Facts Over Fear: Research-Based Considerations for Sourcing Fruits and Vegetables

When making choices between fruits and vegetables that are grown organically, conventionally, and locally, consumers should know that fruits and vegetables of any kind are safe, beneficial, and necessary for daily consumption to support overall health and well-being. SAGE recommends sourcing strategically from a combination of conventional, organic, and local produce to optimize both nutritional and environmental impacts.

Benefits of Fruit and Vegetable Intake

Fruits and vegetables are primary sources of essential daily dietary nutrients that play an important role in the prevention and management of chronic disease.

The United States Department of Agriculture (USDA) recommends children ages four to 18 consume one to two cups of fruit and 1½ to three cups of vegetables daily. It's recommended that adults consume two cups of fruit and 2½ to three cups of vegetables a day (USDA, n.d.). Most Americans aren't meeting these recommendations. Only 12% of adults and 40% of children are regularly meeting daily fruit recommendations, and only 9% of adults and 7% of children are meeting their daily vegetable recommendations (Lee-Kwan et al, 2015; CDC, 2014). Not meeting these recommendations is a public health concern because it raises the risk of diet-related chronic illnesses. Food and Chemical Toxicology published an analysis that estimates about 20,000 cancer cases could be prevented every year if Americans ate additional servings of fruits and vegetables each day (Reiss et al, 2012).

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Barriers to Fruit and Vegetable Consumption

There are many barriers contributing to low fruit and vegetable intake. Hinderances include consumers' preferences, familiarity with the products, and accessibility to markets, as well as the quality, availability, and price of products (Huang et al, 2016).

More recently, a new barrier has emerged: fear. Consider the following recent headlines:

"Massive Study Finds Eating Organic Slashes Cancer Risks" (Environmental Working Group (EWG), 2018)
"Pesticide alert: 12 most contaminated fruits and veggies" (CBS News, 2018)
"Ban entire pesticide class to protect children's health, experts say" (The Guardian, 2018)

With headlines like these, it's no surprise consumers have become skeptical of conventional, nonorganic produce. Such media coverage has caused some consumers to avoid produce altogether if unable to purchase organic (Huang et al, 2016; Rodman et al, 2014). This finding is troubling, since very few people are meeting consumption recommendations to begin with (Lee-Kwan et al, 2015; CDC, 2014).

Now consider the facts. A hazard does not necessarily equate with high risk (EPA, n.d.). For example, a shark is a hazard that exists in the ocean. However, the risk of a shark attack when swimming close to the shoreline is not comparable to the risk of a shark attack when swimming in shark-infested waters. The same idea applies to the risk that average people face from pesticides that might be found on their produce. A person whose job is to apply large quantities of pesticides every day has a much higher risk of developing a disease than someone who ingests trace amounts of pesticides from eating fruits or vegetables (Today's Dietitian, 2017).

The Dirty Dozen™ and The Clean Fifteen™

One of the most publicized and fear-inducing reports on organic versus conventional produce is the Environmental Working Group's (EWG's) annual ranking of "dirtiest" and "cleanest" fruits and vegetables, based on pesticide residues. These lists are better known as the Dirty Dozen™ and Clean Fifteen™. To minimize pesticide exposure, the EWG advises consumers to purchase only organic versions of all items on their Dirty Dozen™ list.

The scientific community has questioned the methodology the EWG uses to create these lists because the process does not quantify consumer exposure. The EWG considers six measures of pesticide residues, only one of which addresses exposure by volume. The remaining five measures account for merely the presence of pesticide residues (EWG, 2019).

In other words, the EWG's methodology operates under the assumption that any presence of pesticide, regardless of volume, is harmful. This is simply not accurate.

The level of pesticides detected on all foods on the Dirty Dozen™ list are far below levels harmful to humans. In fact, the majority are below 0.01% (1/10,000) of the levels established by the EPA as safe for human consumption (Winter, 2015).

In addition to implementing questionable methodology, the EWG also uses alarming messaging, with language such as "contamination," "human carcinogen," "highly toxic impurities," and "poison gases." This messaging causes unnecessary concern about produce, which counteracts health recommendations that encourage all kinds of fruit and vegetable intake (EWG, n.d.).

