CGFI
P.O. Box 202
Churchville, VA
24421-0202

Phone: 540 337-6354
Fax: 540 337-8593
Email: cgfi@hughes.net

"Organic Abundance" Report: Fatally Flawed

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The recent report from Catherine Badgley et al. at the University of Michigan (*Renewable Agriculture and Food Systems*, July, 2007) claimed that "organic agriculture has the potential to contribute quite substantially to the global food supply" and said "organic methods could produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base."

This claim is simply not credible given the following internal fatal flaws:

1. Claiming yields from non-organic farming methods as organic;

2. Comparing "organic" yields to non-representative "non-organic" yields;

3. Double, triple, even quintuple counting of organic yields from the same few research projects;

4. Omitting non-favorable crop yields while using favorable yields from the same studies;

5. Misreporting yield results.

1. Non-organic Yields Used to Inflate Organic Productivity

In perhaps the most brazen example of research misrepresentation in decades, 105 to 119 studies claimed as "organic" by the University of Michigan group were not organic. Only 11% to 21% of "developing world" yields cited were from studies actually using organic farming methods. Some "organic" examples even used GMO crops; many (if not most) used synthetic fertilizers and pesticides. The researchers did not provide enough detail to determine the exact number of misrepresented studies, but their main source (Pretty and Hine, 2001) stated clearly in their reports that only 14 of 208 studies in their database are "organic." The Michigan group relied on 70 of these for their paper. They also labeled as "organic" 49 yield ratios from the "System of Rice Intensification" which is not organic. Combined, these represent 79% to 89% of the 133 "developing world" yield ratios included in the study.

As an example, Badgley et al. claim organic methods increased Argentine maize yields by 37%. (Source: Roberto Pieretti in "Pretty and Hine, 2001") In fact, this statistic comes from Argentine farmers using herbicides to kill weeds, growing GMO

herbicide-tolerant soy (~98%) and GMO insect resistant maize (~25%), and extensively using synthetic fertilizers and organic-prohibited herbicides and pesticides. To label these yield gains as "organic" is absurd. (Source: Mr. Roberto Peiretti, past president of the Argentinean No-Till Farmers Association: sdrob@idi.com.ar)

Another misrepresentation is China maize yield increase of 38%, reported from the East Gansu project run by the Chinese government. The primary source (Pretty and Hine, 2001) reports that "Grain output and food per capita [in the project area] have increased greatly because of improved crops varieties, runoff harvesting and water-saving irrigation, ***and fertilizers and pesticide use***." [emphasis added]

These facts are made clear in the research reports used in the Badgley et al report, so their ignoring the non-organic reality of these projects is hard to explain. It is especially hard to explain given supervising author Ivette Perfecto's clear statement in a press release issued by the University of Michigan that "My hope is that we can finally put a nail in the coffin of the idea that you can't produce enough food through organic agriculture."

2. False Comparisons with low non-organic yields

The amazingly high yield increases reported in the developing world should have been a red flag that the non-organic yields used in the comparisons were uncommonly low.

For example, Badgley et al. report one study where Peruvian organic potato yields were 340 percent higher than non-organic (yield ratio of 4.40). Yet the "higher" organic potato yields (reported as "8,000 to 14,000 kg/ha", or 11,000 average) are below the year-2000 average potato yield for Peru, reported by the United Nations Food and Agriculture Organization at 11,221 kg/ha in the year 2000. Many farmers in developing countries using non-organic methods report potato yields well above 15,000 kg/ha and non-organic potato yields in developed countries are routinely above 40,000 kg/ha – each considerably higher than the "high" organic potato yields.

3. Double, Triple, even Quintuple Counting of Yields from the Same Research Projects

The paper claims to analyze a "global dataset of 293 examples, yet there are numerous instances of repeated counting of yields from the same long-term studies.

