

ARE PESTICIDES NEEDED TO FEED THE WORLD?



Main messages



Technically, pesticides are not needed at all to produce food; organic production is a realistic alternative



Farmers producing organic food or food with far less pesticides earn a comparable income compared to the majority of conventional farmers



If the real costs for society would be calculated, industrial farming is not economical



EU policy fails to implement sustainable agriculture while pesticide use is increasing and ecosystems are collapsing



Current EU agro-policy is contributing to the destruction of local markets worldwide and pushes smallholders in the direction of industrial farming



Organic and/or other sustainable ways of farming can feed the world

Background on the question if pesticides are needed.



Technical point of view

PESTICIDES ARE NOT NEEDED

(Synthetic) pesticides are not needed at all to produce food given the wide existence of organic production of almost every single crop. Organic production is full proof of synthetics being technically unnecessary¹.

1. John P. Reganold and Jonathan M. Wachter, Organic agriculture in the twenty-first century, *NATURE PLANTS*, VOL 2, page 1, FEBRUARY 2016

LESS PESTICIDES IS ALSO EASILY POSSIBLE

Several farmers groups use far less pesticides than their competitors. They generally apply “integrated pest management”, a system with crop rotation, resistant varieties, biological control, buffer strips, etc. These systems exist for decades with use-reductions up to 90%² while the products are generally sold on the regular market.

2. W. J. Lewis, J. C. van Lenteren, Sharad C. Phatak, and J. H. Tumlinson, A total system approach to sustainable pest management, *Proc. Natl. Acad. Sci. USA*, Vol. 94, pp. 12243–12248, November 1997

HALF OF CONVENTIONAL FARMERS COMPETITIVE WITH LESS PESTICIDES

French researchers showed among traditional (conventional) farmers that there is no relation between pesticide use and productivity and profitability for most of the farms. They calculated that pesticide use can be reduced by 42% in 59% of the (946) farms studied³.

3. [Lechenet M, Dessaint F, Py G, Makowski D, Munier-Jolain N](#), Reducing pesticide use while preserving crop productivity and profitability on arable farms, *Nat Plants*. 2017 Mar 1;3:17008. doi: 10.1038/nplants.2017.8



SOME COUNTRIES MAINTAIN OUTDATED PRACTICES THAT REQUIRE PESTICIDES

Some countries authorise pesticides, some others don't. This can be illustrated by the soil fumigant Metam-sodium, a gas killing nematodes. Metam-sodium is authorised in 15 EU member states, in 13 it isn't⁴. The reason for this is that the 15 member states continue to allow their farmers to use monocultures, even while the application of monocultures violates EU Directive 128/2009. Without monocultures Metam-sodium would not be needed anymore.

4. <http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=activesubstance.detail&language=EN&selectedID=1557>



Economic point of view

ORGANIC MORE PROFITABLE

Organic production generally has a lower yield, on average 20%⁵ and ranging from 5%⁶ (rain fed legumes) to 13% (best organic practices) to 34% in some cases. The lower yield is generally compensated by a premium in the market. Economically, organic is more profitable than standard (industrial) farms. An analysis of 55 crops in 5 continents showed that organic is 22 -35% more profitable⁷.

5. Ponisio LC, M'Gonigle LK, Mace KC, Palomino J, de Valpine P, Kremen C., 2015 Diversification practices reduce organic to conventional yield gap. Proc. R. Soc. B 282: 20141396.

6. Verena Seufert, Navin Ramankutty & Jonathan A. Foley, Comparing the yields of organic and conventional agriculture, 10 MAY 2012 | VOL 485 | NATURE | 229.

7. David W. Crowder and John P. Reganold, Financial competitiveness of organic agriculture on a global scale, PNAS | June 16, 2015 | vol. 112 | no. 24 | 7611-7616.

INTEGRATED PEST MANAGEMENT NO LESS ON ECONOMICS

Integrated pest management systems or low-pesticide production systems have a yield that is similar to industrial-type production systems. There are various farmer groups that apply IPM or elements of IPM for many years and they are competitive in the market⁸.

