Media and organic created myth: UN endorses small-scale organic farming over biotech

Until a few years ago, I assumed that organic farming must be better for the environment. Since then I've come to realize that I should rely on scientific evidence, not merely assumptions. On several occasions I've asked people (e.g. scientists, organic farmers and supporters) to point me in the direction of evidence on the environmental impacts and sustainability of organic farming. So far that quest hasn't been very fruitful–I haven't learned of many scientific papers that would really support that view, while most studies challenge it.

I am often referred to different kinds of documents instead–not studies but what amounts to opinion pieces in the guise of summaries. The United Nations Conference on Trade and Development (UNCTAD) 2013 review, "Wake Up Before It is Too Late: Make Agriculture Truly Sustainable For Food Security In A Changing Climate," is one of them.

Does the UNCTAD report constitute good evidence for the benefits of organic agriculture?

This review, as well as similar earlier UNCTAD reports, have been presented–in the media, and by organic supporter organizations (like the Swedish Society for Nature Conservation)–as the word of United Nations.

Hundreds of headlines made this claim when it came out. For example: "UN Report Says Small-Scale Organic Farming Only Way to Feed the World" on a site called Technologywater, which reports on aquaponics, self-reliance, and water security; the piece was re-posted on the Huffington Post). The activist site truth-out.org ran a similar summary headline: "United Nations Calls for an End to Industrialized Farming."

Despite the headlined claims, this review does not actually represent the views of the UN or the UNCTAD. These myriad reports are presentations made by collections of individual authors. This particular 2013 report is written by a group of organic advocates; these are not the words of institutions, or UN, or scientific organizations, or even agricultural organizations.

Note

The views expressed in the articles contained in this Review are the personal views of the authors and do not necessarily reflect the positions of their respective organizations or institutions. Therefore, the views expressed in this Review should be attributed to the authors and not to any institution or to UNCTAD or its member States.

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Disclaimer in the UNCTD report

In the first pages of this review (of all UNCTAD reports), the note to the left can be found (my emphasis). "**The views expressed in the articles contained in this Review are the personal views of the authors**

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Many of the individuals behind it are working for organic companies or activist organizations that promote organic agriculture and are highly critical of conventional farming–SEKEM (trading company driving biodynamic farming and other activities according to the controversial philosophy of Rudolf Steiner, called Antroposophy); Heinrich Böll Foundation (think tank for the German Green party); Regionalwert AG (German organic local food company); and Grolink (Swedish consulting company, motto: "Serving the organic world"); ISIS, (Institute of Science In Society, which promotes homeopathy, water memory, and Chinese medicine and disseminates anti-vaccine articles); and Pesticide Action Network (which historically sharply criticizes conventional agriculture), to name a few.

Among the scientists featured among the report authors is New Zealander Jack Heinemann, who has a track record for questionable claims about GMOs and farming which have been reviewed and rejected by the New Zealand and Australia's food regulatory agency FSANZ. (More about Heinemann's far-out claims in Science-Based Medicine and Biofortified.)

The authors are mostly affiliated with organic supporting and biotech criticizing advocacy groups. Still, the personal views presented in this report could reflect scientific evidence, and a judgment should be made based on scientific evidence; if their views are scientifically valid, they should be embraced. Giving this (or any other UNCTAD) report as a reference for a point about organic or conventional farming, however, seems more an obfuscation than a clarifying tactic. The report requires the reader to sift through some 300 pages of different individual views on various topics (from trade, forestry, regulation, food waste, to agriculture, with many subtopics on special cases) instead of focusing on key evidence.

Why turn to UNCTAD to begin with?

If one is seeking an organizational statement as useful guide to understanding an agricultural method, it's reasonable to ask whether the Conference on Trade and Development would even be the right UN agency to turn to. There are three other UN agencies which more directly deal with questions relevant to agriculture and regularly produce scholarly reports: UN Food and Agriculture Organization (FAO), World Food Program (WFP), and World Health Organization (WHO). Many popular media articles about this UNCTAD report leave the UN department unnamed, claiming simply that the United Nations has announced small scale organic farming to be the solution to feeding the world, although neither UNCTAD nor any of the more agriculture-relevant UN agencies have made such claims.

What does this review actually report?

