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Review

Postharvest quality and composition of organically and conventionally produced fruits: A review



Asanda Mditshwa^{a,*}, Lembe Samukelo Magwaza^b, Samson Zeray Tesfay^a, Nokwazi Mbili^c

^a Department of Horticultural Science, School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Scottsville, Pietermaritzburg 3201, South Africa

^b Department of Crop Science, School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Scottsville, Pietermaritzburg 3201, South Africa

^c Department of Plant Pathology, School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Scottsville, Pietermaritzburg 3201, South Africa

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ABSTRACT

The rapidly growing organic food market has prompted many researchers to compare numerous aspects of organically and conventionally grown foods. This review of literature provides an overview of empirical studies comparing postharvest quality of organically and conventionally produced fruits. The emphasis is on key postharvest quality parameters including physicochemical properties, postharvest storage performance, microbiological, sensory and nutritional quality. The study showed that physicochemical and nutritional properties relating to the contents of vitamins, phenolics and antioxidants are higher in organically produced fruits. It is also showed that production system has little effect on sensory quality. The better taste of organic produce as perceived by consumers is only due to the 'halo effect' of the organic label. The differences identified could be largely attributed to the different fertilization systems between organically and conventionally managed soils. The microbial contamination due to improper use of manure and compost in organically managed soils is a major concern in organic fruits. High levels of pesticide residues and nitrates in conventionally grown fruits is also a cause of concern. Several important problems in organic fruits are yet to be addressed, bacterial and fungal contamination of organic fruits warrants more intensive research. Future research should also investigate the effect of production system on storage potential.

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Contents

1. Introduction	149
2. Organic and conventional fruit production systems: an overview	149
3. Physicochemical quality	150
3.1. Firmness	150
3.2. Pigment and colour	151
3.3. Soluble solids content and titratable acidity	151
4. Sensory quality	151
5. Storage quality	152
6. Nutritional quality	152
6.1. Vitamins	152
6.2. Phenolics	153
6.3. Antioxidants	153

* Corresponding author.

E-mail addresses: mditshwaa@ukzn.ac.za, amditshwa@gmail.com (A. Mditshwa).

6.4.	Carotenoids	153
6.5.	Organic acids	154
6.6.	Minerals	155
6.7.	Total sugars	155
7.	Microbiological quality	156
8.	Food contaminants	156
8.1.	Nitrates and nitrites	156
8.2.	Pesticides	157
8.3.	Aflatoxins	157
9.	Future prospects and conclusion	157
	References	157

1. Introduction

It is commonly known that preharvest practices and farming systems have significant effects on postharvest quality of agricultural products. In recent years, conventional farming has successfully increased the performance of plants and decreased production costs. However, the intensification of production has negatively impacted on the environmental health (Sundrum, 2010). As a result, some farmers have seen organic farming as an alternative production with a potential to reduce the economic pressure on production costs. Advocates for organic farming have often claimed that organically produced plant foods are more nutritious and healthy compared to those from conventional farming systems. On the other hand, those advocating for conventional agriculture claim that inadequate nutrition for plants coupled with the lack of protection against insects and diseases result to low nutritional content (Brandt and Mølgaard, 2001; Woese et al., 1997).

Due to the importance of this topic to consumers and food scientists, concerted research efforts have been made to compare the nutritional qualities of organically and conventionally grown food products. This is attributed to the fact that the World Health Organization and Food and Agricultural Organization (WHO and FAO, 2004) has increasingly put emphasis on the relationship between food, nutrition and health. Consequently, the public interest has increasingly focused on the quality of food purchased. As a result, organic farming has received a considerable attention and its share in food production has significantly increased. This is attributed to the belief amongst consumers that organic foods are healthier than conventionally produced foods. This assumption presented a task to food scientist and technologist of examining this hypothesis. Earlier studies by Vetter et al. (1987) proposed three ways that could be used to compare organically and conventionally produced foods, these include market-orientated supply studies, survey and cultivation tests. Of the three methods, cultivation tests are viewed by food scientists as the most accurate (Woese et al., 1997). The major shortfall of this method is the large sample size and a high number of tests required to produce reliable information.

A number of research reviews aimed at comparing organically and conventionally grown foods have been written. Table 1 summarizes several reviews which have been published in the last 15 years on the quality of organically and conventionally grown foods. The most recent review was published by Jensen et al. (2013), this review focused on the aspect of postharvest quality of plant and animal food products. Regardless of the importance of fruit in human diet, none of these reviews extensively examined the postharvest quality of organically and conventionally grown fruits. This is of great importance as the fruit is highly perishable and has limited shelf-life. The influence of organic or conventional production system on fruit quality, nutrition as well as safety is examined.

Table 1

Selected literature reviews published in the last 15 years on organic and conventional production systems.

Product of focus	Scope of the review	References
Fruits	Postharvest quality	Bourn and Prescott (2002)
Different crops and animal products	Consumer perception towards organically and conventionally produced foods	Yiridoe et al. (2005)
Different crops	Food safety	Magkos et al. (2006)
Different crops	Postharvest quality	Rembiałkowska (2007)
Different crops	Nutritional quality of organic foods	Dangour et al. (2010)
Crops and dairy products	Nutritional quality and safety	Lairon (2010)
Different crops	main differences between organic and conventional plant-based foods	Lima and Vianello (2011)
Different crops	Comparing the yields of organic and conventional agriculture	Seufert et al. (2012)
Plant and animal foods	Postharvest quality	Jensen et al. (2013)

2. Organic and conventional fruit production systems: an overview

In recent years, organic farming of fruit and other agricultural foods has been successful at reducing production costs and environmental impact. Although perceived positively from the cost reduction and environmental pollution perspective, organic agriculture has been criticized as an inefficient approach to food production (Seufert et al., 2012). Critics have further argued that organic agriculture may have lower yields and would need more land to produce the same amount of food as conventional farming. However, organic food has a fast growing market share in the international food industry (Woese et al., 1997). The increase of organic farming is in response to food safety, human and animal health concerns associated with conventional agricultural systems (Yiridoe et al., 2005; Rembiałkowska, 2007). The demand for organic foods has also been fueled by increased consumer awareness of the relationship between health and diet coupled with highly publicized food safety contamination cases linked to conventional agricultural practices (Lester, 2006). As a result of all these demands, in 2011, organic farming was estimated to cover over 37.2 million hectares which account 0.9% of the global agricultural land (Paoletti, 2015).

By definition, organic farming refers to an agricultural production system that prohibits the use of genetically modified material, synthetic mineral fertilizers, fungicides and pesticides. Due to the restraints to the type and intensity of fertilization, soil fertility is enhanced by mulching, compost, and manure. Biological and

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