeholders in extension, industry, policy-making and civil society. This multi-disciplinary and cross-sector approach is designed to foster the development and implementation of strategies rationalising and reducing pesticide inputs as well as reducing risks.

Our specific goals are to:

- integrate research capacity and resources currently fragmented across Europe. We will share knowledge and people, and pool our facilities, biological resources and equipment through a joint crop protection research programme and the creation of a coordinated and geographically decentralised European resource facility—a 'virtual laboratory'—on pest control.
- enhance the research-to-R&D innovation process by creating working relationships between researchers and practitioners in extension and farming,
- engage with 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, researchers, policy-makers and civil society. Our European Pest Control Competence Centre is designed to become a source of knowledge and expertise to support public policy-makers, regulatory bodies, extension services and other crop protection stakeholders.
- build a sustainable, coherent and transnational institution made up of leading European crop protection research, R&D, extension, and industry organizations.
- We will advance toward these goals via three types of activities:
- Integrating activities will help us identify priority research areas, link up with other relevant research and civil society groups, and plan our legal and financial sustainability.
- Jointly executed research will stimulate and develop a culture of collaboration in areas that are key to achieving progress in reducing reliance on pesticides.
- Dissemination activities will extend our activities and outputs to farmers, extension agents, students, policy-makers, consumers and society-at-large, as well as to elicit feedback and dialogue ensuring that activities and outputs meet the needs of these stakeholders.
- The four-year programme started in January 2007. The initial 18 month period—with funding spread over a large number of participants and activities to foster interaction and sharing—will serve to review and collate research and will lead to a focused research programme shaped by competitive bids in priority areas for collaborative projects submitted by at least three partners from three countries.

Key words: plant disease, plant pests, weed management, integrated pest management

Introduction

Advances in plant protection have contributed considerably to increasing yields and have ensured consistent production in recent times. Chemical crop protection products that have been relatively inexpensive and easy to obtain and apply, have proved extremely efficient and reliable for controlling pests over large cropping areas. However, with the development and use of these products, cropping systems have evolved to maximise production, leading to agronomic practices that increase risks of pests, weeds and diseases and consequently this has lead to a strong dependence on their use. Progressively, concerns about the negative impacts of pesticides on the environment have been expressed. Today, in most European countries, the systematic use of pesticides is questioned, with the awareness of undesirable negative effects on ecosystems, on non-targeted useful or domestic species and human health. New objectives are needed for sustainable development and human health: ensuring food safety throughout the food chain, protecting the health of industrial and agricultural workers, preserving natural resources, ecological integrity and biodiversity. Because of this, some pesticides previously used are now being phased out because of concerns about their environmental impact and safety (e.g. methyl bromide, organophosphates), or development of resistance by target organisms (e.g. benzimidazoles).

Increased consumer awareness on food safety and environmental issues has also accelerated the demand for pesticide reduction in conventional agriculture, with actions focusing on delivering tools such as decision support systems (DSS) and on technologies supporting precision agriculture.

The increasing awareness of pesticide side effects has resulted in a growth of organic farming and other low input systems. Organic farming is a very dynamic sector in EU agriculture, and has grown by 30% per year since 1998 even though the starting point was low and the situation remains diverse across EU countries.

In response to a desire to reduce the use of plant protection products (PPP), the diversity of plant protection systems is increasing in the EU. These systems range from tactical adaptations of currently existing cropping systems rationalizing and reducing pesticide use, based on risk analysis and DSS, to strategic approaches where new cropping and farming systems are conceived, incorporating a number of alternative control methods, aimed at being less dependent on pesticide use.

Supporting these changes requires that new technologies and practices are translated into practice, which in turn demands additional, coherent and re-oriented efforts of the research community and the development institutions. These efforts should be particularly oriented to three key complementary points: (i) pursue and coordinate fundamental research in biology e.g. on pest/plant and pest/ natural enemy interactions and their relevance to crop protection systems, (ii) stimulate approaches to understand the functioning of the agrosystem in order to integrate efficiently innovative technologies, (iii) strengthen partnerships between biotechnical and socio-economic disciplines to better anticipate or break down barriers for the development of innovations in these areas. Supporting these changes also necessitates new governance in plant protection policies and regulation. These necessary changes must be considered as common target goals in both developed and developing countries and should become a major aspect of agricultural research. The ENDURE project (European Network for the Durable Exploitation of crop protection strategies) aims to address these three points and to re-shape crop protection research across Europe.

Workplan

The ENDURE network of excellence involves sixteen partners, across 10 countries (Table 1). The project will be coordinated by INRA with the coordination team based at the Centre de Recherche de Sophia-Antipolis, France.

Table 1. ENDURE partner organisations and country affiliations.

Partner organisation	Country
INRA (ENDURE Coordinator)	France
Association de Coordination Technique Agricole ACTA	France
CIRAD	France
INRA Transfert IT	France
International Biocontrol Manufacturers' Association IBMA	International
Consiglio Nazionale delle Ricerche CNR	Italy
Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna, SSSUP	Italy
Biologische Bundesanstalt fuer Land- und Forstwirtschaft BBA	Germany
Rothamsted Research RRES	UK
Danish Institute of Agricultural Sciences DIAS	Denmark
Danish Agricultural Advisory Service DAAS	Denmark
Agroscope Swiss Federal Research Station AGROS	Switzerland
Plant Breeding and Acclimatization Institute IHAR	Poland
Szent Istvan University SZIE	Hungary
Universitat de Lleida UdL	Spain
Plant Research International B.V. PRI (part of Wageningen U.)	Netherlands

The ENDURE work programme consists of four distinct disciplines: Integrating activities, Joint Research Activities, Spreading Activities and Project Management. These are then sub-divided into sub-workpackages as detailed in Table 2.