To make optimal purchasing decisions, consumers must look beyond the hype and understand the science behind the research. Only then can they properly balance the overall positive effects of all fruit and vegetable consumption with the additional advantages organic produce may provide.

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Safety of Conventional Produce

There's a solid body of evidence supporting the safety of conventional produce.

Before a pesticide can be marketed and used, the pesticide and its ingredients must be thoroughly evaluated by the Environmental Protection Agency (EPA). Approved pesticides are granted a license for sale and use in accordance with EPA requirements to protecthuman and environmental health (EPA, n.d.).

Pesticide-level tolerances set by the EPA are defined as levels at which the pesticide can be used with a "reasonable certainty of no harm" (EPA, n.d.). Through the Food Quality and Protection Act (FQPA), the EPA is required to review and set tolerance levels with an additional tenfold margin of safety to account for the cumulative risk of exposure from multiple sources (EPA, n.d.).

The process of setting tolerance levels begins with rigorous scientific testing, which includes potential toxicity and harm to human health, amount of residue at the time of consumption, and scope of pesticide use in agricultural practice. In addition, the amounts and types of food Americans regularly consume, with an emphasis on commodities that are highly consumed by infants and children, are considered in assessing cumulative risk (AMS, n.d.). Before a tolerance level is set, the risk assessment findings are posted in the Federal Register.A public comment period follows, providing opportunity for filing objections and hearing requests. Once a pesticide is approved, farmers must abide by regulations regarding proper use and disposal, reporting, pollutant limits, management practices, and operational standards (EPA, n.d.). Approved tolerance levels apply to both imported and domestically grown produce (EPA, n.d.).

Using these established tolerance levels,

> the EPA partners with the USDA to maintain the Pesticide Data Program (PDP), which monitors pesticide residues in foods through extensive sampling, testing, and statistical analyses

on both domestic and imported products. Any finding that exceeds the tolerance level and poses a safety risk is immediately reported to the USDA and EPA.

PDP results showed that 99% of the sampled products tested had residue levels that fell below EPA tolerances (AMS, n.d.). These findings are publicly available online and assure consumers that any pesticide residues on produce remain at safe levels. Consumers should feel confident about eating fruits and vegetables that are farmed conventionally (AMS, n.d.).

In short, conventional produce is safe and affordable. It's widely accessible, allowing everyone to enjoy the nutritional advantages of consuming fruits and vegetables. The benefits of eating produce, whether conventional or organic, far outweigh the risk of pesticide residues when it comes to overall health and well-being (ACHS, n.d.).

Comprehensive Views in Produce Decision-Making

RISK TOLERANCE

When deciding what type of produce to consume, everyone has different risk tolerances and values. When conventional, organic, and local options are all offered, consumers can make choices that align with their values and provide an enjoyable dining experience.

SUSTAINABILITY

From the vantage point of sustainability, organic produce is a solid choice. Organic farming practices reduce runoff, conserve natural resources, improve biodiversity, and maintain soil health by retaining organic matter and decreasing erosion.

However, organic farming methods produce lower yields than conventional growing practices, require more land to grow, and may involve long distance transportation via energy intensive modes, resulting in product that tend to be more expensive and less accessible (Pimentel et al, 2015; Tuomisto et al, 2012). Overall, organic produce tends to have price points 25-100% higher than nonorganic varieties (Business Insider, 2018).

Conventional produce is more affordable and accessible. Conventional farming methods yield a larger and more consistent product on smaller plots of land, despite shifts in climate and growing conditions. However, conventional farming practices tend to have a larger carbon footprint than organic farming methods, raising environmental concerns (Pimentel et al, 2015).

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To feed the growing population while responsibly managing natural resources, research has supported the idea that a combination of organic and conventional farming practices would produce high yields with low environmental impact and would lead to a more sustainable food system (Pimentel et al, 2015; Tuomisto et al, 2012).