As an example, there is a section in the UNCTAD report about the supposed benefits of biodynamics — that is, benefits of treating the soil as a holistic spiritual organism (see the report for the section about SEKEM). If you are not familiar with biodynamic practices, let me give a brief description. I've touched on it before, buried organs and the like. As Wikipedia puts it:

> One of the first sustainable agriculture movements,[2][3][4] it treats soil fertility, plant growth, and livestock care as ecologically interrelated tasks,[5][6][7] emphasizing spiritual and mystical

> perspectives. Proponents of biodynamic agriculture, including Steiner, have characterized it as "spiritual science" as part of the larger anthroposophy movement.[1][2][8]

Key methods of biodynamic farming include eight essential preparations (see table).

> Components of biodynamic preparations

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> Key biodynamic preparations. See the paper for a review of biodynamic methods

A literature review of biodynamic farming reports on remarkably ritualistic ways of using the preparations, far removed from basis in evidence:

> Essentially, the only difference between organic and modern biodynamic farming lies in the application of Steiner's preparations (Carpenter-Boggs et al, 2000a; Giannattasio et al., 2013), which must be "applied in minute doses, much like homeopathic remedies are for humans"

And the review mentioned more methods adopted by biodynamic farming, which are even further removed from this world:

> Other alternative practices not discussed in this review have become part of the biodynamic movement, including use of cosmic rhythms to schedule various farm activities and image formation to visualize nutritional quality of plants.

You can read more about the cosmic rhythms planting calendar at the Biodynamic Association. Let's just say that the individuals writing this particular UN conference report do not necessarily require sound scientific (or even non-spiritual) grounds for the methods they advocate for. Luckily most of the report is not about biodynamic farming.

UNCTAD report and subsistence farming

Most of these cases presented in the UNCTD review look at subsistence farmers in the developing world. This is a very special scenario, where people have extremely limited resources, and are living from hand

to mouth — nothing comparable to the more expensive premium priced food situation that organic label stands for in the western world. In chapter IX the author makes an interesting combination of arguments. Firstly, that organic farming is better in the developed world because the farmers can ask for a higher premium for their product. Secondly, in the developing world organic is also better because it could bring in higher prices.

One may fairly ask if more expensive food really is the key for the developing nations food situation? In fact, one of the contributing authors makes just this contradictory point in his conclusions on page 209, that it would be important to lower the price of food for which the poor use most of their meager incomes on.

Bakweri_cocoyam_farmer_from_Cameroon

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Farming in Sub-Saharan Africa. Image from Wikipedia: Subsistence farming, CC BY-SA 3.0

The author of chapter IX lastly states that organic is better in the developing world because it results in better yield. Why would organic give better yield in the developing world, when its yields are consistently lower in the west?

Looking at some of the trials in this review where the authors claim a yield increase (with their respective methods) as high as 180%, it is important to note that it may not be that hard for organic production trial to yield the same or to outperform conventional subsistence farming, when that subsistence farming has limited access to improved seeds, fertilizer and other inputs; small improvements or access to better materials could make a world of a difference.

However, if you compare the yield differences presented in these trials to the body of scientific literature, the results are night and day. Reviews of conventional and organic farming find that organic yields are consistently a third smaller than conventional (depending on the review, 20-50% smaller – see more in Delving deeper into the roots of organic or a review in Nature or an analysis by the US Department of Agriculture).

An important thing to keep in mind: the lower the level of production to start with, the easier it is to show a percentage gain, even from a small actual gain. Because parts of the developing world face very poor farming conditions, it is not perhaps so surprising that there is an large variance in yield. Well implemented organic farming would undoubtedly jump yields, but higher tech conventional methods would increase yield substantially more.

This review primarily makes the case that subsistence agriculture in developing nations doesn't work well and is in need of improvement, which we have known for years. It doesn't look at developed nations or advanced conventional agricultural practices–yet the "study" is consistently misrepresented as an endorsement of the universal benefits of organic agriculture, particularly in the developed world.

How does the UN view the role of biotechnology?