Integrating activities

A series of activities will ensure that our network is efficiently integrated and matches societal needs. First, we will map out and anticipate the future of crop protection. We will then take steps to pool our resources, link up with other research networks and sectors of society, and steer our research priorities accordingly. Support will be provided to increase the mobility of staff between countries and institutes to exploit complementary expertise and experimental facilities.

A 'virtual laboratory in crop protection will provide the scientific infrastructure for the reduction and optimisation of pesticide use and will promote the development of new technology or new applications of existing technology. In the initial phase, we will produce an inventory of resources, facilities, protocols, decision support systems, and technological innovations to promote precision agriculture. The virtual laboratory will be accessed via a website that will provide an interface that is visually identical to a modern laboratory setting, with links to virtual "rooms" containing information on knowledge, procedure, collections, equipment and personnel experience.

Research activities

The first activity (RA1 - Optimising and reducing pesticide use based on existing approaches) aims to strengthen existing

practices, tools and evaluation methods that can be adapted and transferred to new national or agro-ecosystem contexts. We have selected five pest management challenges (case studies) for joint research during the initial 18-month period: wheat, potato, integrated weed management, pomefruit and tomato. We will develop four other case studies –maize, oilseed rape, grapevine and banana—to be worked on subsequently. In contrast, RA2 (Designing innovative crop protection strategies) research focuses on the design of innovative crop protection strategies targeted at both the cropping and farming system levels. An overall perspective of the agricultural and food chain – from fork to farm - will be adopted through the assessment of existing strategies that offer scaling-up potential, and pioneering strategies based on cutting-edge research. Similarly, RA3 (Multi-sector evaluation of crop protection methods and cropping systems) will develop a set of criteria for environmental, economic and societal assessments of crop protection strategies, initially focussing on apple and wheat as case studies. RA4 (Improving basic understanding of the biology of crop-pest systems) focuses research effort on areas of basic research where achievable advances could significantly improve our basic understanding of crop-pest systems and promote the development of alternative crop protection strategies.

Table 2. The main activities to be done during ENDURE (European Network for the Durable Exploitation of crop protection strategies).

Activity	Specific sub-activity	Lead partner
I. Integrating Activities	IA1 – Ensure long-term strategy of Endure	INRA[a]
	IA2 – Creation of a networked "virtual" laboratory in crop protection	RRes[b]
	IA3 – Human resource exchange	CNR[c]
	IA4 – Integrated knowledge and communication within the Network	BBA[d]
		DIAS[e]
II. Research Activities	RA1 – Optimising and reducing pesticide use based on existing approaches Case studies1: Wheat, Potato, Weed Management, Pomefruit, Tomato Case studies2 (beginning in 2008): Maize, OSR, Grapevine, Banana	INRA[a]
	RA2 – Designing innovative crop protection strategies	AGROS[f]
	RA3 – Multi-sector evaluation of crop protection methods and cropping systems	RRes[b]
	RA4 – Improving basic understanding of the biology of crop-pest systems	
III. Spreading Activities	SA1 - Joint training and education programmes	
	SA2 - Technology transfer	IT[g]
	SA3 - External Dissemination	CIRAD[h]
	SA4 - Creation of a European Pest Control Competence Centre (EPC)	PRI[i]
IV. Management		INRA[a]

[a] INRA - INRA, France
[b] RRes - Rothamsted Research, UK
[c] CNR - Consiglio Nazionale delle Ricerche, Italy
[d] BBA - Biologische Bundesanstalt fuer Land- und Forstwirtschaft, Germany
[e] DIAS - Danish Institute of Agricultural Sciences, Denmark
[f] AGROS - Agroscope Swiss Federal Research Station, Switzerland
[g] IT - INRA Transfert, France
[h] CIRAD - CIRAD, France
[i] PRI - Plant Research International B.V., Netherlands

Dissemination Activities

As part of our efforts to develop stakeholder awareness of pesticide reduction or optimisation strategies, we have planned a series of collaborative training and education activities tailored to the needs of researchers, pest managers, agricultural advisors and farmers. In addition, ENDURE will provide an interactive platform for European crop protection end-users and facilitate the uptake and use of the knowledge and tools generated within the project. ENDURE will engage in exchange activities with INCO partners for specific challenges, like the potential movement of non-endemic pests. Much of this external dissemination will be via the website to stakeholder groups.

ENDURE will also develop the European Pest Control Competence Centre, offering up-to-date and validated recommendations for crop protection strategies. The EPC will be designed to become a source of impartial advice, open to the needs and views of industry and civil society but independent of specific vested interests. Intended users include farmers, consultants, industrialists, scientists, and policy makers involved in crop protection policy and research, agenda setting at the national and European levels. The ambition of the EPC is to become a central point of reference on crop protection enjoying international recognition.

A website for the ENDURE project is under construction and will be publicised shortly.

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