

# A NATIONAL FIELD EXPERIMENT NETWORK TO ANALYSE PESTICIDE-FREE CROPPING SYSTEMS IN ARABLE CROPS

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V. Cellier<sup>1</sup>, M.H. Bernicot<sup>1</sup>, C. Colnenne-David<sup>2</sup>, V. Deytieux<sup>1</sup>, S. Plessix<sup>1</sup>, A.L. Toupet<sup>1</sup>, J.N. Aubertot<sup>3</sup>

<sup>1</sup> INRA, UE 115 Domaine d'Epoisses, F-21110 Bretenière, France,

<sup>2</sup> INRA, UMR 211 Agronomie, BP 1, F-78850 Thiverval-Grignon, France

<sup>3</sup> INRA, UMR 1248 AGroécologie – Innovations – Ruralités, BP 52627, F-31326 Castanet Tolosan, France

[Violaine.Deytieux@dijon.inra.fr](mailto:Violaine.Deytieux@dijon.inra.fr); [Jean-Noel.Aubertot@toulouse.inra.fr](mailto:Jean-Noel.Aubertot@toulouse.inra.fr)

In 2011, the INRA/CIRAD Integrated Pest Management Network set up a national pesticide-free trial network in France, called Rés0Pest. Its purpose is to produce new references and knowledge for the design of innovative cropping systems less reliant on pesticides. Its two main objectives are:

- Designing and testing cropping systems under the constraint of using no pesticide and assessing their agronomic, environmental and socio-economic performances;
- Analysing the effects of pesticide-free cropping systems on pest populations and natural biological regulations.

Tested cropping systems were designed using Integrated Pest Management principles by combining different techniques to enhance biological regulations in order to limit damages caused by pests. Each tested cropping system is adapted to the local production situation and is designed according to the same set of:

- Constraints → no pesticide use (except for biopesticides), cultivation of the regional major crops;
- Objectives → to maximise, under these constraints, crop production satisfying market specifications, while reducing other environmental impacts and maintaining economic profitability for farmers.

The network includes seven long-term experiments implemented since 2012 in INRA experimental units and one agricultural high school, in a wide range of production situations in France. The plot areas are at least 0.5 ha, in order to be representative of commercial fields. In addition, 50% of crops of the rotation are tested every year in the experiment. A set of protocols was written in order to standardise data collection and to allow (i) future agronomic diagnoses and performance analyses, (ii) cross-cutting analyses within the network. In these tested cropping systems, biological diversity is enhanced by diversifying crop sequence or by associating several species or cultivars in the same field. Many other techniques with partial effects on pest regulation are combined in the tested cropping systems.

The pesticide free cropping systems tested in the Rés0Pest network are prospective, ambitious in terms of pesticide reduction and are implemented in a large range of production situations. Thus, Rés0Pest represents a unique experimental tool in France for research programs related to agroecology. The system approach used in long-term field experiments is also original and permits to analyse long-term effects of cropping systems on the environment. Currently, some specific protocols are being written to characterise pest injury levels and biological regulations. New collaborations have to be initiated and developed in order to fully take advantage of the network.

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