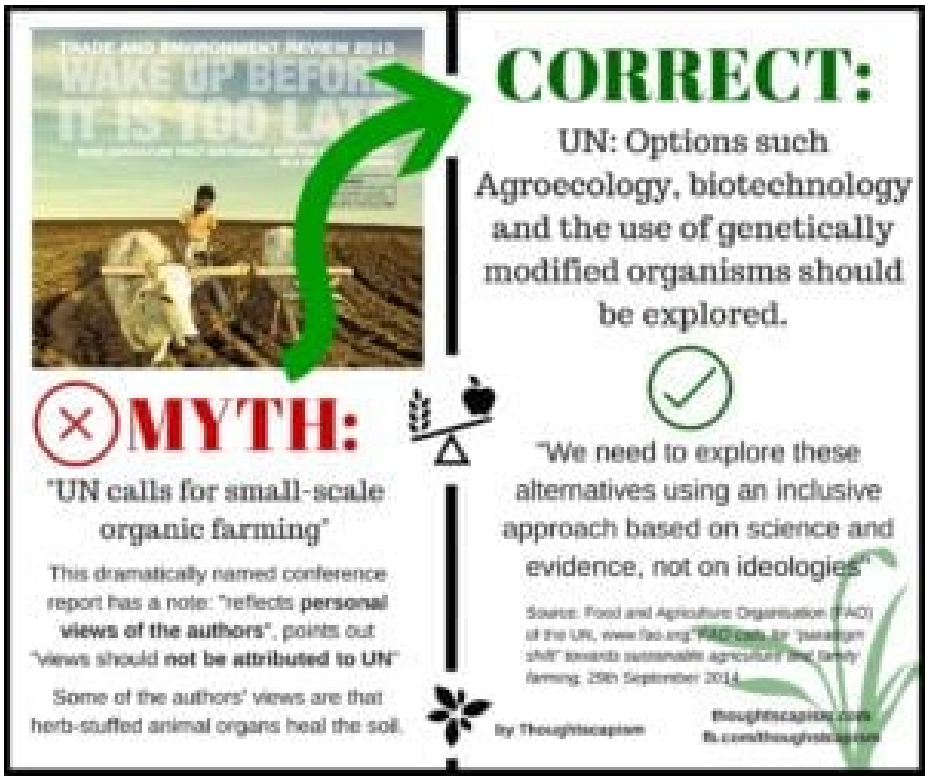
This review also makes very little mention of biotechnology, and when it does (in one of the chapters by Jack Heinemann, the scientist known for his extremist anti-GMO claims), they are introduced to the reader in the form of a blanket rejection (page 203). The argument is: we still have problems, ergo, biotechnology has not worked. It should not be used.

Why? That's not what UN agencies that specialize in food and agriculture have consistently concluded. The Food and Agriculture Organization (FAO) of the UN does not recommend excluding GMOs and endorsing only organic methods; far from it. FAO calls for the inclusion of biotechnology, because it complements a "paradigm shift" towards more sustainable farming. From a speech by FAO Director-General José Graziano da Silva:

> Options such as Agro-ecology and climate-smart agriculture should be explored, and so should biotechnology and the use of genetically modified organisms, FAO's director-general said, noting that food production needs to grow by 60 percent by 2050 to meet the expected demand from an anticipated population of 9 billion people. "We need to explore these alternatives using an inclusive approach based on science and evidences, not on ideologies," as well as to "respect local characteristics and context," he said.

This is all we should ask: explore farming methods based on the science. We must look at the evidence instead of relying on any ideology –including the ideology that "natural" farming methods, whatever that means, must be best. The official FAO statement on Biotechnology includes this statement:

> FAO continues to assist its member countries, particularly developing countries, to reap the benefits derived from the application of biotechnologies in agriculture, forestry and fisheries.



What about small-scale farming?

The Director-General also pointed out:

> Subsistence agriculture on small plots of land perpetuates the vicious cycle of poverty.

Small-scale is not a solution to the developing countries agricultural problems. Small scale is the status quo, out of necessity. The necessity of constant farm labor is keeping the population from seeking education and other work. It requires that a majority remains as farmers, their efforts barely fulfilling the needs of their families. Their children can't go to school if they have to help out on the fields to survive. This is the cycle of poverty.

