

English 280, First Place; Professor, Dr. Timothy Helwig

## **The Double Edged Sword of Conventional and Organic Farming**

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Water is the number one entity for human survival, but food is number two. Through cultivation, domestication of animals, and advanced technologies, the global farming industry has been able to provide the seven billion people of the world with a continual food supply. What happens when the population drastically increases, though? According to four crop and soil scientists of the School of Biology, University of Leeds, Leeds, UK, “The global demand for food and farmland is rapidly growing...[because] agricultural production has to increase globally to supply the food required for the estimated over nine billion people by 2050” (Benton et al. 355-356). This situation has become a serious concern in the agriculture industry because farmland availability is scarce, and yet the population continues to grow. The higher demand for food production forces the industry to increase conventional applications such as chemicals and create more

uncertainty of conventional farming's sustainability and pesticide residue contributing to human health conditions, direct consumers to demand more of the safe alternative of organic farming. The downfall of this consumer trend is that organic farming cannot supply the world with the same quantity of food as conventional practices do. Therefore, additional scientific research must be conducted to conclude or increase the safety and efficiency of the industry.

Science has been able to date farming practices back roughly 10,000 years ago to present day Turkey and the Middle East. Hunting and gathering was slowly abandoned as civilians of Catal Huyuk and Jericho began harvesting plant seeds and saving them to plant in future seasons (Rymer). Up until the early 1900s, all farming was what the 21<sup>st</sup> century refers to as organic, in that the use of any synthetic chemicals or genetically modified organisms were nonexistent. Nitrogen, a crucial element for increasing soil fertility in crop fields, was obtained through the input of animal manure on fields or the planting of nitrogen-rich cover crops such as legumes (Pearce, Smith, and Williams 284). Cover crops are planted after harvest in the late fall to reduce weed penetration in the field, increase soil fertility, prevent soil erosion, and diversify soil nutrients and organisms. In the spring, cover crops are killed off and/or grain crops are planted over them. In 1910, chemists Fritz Haber and Carl Bosch developed an ammonia synthesis process that made nitrogen readily available in a synthetic form (Chemical Heritage Foundation). The practice of conventional farming was thus born. Conventional farming now consists of various synthetic fertilizer applications, chemical herbicide and pesticide use, antibiotics in the animal sector, and genetically modified organisms (GMOs). GMOs are created by scientists in a lab through changing a single or multiple genes in a plant seed to get a specific trait such as weed

The number one concern of any production sector is yield rate. Yield rates become more pressing

that there is evidence that the increased yield rates of conventional farming do cause a decline in biodiversity, a contributing factor to agricultural sustainability (Benton et al. 357).

Sustainability has become a front runner of debates for

management, soil fertility will deplete and in time the soil will lose its ability to produce a viable crop altogether. Although it is evident that organic farming is a higher promoter of sustainable agriculture than conventional farming, “knowledge is very limited for the costs, in terms of yield loss, that are associated with biodiversity gains through organic farming” (Benton et al. 357). More research must be conducted to conclude if there is an advantage of biodiversity over yield rates.

Another consequence associated with conventional farming, that is non-existent in organic, is chemical residue. Conventional farmers apply artificial fertilizers, insecticides, fungicides, and other pesticides on their crops to achieve high yield returns. Research has found trace elements of the various synthetic chemicals on conventional retail produce. Consumption of the chemicals has been reported to cause health defects. In an article from *Rural Sociology*, professors from the Department of Sociology, University of Kentucky, Lexington, KY, explain that, “pesticides in particular are of concern because they are linked to increased rates of cancer... [And] are tied to reproductive disorders and birth defects” (Bell, Brislen, and Hullinger 286). Biochemists of University of Padova, Padova, Italy and UNESP, Brazil, report in the *International Journal of Food Science and Technology* that a study of “organic tomatoes presented a lower content of u

control because herbicides cannot be used

and vegetable harvest” (2). The US Department of Agronomy suggests 120 days of manure decomposition before field application (2). Decomposition of organic manures is an important biological process for agricultural sustainability. The amount of nitrogen accumulating in fresh manure is too high for agricultural crops so an early application will burn and kill the plant. Decomposition releases some of the nitrogen from the soil and beneficial bacteria breaks down harmful plant and animal pathogens, leaving healthy and nutrient rich organic fertilizer to be applied in crop fields. Another method producers and consumers can use to prevent organic fertilizer consumption is to wash the produce just as stated for conventional goods. But if both practices result in residue, which is better? Lima and Vianello conclude from their study that “the comparison of the contaminant content in organic and conventionally grown raw materials showed no conclusive evidence whether conventional products are more or less safe than organic ones (3). It is apparent that more research must be conducted on organic and conventional foods to determine the level of safety for food consumption.

Food consumers, producers, and scientists are at a standstill when it comes to agriculture. The questions concerning the safety of conventional goods, the sustainability of conventional and organic farming, and the capability of farmers to produce enough food

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