8. Agra Ceas, INTEGRATED CROP MANAGEMENT SYSTEMS in the EU, report for the EU Commission, 2002

CURRENT CALCULATIONS 'PSEUDO' ECONOMICS

For a real economic analysis of agricultural systems all costs need to be taken into account, including the external costs put on society by polluters. Already the human health costs of



9. L. Trasande, R. T. Zoeller, U. Hass, A. Kortenkamp, P. Grandjean, J. P. Myers, J. DiGangi, P. M. Hunt, R. Rudel, S. Sathyanarayana, M. Bellanger, R. Hauser, J. Legler, N. E. Skakkebaek and J. J. Heindel, Burden of disease and costs of exposure to endocrine disrupting chemicals
10. Denis Bourguet and Thomas Guillemaud, The Hidden and External Costs of Pesticide Use, Springer, Sustainable Agriculture Reviews 19, 2016 in the European Union: an updated analysis, Andrology, 1-8, 2015.

the group of endocrine disrupting chemicals (among others capable of causing chronic disease and child neurodevelopment disorders) in Europe is estimated to be yearly at 163 billion Euro's⁹. This still excludes other health costs as well as the costs for the environment (destruction of biodiversity), costs to be paid by society as a whole.

Bourget et al.¹⁰ argue that from 1990 on the real costs of the use of pesticides outweighs the benefits. There is little doubt therefore that a fair economic picture would demonstrate that industrial farming is less economically viable than IPM and organic.



Political point of view

SUSTAINABLE AGRICULTURAL POLICY CAME TO A FULL STOP

National and European policy can do a lot to change practices in agriculture. The 'Green Revolution' in the 60-ties of last age was very successful and radically modernised agricultural practices and yields with a combination of guidance (national extension services), regulation (on inputs) and subsidy's (EU Common Agricultural Practices, CAP). Government therefore is very well capable of changing agricultural practices¹¹.

However in the 90-ties, when the neoliberal wind started blowing, governments stopped their policy and left everything to the 'market' and 'self regulation'. The just started transition to sustainable agriculture came to a full stop. As a result, in the 21ste century the use of pesticides increased¹², the number of pesticides doubled¹³, more mixtures of pesticides were applied¹⁴ which resulted in destruction of biodiversity, low quality products (polluted with pesticides, less taste, low on useful micronutrients), but at the same time very cheap products in the supermarkets. Consumers in rich countries use around 10% - 15% of their income for food¹⁵, back from 40-50% 60 years ago.

11. Prabhu L. Pingali, Green Revolution: Impacts, limits, and the path ahead, 12302-12308 | PNAS | July 31, 2012 | vol. 109 | no. 31


12. http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_consumption_of_pesticides

13. COMMISSION REGULATION (EU) 2017/269 of 16 February 2017 amending Regulation (EC) No 1185/2009 of the European Parliament and of the Council concerning statistics on pesticides, as regards the list of active substances

14. www.pan-europe.info/press-releases/2017/04/how-many-pesticides-did-you-eat-today-plenty-according-european-food-safety

15. www.economist.com/blogs/graphicdetail/2013/03/daily-chart-5





16. Gretchen Vogel, WHERE HAVE ALL THE INSECTS GONE?, Science, 12 MAY 2017 • VOL 356 ISSUE 6338

17. Flavia Geiger, Jan Bengtsson, Frank Berendse, Wolfgang W. Weisser, Mark Emmerson, Manuel B. Morales, Piotr Ceryngier, Jaan Liira, Teja Tscharntke, Camilla Winqvist, Sönke Eggers, Riccardo Bommarco, Tomas Pärt, Vincent Bretagnolle, Manuel Plantegenest, Lars W. Clement, Christopher Dennis, Catherine Palmer, Juan J. Oñate, Irene Guerrero, Violetta Hawro, Tsipe Aavik, Carsten Thies, Andreas Flohre, Sebastian Hänke, Christina Fischer, Paul W. Goedhart, Pablo Inchausti, Persistent negative effects of pesticides on biodiversity and biological control potential on European farmland, Basic and Applied Ecology 11 (2010) 97–105

18. www.commondreams.org/views/2015/03/15/failure-modern-industrial-agriculture

19. Directive 128/2009

WRACKING HAVOC

While politicians looked the other way, farmers cut trees and hedges, filled ditches, destroyed natural herbs and life in agricultural areas, and turned it -in their eternal fight for cost reduction- into an ecological desert. Birds are not disappearing so much because they are killed by pesticides but because there is no food (no insects¹⁶) and no shelter.