For those interested in best agricultural practices from both environmental and humanitarian perspectives, the FAO's work includes projects such as Sustainability Assessment of Food and Agriculture systems (SAFA). SAFA presents the many important aspects which should be taken into consideration when concluding whether a farming style is sustainable or not. Organic farmers, just like all others, should strive to show concrete evidence of benefits or shortcomings concerning factors like human safety and health, climate change and energy, land, accountability, product quality and information, and so forth – not rely on the assumption that their naturalness will automatically result in greater sustainability. From the SAFA indicators publication:

Having a mission which includes sustainability principles is not evidence of sustainable practice. Mission statements can be used to project an image of sustainable practice beyond the actual effort of the enterprise.

SAFA sustainability circle 1

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FAO tool for Sustainability Assessment of Food and Agriculture systems (SAFA). The lined purple area gives a simultaneous overview of all respective indicators, giving an idea of overall sustainability. The further out to the green (red-organge-yellow-green), the better the impacts in each aspects.

Biotechnology helping the poor

When it comes to improving the lot of the poor, consider a decade of European Union research on biotechnology, which also focuses on developing nations. The European Academies Science Advisory Council's (ESAC, representing all EU member state science councils), in their report "Planting the Future: Opportunities and challenges for using crop genetic improvement technologies for sustainable agriculture", highlights how the very technology that is most criticized by organic advocates offers significant benefits on many sustainability aspects (my emphasis):

> Taken together, the published evidence indicates that, if used properly, adoption of these crops [GMOs] can be associated with the following:
>
> - reduced environmental impact of herbicides and insecticides;
> - no/reduced tillage production systems with concomitant reduction in soil erosion;
> - economic and health benefit at the farm level, **particularly to smallholder farmers in developing countries**;
> - reduction in greenhouse gas emissions from agricultural practices.

Excluding the mysticism-based farming ideas, and the general antagonism of many modern technologies reflected in organic labels, there may still be important research into the organic methods in subsistence farming conditions referenced in the UNCTAD report. If such studies are included (the reference list is long and much of it is not scientific papers), examining them in context with all the other evidence is the objective way to evaluate farming methods. **I**t's a more helpful than the opinions of authors, many of whom are know ideologues.

In other words, the question we really should be asking is: is this review the most relevant evidence that can be found? What about scientific reviews, analysis or critical statements from independent expert science and agricultural organizations?

Pros and cons of organic

Looking at the body of current evidence, most scientists have found a reduced environmental impact, reduced greenhouse gas emissions, and better situation for farmers as result of biotechnology. When you combine that with the scientific consensus that GMOs are just as safe, and in some cases nutritionally and environmentally superior to their non-GMO counterparts (see more at Biofortified or Genetic Literacy Project), claims that organic agriculture is inherently superior rely on ideology rather than evidence.

The full version available here at GLP

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The full version available at Genetic Literacy Project

Although my criticisms of organic agricultural proponents reliance on ideological based arguments raises serious concerns, I do not mean to suggest that all organic methods are inferior. The great majority of farmers want to do what's best for their land, crops and consumers. Organic farmers do this by making good use of important methods like crop rotation, Integrated Pest Management (IPM), soil management and cover crops, for instance–methods that are supported by scientific evidence and have documented environmental benefits. This does not necessarily single organic out as better than non-organic, however, as these methods are used by non-organic farmers as well, although not always at the same level of commitment.

The USDA tells us that the majority of cropland in the U.S. is farmed using crop rotations and that integrated pest management has been incorporated on more than 70 percent of U.S. farms since 2000. Cover-cropping on the other hand is not very widespread. According to USDA, for various reasons, only 3 to 7 percent of farms use cover crops. The majority of these farms, by necessity, are non-organic, as organic farms account for less than 1 percent of the farms in the US (roughly 14,000 organic farms, or 3.7 million acres versus about 2 million farms all in all, or total of 914 million acres).

A large meta-analysis of European research finds that organic farming compares favorably when it comes to soil organic content, but its drawbacks are greater land use and higher nitrogen pollution. There are drawbacks and benefits to every method, and only careful evaluation will help us discern them.

Whenever we make a specific claim, it's important to remember that we should not assume, but instead try to look for good sources of evidence that confirm or reject that claim. I am sure we are all on board with this sentiment; it's an important common ground, one that we should never forget.

I would like to thank the many scientists, farmers, and interested lay people at GMO Skepti-Forum and Food and Farm Discussion Lab for their participation and valuable pointers in dissecting topics of contemporary agriculture.

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