LOCAL SOURCING

When choosing conventional or organic produce, it's also important to consider locally grown produce. Local produce supports communities and economies and travels shorter distances, ensuring its freshness and increasing its environmental benefits. Some smaller local farms might use organic practices but do not have official recognition because organic certification costs can reach several thousand dollars (AMS, n.d.).

One disadvantage of local sourcing is that climates and growing seasons can limit produce variety. To increase variety, local farms may resort to the use of high energy practices (Coelho et al, 2018). Connecting and communicating with local farmers regarding their farming practices can be useful in finding produce that aligns with one's values.

Conclusion

There are unique positives and negatives to all sourcing options, making it difficult to conclude that one is definitively better than the other.

> **Consumers should make decisions based on access and availability, personal risk tolerance,**

and environmental interests, keeping in mind that by sourcing 100% from one option, they are likely to lose out on the benefits that the other options can provide. SAGE recommends a strategic sourcing from a combination of conventional, organic, and local produce to optimize benefits.

External Sources

Organic Trade Association (n.d.). Organic Market Analysis. OTA.COM/RESOURCES/MARKET-ANALYSIS

USDA Economic Research Service. (n.d.). WWW.ERS.USDA.GOV/TOPICS/NATURAL-RESOURCES-ENVIRONMENT/ORGANIC-AGRICULTURE/ORGANIC-MARKET-OVERVIEW.ASPX

Global Burden of Disease 2017 Diet Collaborators. (2017). Health effects of dietary risks in 195 countries, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet. Retrieved from: DOI.ORG/10.1016/S0140-6736(19)30041-8

Reiss R, Johnston J, Tucker K, DeSesso JM, Keen CL. (2012). "Estimation of cancer risks and benefits associated with potential increased consumption of fruits and vegetables." Food and Chemical Toxicology, 50(12). Retrieved from: WWW.NCBI.NLM.NIH.GOV/PUBMED/22981907

USDA. (n.d.). My Plate. CHOOSEMYPLATE.GOV

Lee-Kwan SH, Moore LV, Blanck HM, Harris DM, Galuska D. (2015). "Disparities in State-Specific Adult Fruit and Vegetable Consumption — United States, 2015." Retrieved from: DX.DOI.ORG/10.15585/MMWR.MM6645A1

Center for Disease Control (CDC). (n.d.). WWW.CDC.GOV/MEDIA/RELEASES/2014P0805-FRUITS-VEGETABLES.HTML

Huang Y, Edirisinghe I, Burton-Freeman BM. (2016). "Low-income shoppers and fruit and vegetables." Nutrition Today, 51(5), 242-250. Retrieved from: JOURNALS.LWW.COM/NUTRITIONTODAYONLINE/FULLTEXT/2016/09000/LOW_INCOME_SHOPPERS_AND_FRUIT_AND_VEGETABLES__WHAT.6.ASPX

Business Insider. (2018). "Scientists are learning that eating organic might be tied to a lower cancer risk, but there are some big caveats." WWW.BUSINESSINSIDER.COM/COULD-EATING-ORGANIC-PREVENT-CANCER-2018-10

Rodman SO, Palmer AM, Zachary DA, Hopkins LC, Surkan PJ. (2014). "They just say organic food is healthier": perceptions of healthy food among supermarket shoppers in southwest Baltimore. Culture, Agriculture, Food and Environment, 36(2), 83-92. Retrieved from: WWW.RESEARCHGATE.NET/PUBLICATION/269288971_THEY_JUST_SAY_ORGANIC_FOOD_IS_HEALTHIER_PERCEPTIONS_OF_HEALTHY_FOOD_AMONG_S SUPERMARKET_SHOPPERS_IN_SOUTHWEST_BALTIMORE

Environmental Working Group (EWG). (2018). WWW.EWG.ORG/RELEASE/MASSIVE-STUDY-FINDS-EATING-ORGANIC-SLASHES-CANCER-RISKS

CBS News. (2018). WWW.CBSNEWS.COM/PICTURES/PESTICIDE-ALERT-12-MOST-CONTAMINATED-FRUITS-AND-VEGGIES/

The Guardian. (2018). WWW.THEGUARDIAN.COM/ENVIRONMENT/2018/OCT/24/ENTIRE-PESTICIDE-CLASS-SHOULD-BE-BANNED-FOR-EFFECT-ON-CHILDRENS-HEALTH

