Can Organic farming feed the world?

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The blazing banner of a media release (14-Nov-2017) by the Swiss-based "Research Institute of Organic agriculture" caught headlines all over the world as it made the claim that "organic farming can feed the world after all" (see also the scientific paper in "Nature communications"). In "Strategies for feeding the world more sustainably with organic agriculture", agronomists led by Dr. Adrian Mueller claim that "a world conversion to organic farming can contribute to a comprehensive and sustainable food system, if combined with further measures".

Public disenchantment over conventional agriculture.

The ordinary public sees conventional agriculture with a suspicious eye even though quite happy to demand the lowest prices for food and shop at box stores like Wall Mart and Costco. Everyone has heard of how the over use of DDT led to the famous "silent spring" documented by Rachel Carson in the 1970s. DDT killed the bad bugs as well as the good bugs! Richard Nixon, no friend of ecology loved the votes of the green movement and banned DDT in 1975. However, the public doesn't know that after extensive study, the WHO approved the use of DDT for domestic use (e.g., against mosquitoes) while it remains banned for agricultural use. Nevertheless, many countries like India, Russia and China use DDT even in the agricultural sector. Tea imported from India contains surprisingly high amounts of DDT. Even the completely innocuous N, K, P fertilizer is unpopular with the public because of news about excess phosphate run off producing algae blooms which convert lakes to oxygen depleted dead bodies of water.

Glyphosate controversy and Russia.

Even very safe herbicides like glyphosate have come under the gun because of public suspicion that these "chemicals" are the cause of various chronic diseases including cancer. A recent (2014) classification of glyphosate as a class-II carcinogen by the International Agency for Research in Cancer (IARC) has been used by the "green-lobby" to demand the ban of glyphosate. They ignore that according to IARC classifications, motor-vehicle exhaust, red meat and sausages are more dangerous class-I carcinogens! The IARC merely indicates the health hazard level and not the health risk level. An excellent discussion of glyphosate by knowledgeable scientists may be found in the debate on "Roundup" (a commercial form of diluted glyphosate containing some additives like tallowamine), hosted by Steve Paikin on TV-Ontario (https://tvo.org/video/programs/the-agenda-with-steve-paikin/the-last-roundup-debate). Interestingly, while Russia is a major producer of glyphosate, internationally it opposes gyphosate and spreads fake news as a means of crippling European agriculture as a part of its global anti-NATO political strategy (see https://www.youtube.com/watch?v=cItuOUp15Yw).

The existing excellent safety and harvest records of conventional agriculture are ignored by the frightened but poorly informed members of public public who look for a "safe environmental alternative". Hence the increasing interest on organic farming as an environmentally friendly alternative. But is it actually environmentally friendly, and is it practicable to feed the world using organic farming exclusively?

Organic agriculture.

Today only about 1% of the world's food is “organic”. The huge claim by the Swiss research group is based on computer simulations projected to 2050. Although many of us ignore projections of complex systems that go beyond a few years, such studies reveal the assumptions made by scientifically well-informed but naive optimists. They can guide us to launch better, more practicable environmentally friendly approaches which are not inflexibly bound to irrational ideologies.

The ideology of organic agriculture is a close kin of belief systems that reject vaccinations etc., and insist on `natural cures' and prayer for treating disease. The origins of organic farming in the West go back to “biodynamics” claims of Rudolf Steiner (1920s) in Austria. He claimed that agriculture must use “cosmic and telluric forces,” and established the lucrative certification of “bio-dynamic” products. The British Soil Association’s “organic agriculture” (e.g., Sir Albert Howard, 1940) advocates composting and a return to a “yeoman-farmer-based agriculture”. Certain agricultural practices distinguish “organic” from conventional farming:

1. a prohibition on chemical fertilizers and pesticides, plant and animal growth regulators, hormones, antibiotics, preservatives, etc.;
2. a prohibition on genetically modified organisms (GMO) and biotechnology;
3. a prohibition on soil-less culture (hydroponics etc.) while allowing greenhouse growing;
4. in animal production, to allow free-range practices, use organic feed, and limit animal density;
5. require farm conversion periods before any produce can be marketed as “organic”.

Many supporters of organic farming include social taboos and ethical aspects (e.g., humane treatment of animals) to the definition of organic farming.

6. Hence some organic farmers prohibit human excreta and urine in producing organic fertilizers.

The French aristocrat had his Chateau, private vineyard, orangerie, pommier and farm managed by his peasant subjects, together with his private forest for him to hunt “gibier”; this exemplified the highest manifestation of the organic farm in practice. In medieval times, a small handful of aristocrats all over the world lived the “organic life” while the others starved. Nevertheless, a strong driving force behind “organic agriculture” is the opposition to “big agro-business” latent in socialist activism, and a misplaced nostalgia for the small-farming communities of the pre-industrial world, often exemplified by the “weva-kumbura-gama ” (water-source, farm, community) concept.

When “organic” farming methods are coupled with quasi-religious, astrology and folklore-based practices, we obtain “traditional agriculture” where a return to the use of “traditional seeds” is a must. The “Vasha-Visha Naethi Ratak” (toxin-free nation) program with catastrophic consequences to Sri Lanka's agriculture is a result of such an ideology.

The Swiss agronomists' proposals for an organic future.