For example, the maize yields from the long-term Farming Systems Trial project conducted by the pro-organic Rodale Institute (Kutztown, Pennsylvania, USA) are reported 4 times: once in a "case study" in a 1989 report from the National Research Council, twice in a report from Pimentel et al., and once in a 2001 newsletter article by Bill Liebhardt.

Soy yields from the same Rodale FST project are reported five times: once by the 1989 NRC report, once by Liebhardt, once by Hanson et al., and twice by Pimentel, et al.

4. Omitting Non-Favorable Crop Yields and Cherry-Picking Data

The paper reports the favorable yields of specific organic crops from research, while omitting the unfavorable yields of other crops reported in the same research. In addition, non-favorable study results from organic research groups were entirely omitted.

Four different favorable potato yield ratios are cited from one research project in Germany (90-106% of non-organic yields), while unfavorable organic potato yield data (75% of non-organic potato yields) published in the very same journal in which the Badgley paper appeared was omitted! (Gallandt, et al. *American J of Alt Agriculture*, 1998 which is now *Renewable Agriculture and Food Systems*)

The paper cites four separate favorable yield ratios for wheat from the first three years of a long-term California research project (McGuire et al., 1998), but they omit the drastically lower organic maize yields from the same project reported in 2004. The non-organic maize yields were 52% higher than the organic from 1996 to 2004. This result in particular calls into question one of the Michigan group's major claims: That organic farming can obtain ample nitrogen by growing off-season green-manure crops to replace the inorganic synthetic nitrogen fertilizer that currently underpins roughly half of global crop production. In this case, the legume crop cost half the ensuing corn crop. Thus, the green-manure strategy, implemented worldwide, threatens a major cropland expansion due to lower per acre yields and the ensuing loss of wildlife habitat and biodiversity.

Moreover, while there were "no statistically difference in tomato yields among [the different systems]" during those 8 years, conventional irrigated wheat yields were nearly 30% higher than irrigated "organic" wheat over the same period.

Many of the studies cited by Badgley et al. are from organic activists with a clear agenda in reporting only high organic yields. The Michigan researchers call these sources "grey literature," but a more accurate term would be "biased observers with a clear economic and reputational stake in the outcome."

For example, there are numerous yield ratios gleaned from reports from "biodynamic" societies such as the Anthroposophic Society, the Institute for Biodynamic Research, and anti-GM/anti-conventional agriculture pressure groups such as Food First.

This clearly skews the results. A recurrent source for "developed country" yield ratios is an article written by Bill Liebhardt, published in the quarterly newsletter of an organic promotion organization. Liebhardt cites a 0.95 yield ratio for organic maize following a legume soybean rotation in comparison to continuous maize yields – despite the fact that the same research Liebhardt cites shows that non-organic maize following soybeans out-yields organic by 10 to 30 percent. This is a clear case of favoring the organic perspective.

More egregiously, Liebhardt combines tomato yields from two separate projects to claim "equal" organic tomato yields when the studies he cites found organic tomato yields were significantly lower yielding. In the first three years of one project, non-organic tomatoes out-yielded organic by 66 percent. So in the fourth year, the researchers started giving the organic tomatoes a literal head start by transplanting tomato plants started weeks earlier in a greenhouse –while still using tomato seeds in the non-organic plots. Yet the non-organic tomatoes continued to out-yield the organic by an average of 20% in the following four years. So in year seven of the project, the researchers tripled the amount of poultry manure applied to the organic plots, giving the organic tomatoes 3 to 4 times more nitrogen than the non-organic. Only after all these changes did the organic tomato yields surpass the non-organic by 9%. Even then, organic fruit quality was lower, used more irrigation water, had far greater weed problems, and cost hundreds of dollars more per acre to grow – losing money without a high price premium.

5. Misreporting of yields

The authors simply misreport organic yields compared to conventional in at least one instance. Badgley et al. report that organic apples achieve 100% equal yields (ratio of 1.00) in a study published in *Nature* (vol. 410, pages 926-930, 2001). The study actually reported organic apples achieved only 93% of non-organic yields (ratio of 0.93).