Scientists analysed the use of pesticides in 8 EU countries and monitored the destruction of plants and animals. Of the 13 components of intensification of agriculture they measured, use of insecticides and fungicides had consistent negative effects on biodiversity¹⁷. But industry nevertheless tries to cover the problems with pollution, food safety, animal welfare and marginalising smallholders under a ongoing multimillion Euro propaganda campaign to restore trust in today's agriculture¹⁸.

NEW 'GREEN REVOLUTION' NEEDED

If governments wouldn't have dropped their policy and embraced a 'laissez-faire' policy, biodiversity could have been maintained for a big part and the massive costs for human health reduced while high-quality food was produced. But governments didn't, and still doesn't. The new Directive on the sustainable use of pesticides¹⁹ was adopted in 2009 by EU countries but soon 'forgotten'.

Pesticide Action Network feels a new "Green revolution" is needed, this time focussed on sustainability. Rules on input (pesticides, fertilizers) should be made stricter, the CAP-money used for organic and IPM-farmers, and national extension services restored. Now only representatives of chemical industry are talking to farmers, advocating their pesticides and deliver easy to apply "spraying calendars".

Global point of view

THE CLAIM THAT PESTICIDES ARE NEEDED TO FEED THE WORLD IS A MYTH, UN SAYS

Pesticide industry is campaigning for years now with the slogan “we can only feed the world by increasing yields (with more of their pesticides and genetically manipulated crops)”. This is a myth as the recent UN-report on the right to food clearly stated²⁰. But the myth is repeated Goebbels-style in consecutive industry-organised meetings so much that the Brussels-based community tends to believe it.

Industry propaganda implies that Europe can help feeding the world. While this was never the intention of Europe, it is also an illusion with only 3,7% of the arable land in the world²¹ and massive imports of soybeans. Industrial production, additionally, is mainly exported to other (rich) countries²² and will not feed the poor in the world.

CURRENT FOOD PRODUCTION IS THE PROBLEM, NOT THE SOLUTION

At the moment there is enough food to feed the world. Shortages are caused by extreme climates and/or war and simply because poor people cannot afford to buy it. This keeps around one billion human beings hungry²³. Many problems are even caused by the agricultural system of low prices itself. Farmers in poor countries are pushed from their own markets because of food dumped by industrial-type agriculture in Europe. Well known examples are dumping European glasshouse tomatoes in Western Africa and dumping unpopular chicken wings in Central Africa²⁴.

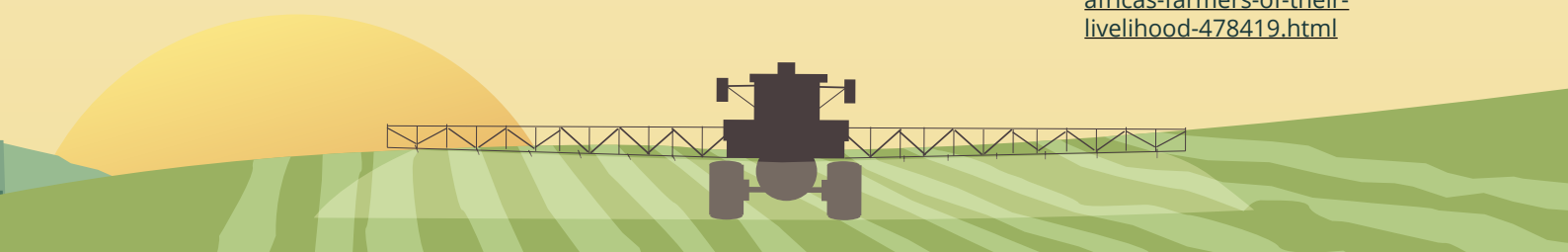
20. United Nations General Assembly, Report of the Special Rapporteur on the right to food, A/HRC/34/48, 2017, [new report](#)

21. www.nationmaster.com/country-info/stats/Agriculture/Agricultural-land/Sq.-km

22. www.ewg.org/research/feeding-the-world

23. IPES FOOD 2016, [From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agroecological systems](#)

24. www.independent.co.uk/news/world/politics/eu-subsidies-deny-africas-farmers-of-their-livelihood-478419.html



