



**Pesticide
Action
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Europe

Crop rotation **the forgotten practice in European Agriculture**

Whoever skilled agronomist you speak to will tell you that crop rotation¹ is one of the most important agricultural practices, existing for thousands of years, and often used in organic farming but with less and less use in conventional agriculture². Though when trying to find out which scientific literature there exists about this topic, to prove its benefit, you realise that studies are scattered and have never been gathered in a same paper

Why? Few researchers are engaging in research projects, financed beyond three to five years terms, though it takes much longer to evaluate beneficial impacts of crop rotations; rotation may need to be 6 years or longer to achieve the desired crop protection effects, and to quantify such effects it would be necessary to monitor at least 2 successive rotations.

Generally, rotations are not a subject of interest as a business opportunity, as only few had a commercial interest. As a result this is a topic which should receive high priority for public research.

Long term experiments studying the effects of crop rotation already exist.

Long-term field experiments are an indispensable aid to our knowledge of predominantly practical solutions for sustainable land use. A large proportion of current agronomic problems can be clarified exclusively using long-term experiments³.

Some of the most famous field experiments on crop rotations include very old research such as the Morrow plots established in 1876 by Morrow and Miles aiming at investigating whether productivity could be sustained and how various cropping-systems would affect yield and soil properties⁴ as well as more recent one a 40 years field experiment in Martonvasar in Hungary where comparing various crop sequences and fertilisation treatment proved, among others, that the yield of maize and wheat in a monoculture was always lower than in crop

¹ Crop rotation is the practice of growing a series of dissimilar/different types of crops in the same area in sequential seasons.

² See for instance:

DG ENV report on crop rotation

(http://ec.europa.eu/environment/agriculture/pdf/BIO_crop_rotations%20final%20report_rev%20executive%20summary.pdf) and Brisson et al 'Why are wheat yields stagnating in Europe? A comprehensive' Field Crops Research Volume 119, Issue 1, 9 October 2010, Pages 201–212

³ M. Körschens, 'The importance of long-term field experiments for soil science and environmental research – a review', 2005

⁴ <http://cropsci.illinois.edu/research/morrow>

rotation⁵; among many others (see [our briefing](#) for more information)

There thus already seems to be a high number of studies showing the many positive benefits of crop rotation⁶, though, studies are scattered and have never been gathered. Linked to this, it is important to mention an article recently published by Pulleman *et al.*⁷ which provides an overview of current knowledge on the characterization and assessment of soil biodiversity. In [its briefing](#) on Crop Rotation, PAN Europe gathered the opinion of many scientists to highlight new research needs concerning crop rotations.

The way forward for research on crop rotation in the EU.

PAN Europe encourages following work on crop rotation for the coming budget period:

- Keep on reserving EU funding to research into studies on crop rotation, both in short and longer term perspectives, for while some changes in practices show fast effects (eg. Stop ploughing on earthworms), others need more time to be visible/measurable (eg. Pesticide-stop because of the persistence in the soil and the lack of pesticides-eradicated natural predators),
- Launch a literature review on conclusions from already undertaken long term experiments,
- Launch a meta-study on the effects of crop rotation on pest organisms incl. weeds, nematodes, insects and diseases, and
- Reserve funding to study new models on how to organize crop rotation in a more economical way among groups of farmers to ensure practical uptake.

Furthermore PAN Europe calls for the need to increase general knowledge of crop rotation by:

- Collecting data on crop rotation and as part of that on the economics, and
- Spreading knowledge on crop rotation, by making sure the raw data from public bodies, like the Swedish ICSN, and publicly funded research on demonstration farms, like Valle Vacchia⁸, are made available to the public while also
- Investigating the need to develop EU-wide bio-indicators.

⁵ Zoltan Berzsenyi, Bela Gyorffy, Dang Quoc Lap, Effect of crop rotation and fertilisation on maize and wheat yields and yield stability in a long-term experiment, European Journal of Agronomy 13 (2000) 225–244).

⁶ for instance: Finkh, M., van Bruggen, A.H.C. and Tamm, L. (Eds.). APS Press.) Crop rotation. In: Plant Disease management in organic agriculture. (Chapter 4.2).

⁷ Pulleman M, et al: Soil biodiversity, biological indicators and soil ecosystem services - a review of European approaches. Curre Opin Environm Sustain (2012)

<http://dx.doi.org/10.1016/j.cosust.2012.10.009>

⁸ <http://www.venetoagricoltura.org/basic.php?ID=4050>