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The Debate between Conventional and Organic Agriculture

Timothy VanWingerden

In the produce section of a grocery store, the vegan carefully selects the fruit and vegetables in order to satisfy his or her diet. The celiac chooses with even more care, being sure not to eat anything that will cause their body harm. The working man looks for the food that is the cheapest, while the stay-at-home mom casually chooses her trusted brands. All of these people: the vegan, celiac, working man, and stay-at-home mom have their own agenda and perception on the quality of the food they are purchasing. This is inevitable in consumer driven societies such as America. Consumers become aware of how food is processed, and decide what they like best. Food labeling and other marketing techniques aim to “hook” the consumer, trying to gain their trust. This essay will examine the reasons why consumers purchase organic food; it will explore the arguments between the conventional and organic methods of farming, looking at how each method affects the environment and the individual.

When food from agriculture is produced, it can either be produced conventionally or organically. Conventional agriculture uses synthetic materials to help with growing. For example, pesticides are used to prevent bugs from damaging the plant, or fertilizer is used to adjust the nutrients the crop receives. Using chemicals allows the farmer to easily control the quality of his crop from the time of maturity, to the amount it produces. According to the U.S. Department of Agriculture, “Organic agriculture produces products using methods that preserve the environment and avoid most synthetic materials, such as pesticides and antibiotics” (2014). A farmer controls his organic crop by using natural fertilizer and pesticides. Manure acts as a natural form of fertilizer that revitalizes the nutrients in the soil allowing the plant to be fed. A natural form of pesticides organic growers rely on are biological processes, which are living organisms that consume pests. Biological processes are

used for controlling plant disease, weeds, pests, nutrients and other needs the plant demands (Mahaffey & Cranshaw, 2007). Recently, organic agriculture has become more popular in America, and as the steady demand for organic produce increases, it poses many considerations. DeGregori argues that the term organic has been diluted and states: “Organic food buffs have corrupted and greatly diluted the meaning of the word ‘organic,’ which in organic chemistry has meant ‘containing or consisting of carbon compounds’ for more than a century. All artificial pesticides are organic” (DeGregori, 1997). Although “organic food buffs” do not use the literal meaning for organic, research from this essay has been careful to include only studies that were certified organic according to USDA standards. According to the United States Department of Agriculture (USDA) organic farming is “one of the fastest growing segments of U.S. agriculture for over a decade (2014). It has grown tremendously since the end of the 20th century, where Smith-Spangler et al. (2014) refer to the press release from the Organic Trade Association with organic sales increasing from \$3.6 to \$26.7 billion. Various research has looked at organic agriculture such as the factors behind the purchasing of organic foods, the benefit that organic farming has to the environment, and the health benefits that organic food has to the individual.

Chiciudean, Funar, Arion, Chirla and Man conducted a study for marketing purposes to determine what factors of influence organic food has on the consumer (2012). Participants were surveyed in this study which asked questions related to: brand, cost, quality, taste, quantity, price, and the fact that the product was organic. Chiciudean et al. referred to Zanolli and Naspetti explaining that taste seem to be the superior factor of influence. Another major factor of influence appears to be the persona of organic food itself. With the help of marketing, consumers assume organic food as a higher quality product than its conventional counterpart. The study also refers to Saba and Messina saying an influential aspect of organically grown food is how it is safe to the environment and the consumers’ idea of it being more healthy: “[Organic food is] perceived as more environmentally friendly and healthier than conventional foods” (Chiciudean et al., 2012).

