Cropping the pest problem

ENDURE coordinator **Dr Pierre Ricci** explains in detail how the initiative is tackling the problems of pest control in agriculture, in a Europe that is constantly thinking that little bit greener

What would you consider to be the main aim of ENDURE?

ENDURE has aimed to create a pan-European, multidisciplinary network of researchers and extensionists to tackle the issues facing agriculture, in relation to the restriction of pesticide use due to environmental concerns.

How important to ENDURE is a multidisciplinary approach? More generally, do you believe that collaboration and a trans-disciplinary strategy will shape the future of research?

Some think that the pesticide issue will be solved by biotechnological breakthroughs alone, but we do not believe in this silver bullet concept when truly sustainable solutions are needed. In recent years, scientists have made considerable progress in their basic understanding of crop-pest systems, but have not comprehensively transformed these into practical solutions, mostly because they have kept thinking within the frame of individual disciplines. Developing places like ENDURE, where a wide array of disciplines – such as pest biology, population and community ecology, economy and sociology – can cooperate, is essential to exploit research advances into management strategies.

In what ways is ENDURE helping to sustain a permanent research community? Are your long-term research priorities helping cement its foundation?

Building a research community across countries and disciplines emerges from achieving research together, but also from sharing a vision of the future. ENDURE has designed scenarios for 2030 by exploring how crop protection would differ according to possible orientations of European agriculture, such as simplified systems for growing basic commodities, high-tech processes for specialty products, diversified cropping systems for food security, low-energy input systems or through managing territories to provide ecological services. We have further elaborated on the consequences for research priorities, heading for new chemical and precision technologies, and relying more on ecological and landscape management.

How valuable is the dissemination of your results and sharing knowledge?

Besides scientists, ENDURE shares its results through its website, and a newsletter with a circulation over 1,600. Policy makers, industries and NGOs are among the most interested audiences, and our largest dissemination efforts target the extension and training community. We have also created an information centre that provides advisors with a wide multinational set of referenced methods. More than 100 advisors have already gathered around ENDURE and we expect more to join this network in Paris next November.

To date, what have been ENDURE's main successes and how would you quantify them?

Part of our work has relied on analysing existing data, which has provided an original insight on the levers for promoting IPM. Our community has also established a practical systems approach to the design of innovative strategies, paving the way for future developments. It has been convincing enough to generate a new large research project, PURE, supported by the EU from 2011, which will implement this approach in the main European farming systems.

To what extent is ENDURE informing policy makers and providing scientific support?

During our project, the EU has elaborated a new legislation on pesticides, and ENDURE is committed to providing scientific support in the implementation phase of this legislation, especially the Framework Directive on the sustainable use of pesticides. We have organised several meetings with policy makers: Berlin in 2007, Paris in 2008, and November 2010 will be another meeting point. We serve as a vehicle to share lessons learned from a variety of national policy, research and extension initiatives across Europe. ENDURE also draws attention to how social networks in the farming community and the organisation of the entire food supply chain affect crop protection.

Where do you hope to see ENDURE in 10 years and do you anticipate its role changing?

Building on the success of the last four years supported by EC funding, our member institutions are now pooling their resources to create a permanent European Research Group. In the years ahead, our ambition is to become a major resource for our three target audiences – advisors, policy makers and researchers – mobilised throughout the 27 member states by the new legislative context. We hope to become a central point of scientific and technical reference for advisors and a recognised source of scientific advice to inform policies relevant to IPM. For the research community, beyond the research tools that we are making available, we want to play a leading role in building momentum on IPM-dedicated research at the EU level and create synergies from national efforts.

Image courtesy of Emilie Labussière

New ways of dealing with agricultural pests

ENDURE, a collaborative effort bringing together researchers from across Europe, is seeking to develop innovative, viable and cost-effective farming systems that surmount the environmental problems associated with pesticides

FOR OVER 40 years European agriculture has relied on chemicals to control pests, diseases and weeds. Today however, civil society no longer accepts the detrimental effects of this large input of pesticides on the environment, given its associated problems such as the pollution of waters and other natural resources and its impact on biodiversity; moreover, the threat posed to human health is becoming a real international concern. Consequently, European and national policies are becoming increasingly restrictive on pesticide use, which, while a positive step for the environment, still poses the question: how can European farming systems adapt to these new constraints while maintaining their performance and profitability?

ENDURE, the European Network for the Durable Exploitation of Crop Protection Strategies, is a Network of Excellence funded under the European Commission's Sixth Framework Programme, Food Quality and Security. It brings together more than 300 researchers from 16 different institutions in 10 European countries, including research organisations, universities, agricultural extension services and the biological control industry

From its inception in 2007, ENDURE's overall aim has been to help develop farming systems that are less reliant on pesticides, while maintaining profits and yields. This is an ambition shared by the European Commission, which last year introduced a package of new legislation that will challenge both the availability of pesticides and the way they are used in European agriculture.

A DIVERSE RANGE OF SOLUTIONS

The legislation means that certain active substances in pesticides will be banned where they are considered to be particularly hazardous, and all Member States will be required to "encourage the development of Integrated Pest Management (IPM) and of alternative approaches or techniques to reduce the dependency on pesticide use". Consequently European farmers will face a situation where certain commonly used pesticides may no longer be available. Member States will have to draw up National Action Plans detailing how they encourage the shift away from agriculture that is overly reliant on pesticides.