The Swiss-based agronomists (Mueller et al.) are serious scientists who use computer simulations to assess the environmental impact of a theoretical conversion of world agriculture to 100 percent organic. Their study itself shows that global organic conversion would lead to a 16-33 percent increase in land use, a corresponding 8-15 percent increase in deforestation, corresponding additional water resources and increased emissions (from composting). They propose to solve the increased land and water use, deforestation etc., by two strategies. (i) The world to go heroically 100 per cent vegetarian! (ii) Cutting food waste by 50 per cent.

We can't even get everyone to stop smoking, leave aside getting them to be vegetarians. In a 100 % vegetarian world, in optimistic cases, a 100 % reduction in land-area for animal production is possible. However, how does one provide nitrogen to the organic farmer? Animal manure will be as expensive

as black truffles in such a world!

Currently, the organic farmer uses cattle manure from cattle grazed on land fertilized conventionally. He is piggy-backing on Haber-Bosch Nitrogen fertilizer! In the book "Enriching the Earth", the Canadian writer Vaclav Smil discusses nitrogen's unique status in agriculture, and traditional means of supplying the nutrient; then he shows that only about half the world's population can be supported (with great effort) without synthetic urea.

Vaclav Smil overlooks the organic practice of farming a grain crop one year, and a legume crop the following year to enrich the soil with nitrogen via the legume crop. So the actual organic harvest, taken over several years is less than estimated by Vaclav Smil. So the world population must be reduced even more than by ½ to account for the organic "harvest short fall".

The burden falls on the poor nations.

Given that the Swiss program for a "sustainable organic and healthy world" implies reducing the world population by half or more, the burden of famine will fall on the poor nations of Africa, Asia and Latin America. Reducing food waste by 50% will also weigh mostly on the poor countries where food waste is huge. Due to strong social prejudices and traditional beliefs, seeds are not irradiated. Poor tropical granaries are notorious for their weevils, bugs and fungal decay of farm produce in hot humid climates.

Technology is strong on food preservation while the elitist organic consumer wants it "all natural", "no chemicals" and no pasteurized milk! Individuals object to even an innocuous layer of protective wax on apples because they want it "all fresh". In fact, the untreated "organic" apple looses its aroma and rots much faster than the wax-treated "industrial" apple.

The organic farmer relies on inter-cropping, crop rotation and "natural methods" for the control of pests and weeds. A major threat to global harvests is "wheat rust", a deadly fungal disease of wheat, controlled with fungicides. Without these fungicides, wheat rust epidemics occur and spores spread globally via winds and modern mass transport, quickly creating a global famine. Wheat feeds even rice-eating "developing" countries when the rice crop fails. Sri Lanka, recently wedded to a "toxin-free agriculture" has just recently (very quietly and unknown to God Natha?) tripled its imports of industrial GMO wheat flour to feed its people.

Heavy-metal toxins, organic and mineral fertilizers.

The organic farmer faces not only the "nitrogen crunch", but difficulties in providing phosphate (and potassium) to crops. Organic fertilizers do not overcome heavy-metal contamination linked to mineral fertilizers, but actually add new problems. Even if we start with soils containing a mere 3 parts per billion of cadmium, most plants (e.g., rice) accumulate cadmium from the soil during its growth. The seeds and the leaves (straw) may now contain a 100 parts per billion of toxic cadmium. Using this in compost may be 300% as bad as using the worst TSP from Morocco.

One salutary aspect of organic agriculture is its emphasis on "soil health". The soil is a microcosm of many organisms, most of which are beneficial to crops and to our health in reducing toxicity and in making nutrients (e.g., phosphates) more bio-available. But the organisms also need optimal amounts of N, K, and P for their survival as well. It is this balance between organic and inorganic components that the scientific farmer needs to search for. The flocks of egrets (see photo in Maha Illuppallama by Dr. Chamila Perera, courtesy Dr. Sarath Amarasiri) that collect around the plough to eat worms when

fields are tilled is testimony to the fact that Sri Lanka's fields are significantly free of metal toxins, a fact confirmed by several researchers who chemically analyzed the soil and water (e.g., by Nanayakkara et al. 2014).

However, unlike the organic farmer, the scientific farmer can opt for "soil-free" hydroponic and aerophonic agriculture. One can envisage a future world where we return our agricultural fields back to forests, and use grow towers and DNA-based vats for the production of many types of food. Here GM technology and plant cultivation are joined into one activity.

Progress in conventional agriculture.
The Swiss agronomists forget that "conventional" agriculture is moving ahead in leaps and bounds. The energy-intensive Haber-Bosch process can be run on solar energy, reducing climate damaging emissions. The nitrogen needed for a 100% vegetarian population is feasible when solar urea is used. Farm emissions, the need for pesticides etc., can be reduced with GM technology. For instance, blight resistant GM potatoes and similar corps (used in the USA and Canada) that require no pesticides can be

used globally when prejudices are eradicated. Non-legume crops can be genetically modified to make nitrogen.

We cannot halve the world's population by 2050, or even stabilize it and change life styles to more modest, ecologically sustainable forms. An "organic world" feeding the elite rich with their "all-natural, chemicals free" food is a plan for genocide. A world where every one can be fed, while ensuring a healthy environment can be achieved using our very best scientific knowledge, and not by rejecting its recent advances. We need to take what ever is good from any system, without being enslaved by rigid doctrines divorced from empirical science.