American Council on Health and Science (ACHS). (n.d.). WWW.ACSH.ORG/NEWS/2017/04/17/DONT-BELIEVE-EVERYTHING-YOU-READ-EWG-ABOUT-PESTICIDES-FOOD-11150

Today's Dietitian. (2017). WWW.TODAYSDIETITIAN.COM/NEWARCHIVES/0917P32.SHTML

Environmental Protection Agency (EPA). WWW.EPA.GOV/LAWS-REGULATIONS/SUMMARY-FOOD-QUALITY-PROTECTION-ACT

EWG. (2019). EWG's 2019 Shopper's Guide to Pesticides in Produce. WWW.EWG.ORG/FOODNEWS/

Winter, (2015). Chronic dietary exposure to pesticide residues in the United States. International Journal of Food Contamination. Retrieved from: DOI.ORG/10.1186/S40550-015-0018-Y

Environmental Working Group. (n.d.). WWW.EWG.ORG/

Environmental Protection Agency. (n.d.). Setting tolerances for pesticide residues in foods. Retrieved from: WWW.EPA.GOV/PESTICIDE-TOLERANCES/SETTING-TOLERANCES-PESTICIDE-RESIDUES-FOODS (3)

USDA Agricultural Marketing Service. (n.d.). WWW.AMS.USDA.GOV/SERVICES/ORGANIC-CERTIFICATION/BECOMING-CERTIFIED

Environmental Protection Agency. (n.d.). Laws and regulations that apply to your agricultural operation by farm activity. US Environmental Protection Agency. Retrieved from: WWW.EPA.GOV/AGRICULTURE/LAWS-AND-REGULATIONS-APPLY-YOUR-AGRICULTURAL-OPERATION-FARM-ACTIVITY#CROPPRODUCTION (2)

USDA Agricultural Marketing Service. (n.d.). Pesticide Data Program. WWW.AMS.USDA.GOV/DATASETS/PDP

Larsson, M.O., Nielsen, V.S., Bjerre, N., Laporte, F., Cedergreen, N. (2018). "Refined assessment and perspectives on the cumulative risk resulting from the dietary exposure to pesticide residues in the Danish population." Food and Chemical Toxicology, 111, 207-276. Retrieved from: WWW.SCIENCEDIRECT.COM/SCIENCE/ARTICLE/PII/S0278691517306877.

Larsson, M.O., Nielsen, V.S., Bjerre, N., Laporte, F., Cedergreen, N. (2018). Corrigendum to "Refined assessment and perspectives on the cumulative risk resulting from the dietary exposure to pesticide residues in the Danish population." Food and Chemical Toxicology, 113, 345-346. Retrieved from: WWW.SCIENCEDIRECT.COM/SCIENCE/ARTICLE/PII/S0278691518300437.

Pimentel D, Hepperly P, Hanson J, Douds D, Seidel R. (2005). "Environmental, energetic, and economic comparisons of organic and conventional farming systems."BioScience, 55(7), 573-582. Retrieved from: ACADEMIC.OUP.COM/BIOSCIENCE/ARTICLE/55/7/573/306755.

Tuomisto, HL, Hodge, ID, Riordan, P, Macdonald, DW. (2012). "Does organic farming reduce environmental impacts? – a meta-analysis of European research."Journal of Environmental Management, 112, 309-320. Retrieved from: WWW.SCIENCEDIRECT.COM/SCIENCE/ARTICLE/PII/S0301479712004264.

Academy of Nutrition and Dietetics. (2019) Sustainable Food Systems. WWW.EATRIGHTPRO.ORG/PRACTICE/PRACTICE-RESOURCES/SUSTAINABLE-FOOD-SYSTEMS

Coelho, FC, Coelho, EM, Egerer, M. (2018). "Local food: benefits and failings due to modern agriculture." Scientia Agricola, 75(1). Retrieved from: WWW.SCIELO.BR/SCIELO.PHP?SCRIPT=SCI_ARTTEXT&PID=S0103-90162018000100084