ENDURE is playing a key role in meeting these challenges through a broad work package that seeks to provide solutions for farmers in both the short and long terms. Additionally, ENDURE is creating a permanent pan-European agricultural research community, which aims to help policy makers meet the challenges of the new legislation, while ensuring the information and results it collects are effectively shared with agricultural advisers and farmers.

Each of the 10 countries involved in ENDURE has its own vision of the pesticide issue, rooted in the specificities of its individual agriculture, history and sociological makeup. This key factor has encouraged ENDURE to keep away from any opinion-driven approaches, as well as from lobbying influence, and from being committed to any specific agricultural system, such as organic farming, or low-input; instead it offers an array of diversified solutions and tools to help stakeholders assess the consequences of their choices.

To provide short-term solutions, ENDURE is exploiting the knowledge and resources currently available in the network through the use of case studies focused on major crops such as wheat, maize, apple and pear, and field vegetables.

A CASE FOR OPTIMISM

Increased pest resistance to pesticides, combined with tougher regulations on the use of pesticides, has reduced the chemical options available to farmers who are being asked to shift to Integrated Pest Management (IPM) by 2014. Therefore, farmers are in urgent need of new solutions. ENDURE has given priority to exploring some of the most critical crop-pest problems as case studies. The added value of ENDURE's

ENDURE

DIVERSIFYING CROP PROTECTION

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INRA, Institut national de la recherche agronomique, France
JKI, Julius Kühn Institute - Federal Research Centre for Cultivated Plants, Germany
RRES, Rothamsted Research, UK
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CNR, Consiglio Nazionale delle Ricerche, Italy
IHAR, Plant Breeding and Acclimatization Institute, Poland
AGROS, Agroscope Swiss Federal Research, Switzerland
PRI, Plant Research International, Netherlands
AU, Aarhus University, Denmark
SSSUP, Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna, Italy
SZIE, Szent István University, Hungary
UdL, Universitat de Lleida, Spain
DAAS, Danish Agricultural Advisory Service, Denmark
ACTA, Association de coordination technique agricole, France
IBMA, International Biocontrol Manufacturers Association
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Image courtesy of Aarhus University

IPM BUILDS ON A WIDE RANGE OF INNOVATIVE APPROACHES AND TECHNOLOGIES

contribution comes from the combination of its multiple expertise, and the exploitation of transnational comparisons, to identify the most promising and nearly ready-to-use alternatives. They have published these in a set of technical leaflets aimed at agricultural advisers – these are available in several languages on the ENDURE website and can be accessed by the agricultural community. In addition to this, ENDURE is also contributing to a new generation of decision support systems.

In the longer term, merely optimising today's farming practices or substituting today's technologies and inputs with new ones will not sufficiently improve agricultural systems made vulnerable by years of reliance on pesticides. Instead there is a need to examine entire farming systems, an approach that is encapsulated in IPM. For ENDURE, IPM is a continuously improving process, drawing on an array of approaches such as biological controls, plant genetics, cultural and mechanical methods, biotechnologies, and information technologies, together with some pesticides that are still needed to address the most problematic pests in critical situations.

The system case studies, focusing on arable and orchard crops, reflect this approach and draw on ENDURE's pool of researchers specialising in these diverse fields, alongside sociologists and economists, with the aim of proposing improved farming systems, the efficacy of which is being tested using modelling and multi-criteria assessment tools.

AN HOLISTIC APPROACH TO AGRICULTURE

While relying on pesticides, attention is focused on solving each pest problem at the field level during the growing season. Keeping in mind that pest populations evolve at larger time and space scales, researchers at ENDURE have been enlarging their investigations to include factors affecting the whole array of pests in the multi-year and landscape dimensions. Instead of limiting their research to dedicated control methods, they consider a wider range of factors, including cultivar choice, cultural techniques, the role of biological agents, and the succession and spatial lay-out of crops. IPM precisely consists of combining these tools into effective strategies at the farming system level. But farmers do not decide alone the strategy they adopt; a holistic approach also accounts for policy makers, scientists, advisors, input providers, and the other actors of the food chain up to the consumers. All of them have a role to play in the changes towards a more sustainable agriculture.

To apply this holistic approach when designing innovative crop protection strategies, you have to consider their significance not just in terms of environmental impact, but also in terms of the economics of the farming community and their impact on society. Classical field experiments can test point changes in cropping systems, but innovative strategies involving multiple factors over large scales cannot be directly tested. They need to be simulated. ENDURE assesses the potential benefits of adopting such strategies, considering not just technical aspects, but also the consequences on the farming economy, on the environment and on the social system. ENDURE has devised original modelling tools to perform this sort of multidimensional assessment.

THE VIRTUAL LABORATORY

After 2010, ENDURE will become a European Research Group with the aim of remaining a reference point in Europe for crop protection. It will continue to offer its scientific community to share databases and research tools gathered in a 'Virtual Laboratory' with free web access.

Among the original tools developed by ENDURE, are information bases on wheat diseases control and pest damage quantification, and models for managing weeds, deploying resistant cultivars or modelling landscapes. These tools will be demonstrated in Paris at an international conference in November 2010.

Also demonstrated at this conference will be the Information Centre that ENDURE maintains as a source of up-to-date IPM solutions for European advisors. And, looking to the future and building on its success to date, ENDURE aims to continue to provide scientific support to policy makers, offering analysis of the drivers and barriers to IPM implementation and responding to specific requests for help through its Network of Experts.