25. IPES FOOD 2016, From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agroecological systems

26. BROOKE BOREL, WHEN THE PESTICIDES RUN OUT, 302 | NATURE | VOL 543 | 16 MARCH 2017

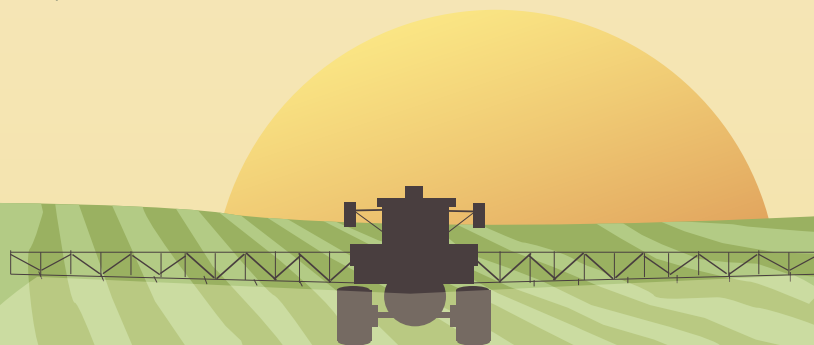
27. Pretty, J. Agricultural sustainability: concepts, principles and evidence. Philosophical Transactions of the Royal Society B 363, 447–465 (2008).

The current agri-system is generating negative outcomes on multiple fronts: widespread degradation of land, water and ecosystems; high greenhouse gas emissions; biodiversity losses; persistent hunger and micro-nutrient deficiencies alongside the rapid rise of obesity and diet-related diseases; and livelihood stresses for farmers around the world²⁵.

Industrial agriculture is a dead-end street anyway because of the ever-rising resistances to pests that will ultimately make pesticides useless; now around 250 weeds are resistant against pesticides as well as 600 species of arthropods²⁶.

SUSTAINABLE AGRICULTURE CAN FEED THE WORLD

Sustainable agriculture is not only technical and economic viable, it is also capable of increasing yield. A study analysing 286 interventions of resource-conserving technologies in 57 developing countries covering a total area of 37 million hectares demonstrated that such technologies increase the average yield by 79%²⁷. These techniques are much more accessible for poor farmers and will help restoring food sovereignty and



food security^{28,29}. Empowering smallholders in developing countries is needed for food sovereignty and combating hunger, and is the solution for a growing world population³⁰. The UNEP/WHO/World Bank-report on the future of agriculture³¹ stresses the importance of smallholders. Industrial farming only accounts for 30% of the food production, 20% comes from fishing and hunting, and 50% from mainly smallholders. For a growing population the potential for increasing productivity is at smallholder level. If the productivity would be increased by 100% by feasible sustainable practices^{32, 33} this would deliver much more (50% more food for the world) than a increase of industrial farming that is estimated to be maximal at 10% (3% more food for the world)³⁴.

The growing livestock production is the biggest threat for our planet and needs to be controlled; alone livestock could take the entire 'safe operation space' of our planet in 2050³⁵.

28. Olivier De Schutter and Gaëtan Vanloqueren, The New Green Revolution: How Twenty-First-Century Science Can Feed the World, www.thesolutionsjournal.org | July-August 2011 | Solutions | 33.
29. H. Charles J. Godfray, John R. Beddington, Ian R. Crute, Lawrence Haddad, David Lawrence, James F. Muir, Jules Pretty, Sherman Robinson, Sandy M. Thomas, Camilla Toulmin, Food Security: The Challenge of Feeding 9 Billion People, 12 FEBRUARY 2010 VOL 327 SCIENCE
30. Lucia Wegner and Gine Zwart, Who Will Feed the World?, Oxfam, 2011.
31. Beverly D. McIntyre, Hans R. Herren, Judi Wakhungu and Robert T. Watson, IAASTD, International Assessment of Agricultural Knowledge, Science and Technology for Development, UNEP, WHO, World bank, 2009.
32. David Tilman, Michael Clark, David R. Williams, kaitlin Kimmel, Stephen Polasky and Craig Packer, Future threats to biodiversity and pathways to their prevention, *nature*, 546, 73-81, 2017
33. Mueller N.D. et al. Closing yield gaps through nutrient and water management, *Nature* 490, 254-257, 2012.
34. Beverly D. McIntyre, Hans R. Herren, Judi Wakhungu and Robert T. Watson, IAASTD, International Assessment of Agricultural Knowledge, Science and Technology for Development, UNEP, WHO, World bank, 2009.
35. Nathan Pelletier 1 and Peter Tyedmers, Forecasting potential global environmental costs of livestock production 2000-2050, *PNAS* | October 26, 2010 | vol. 107 | no. 43 | 18371-18374