Smith-Spangler et al. (2012) found many studies related to their thesis: “the health benefits for organic food is unclear” with their purpose to clarify the health benefits between conventional and organic food. With a professional librarian, they conducted their research attaining articles from seven different databases all subject to a specific criteria. Their sources compared the nutrients of organic and conventional foods, and a few dealt with the affect that this has on humans. Once they obtained their sources, they conducted a meta-analysis observing the differences. After sharing their results they state: “Despite the widespread perception that organically produced foods are more nutritious than conventional alternatives, we did not find robust evidence to support this perception” (Smith-Spangler et al., 2012). Their research did indicate a few differences in nutrition. For example, the phosphorus level present in organic agriculture was higher than those produced conventionally. They refer to the Food and Nutrition Board claiming that even though the difference in phosphorus is present, it is not significant since a person needs to be dying of starvation before producing “dietary phosphorus deficiency” (Smith-Spangler et al., p. 357-358, 2012). Another difference found was the amount of omega-3 fatty acids and phenols. While both of these are beneficial, Smith-Spangler et al. were concerned about the methods the studies looking at these and state: “funnel plots were asymmetric raising concern for publication bias.” Also, the results of the studies looking at omega-3 fatty acids were “highly heterogeneous” –diverse and dissimilar with not many patterns arising –since most of the studies were conducted within a short period of time. Therefore, they were careful to come to any conclusions in regards to omega-3 fatty acids and phenols. Organic milk was the only conclusive evidence found to support the notion of organic health benefits. They referred to the meta-analysis by Palupi, Jayanegera, Ploeger, and Kahl, which compared nutritional quality of dairy. The other seemingly random nutrition differences found were not statistically significant enough to include in their discussion (Smith-Spangler et al., p. 357-358, 2012).

Smith-Spangler et al. also indicated a notary finding in their study, “Conventional produce has a 30% higher risk of pesticide contamination than organic produce” (p. 357, 2012). However, they state that this is not clinically significant as the pesticide residue allowed is very small, so the residual pesticides and chemicals

used in producing conventionally grown food does not really have an effect on the individual (Smith-Spangler et al., 2012). Smith-Spangler et al. do admit to limitations in their study. For example, different experimental methods used for the studies they surveyed, the weather, and different soil types all played a part with limitation. Another factor of limitation was that no long-term studies have been done observing a population consuming primarily organic or conventional food. With that in mind, they state that even though the results they discussed were statistically significant, any conclusions drawn from their findings should be preceded with caution. However, they imply that since neither method of farming rises to the surface as more superior in regards to health benefits, the small differences could be a rebuttal to those claiming the substantial health benefits of organic agriculture.

Fortunately, long term studies have been done observing the environmental effects of organic and conventional agriculture. The results indicate a favor towards organic agriculture when it comes to the soil quality and energy use (Stokstad, 2002). The twenty-one year study measured the different aspects of an organic crop stating: “Organic farms can be nearly [emphasis added] as productive as regular farms for some crops, and they leave soils healthier.” This leads to one of the major arguments against organic agriculture: a smaller yield. In the study, “Comparing the yields of organic and conventional agriculture” Seufert, Ramankutty, and Foley constructed a meta-analysis of crop yields both conventional and organic using a comprehensive literature search (2012). With the organic comparisons, they kept their criteria strict in order to provide an accurate analysis, reviewing every source with careful discretion. With organic crops, they were careful to only include studies that were certified as organic.

According to the meta-analysis, the average conventional-to-agricultural yield ratio was .75; that is, the yield of organic agriculture produces 25% less than conventional agriculture. However, even though the overall results of the meta-analysis indicate a much higher yield with conventional agriculture, they state, “Our analysis shows that, yield differences between organic and conventional agriculture do exist, but that they are highly contextual” (Seufert, Ramankutty, & Foley, pp. 231, 2012). The results indicated that organic crops perform better than average (.75) on weaker-acidic soils between the

pH between 5.5 and 8. They claim that a possible explanation can be because of the difficulty in controlling the pH in organic crops. Since organic crops require the use of biological processes to control pests and nutrients, growing organically demands more knowledge, in other words, “best management practice” (Seufert et al., 2012). Studies conducted in lesser-developed countries indicated a much lower organic yield, supporting their claim of best management practice. Also, studies that applied best management practice indicated the better performance of organic crops after more than two seasons of growing organic (Seufert et al., pp. 230, 2012).

Seufert et al. state that although it is possible for the yield of organic crops to match the yield of conventional crops, it often does not because of the variability of crop types, “The performance of organic systems varies substantially across crop type and species” (2012). So even though certain organic crops are capable to nearly match conventional yields, growing conditions and best management practice are highly variable, making it extremely difficult. While their study indicated the higher yield of conventional agriculture, they conclude their study claiming:

There are many factors to consider in balancing the benefits of organic and conventional agriculture, and there are no simple ways to determine a clear ‘winner’ for all possible farming situations. However, instead of continuing the ideologically charged ‘organic versus conventional’ debate, we should systematically evaluate the costs and benefits of different management techniques...

Observing the many publications between conventional and organic agriculture, it appears the argument will continue to be debated. Both organic and conventional agriculture have their advantages. Organic agriculture is perceived by people to be the healthier option, but there are no long-term, population studies to support this claim. With the exception of organic milk, the findings supporting organic agriculture as a healthier option are saturated with publication bias. Organic agriculture is healthier to the environment because it allows more nutrients in the soil, but the yield is on average 25% less than conventional agriculture. Also, because of biological controls, organic agriculture is more difficult to manage than conventional agriculture. Although there are many more arguments present in the debate between organic and conventional agriculture, this essay determined to address the core arguments alone in great detail.

References

Chiciudean, D., Funar, S., Arion, F., Chirla, G., & Man, A. (2012). The factors of influence over the consumer buying behaviour for organic food. *Bulletin of the University of Agricultural Sciences & Veterinary Medicine Cluj-Napoca*. Horticulture, 69(2), 68-71

In this study, a survey was given to participants over the age of eighteen to determine the factors that influence the reason why consumers buy organic food. In order to determine what the influence could be, the survey touched on a number of factors including: brand, package, quality, taste, price, and the fact that the product is organic. This study is helpful to my research because it provides affirmation of the consumers' responses to organically produced food. It is useful for determining the general responses of the consumer, and it will provide my essay with essential facts, giving my essay more credibility.

DeGregori, T. R. (1996). Can organic agriculture feed the world?. *Priorities for health*, 8(4), 12

In his article, Thomas R. DeGregori talks about the term organic, stating that it is not used the way it should be. He is concerned with the number of people who believe that organic agriculture is strictly just that, organic. He proves that organically grown produce does not exclude the use of pesticides as one might assume.

This article is useful to my essay because the bias supporting conventionally grown agriculture is present. This bias will be helpful for exposing some of the arguments one might encounter when discussing the topic of conventional versus organically grown agricultural. The argument is viable because it applies to the topic that I will be exposing.

Mahaffey, L. & Cranshaw, W. (2007). Biological control organisms for insects and mites.

The article describes different biological controls, and explains the function of each organism. This article is helpful for my essay because it provides the reader with the adequate knowledge needed to know what a biological control organism is and how it can be used in organic agriculture.

Seufert, V., Ramankutty, N., & Foley, J. A. (2012). Comparing the yields of organic and conventional agriculture. *Nature*, 485(7397), 229.

The comparison of organic and conventional yields is an important aspect of my essay because it is one of the arguments frequently brought up. It is important for the reader to understand the difference in the yields, and what prevents organic yields from outperforming conventional.

Smith-Spangler, C., Brandeau, M., Hunter, G., Bavinger, J., Pearson, M., Eschbach, P., & Bravata, D. (2012). Are organic foods safer or healthier than conventional alternatives?: a systematic review. *Annals of Internal Medicine*, 157(5)

The study was conducted to determine whether or not organic foods are a healthier alternative than conventionally grown food. The survey was comprehensive with almost three hundred relevant studies. Although there were different levels of potassium and pesticides between the foods, it was concluded that there are not any substantial health benefits. The research admitted that limitations were present. Different experimental methods used for the studies they surveyed, the weather, and different soil types all played a part with limitation. This article is useful to my essay because it provides me with previous research that has been done to determine the health benefits of agriculturally grown food versus conventionally grown food. This can be implemented into my essay because it exposes one of the essential reasons why consumers choose organically grown food.

Stokstad, E. (2002). Organic farms reap many benefits. *Science*, 296, 1589.

This article talks about the benefits of organic farming looking at the long-term studies that have been conducted. It talks about how organic farming is helpful to the environment because of soil quality and less energy. This is helpful to my essay because it looks at agricultural from a long-term standpoint, which gives the reader more clarity on the issue.

U.S. Department of Agriculture. (2014). Organic Agriculture. *Economic Research Service*.

This is beneficial to my essay because it provides data for the growth of organic agriculture. It helps the reader have a clear picture of what is going on in the world of agriculture in the U.S.