

Organic Tea Production and Health Properties

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Abstract: Certified organic tea is free of synthetic fertilizers, herbicides, and pesticides. Organic tea agriculture sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic tea agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. Organic tea farming practices don't rely on synthetic pesticides and fertilizers to maintain a high yield. Organic tea farming relies heavily on the natural breakdown of organic matter, using techniques like green manure and composting, to replace nutrients taken from the soil by previous crops. This biological process, driven by microorganisms such as mycorrhiza, allows the natural production of nutrients in the soil throughout the growing season, and has been referred to as feeding the soil to feed the plant. The region beginning from the Georgian border up to the district Araklı represents the most suitable and primary high yielding tea plantation areas in Turkey. Tea is the most important income resource of people settled in this region. With the switch of the Hemşin district to organic tea production and with future plans to switch also in Rize gradually to organic tea, in public organic tea production have become important.

In this present work the changeover to organic tea production in Rize, the use of organic fertilizers, possible changes in production and health properties of organic tea will be discussed.

Key words: tea, organic production, Camellia

1. Introduction

Industrial revolution and green revolution led to a direction change in agriculture in the second half of the 20th century. In the well known Green Revolution the aim was to increase yield per unit area to be able to compensate the food need of the humans. In fact, the targeted yield increase could be obtained

by intensive application of pesticides and fertilizers. But with time it was observed that applied pesticides and fertilizers emerged a lot of negative effects, especially for human health. Besides the well known environmental problems like degeneration of physical structure and nutritive balance of the soil, salinisation and desertification arised. As a result of all this mentioned and other negative developments an alternative production system, namely "Organic Agriculture" came alive (Aksoy, 2001).

Turkey has an unique country character regarding tea (*Camellia sinensis* O.Kuntze) in the World. As well known, tea production is located on the World most in the equatorial or near the equatorial region; considering this Turkey is one of the top regions where tea is cultivated. Because of snow at the winter period no economically important diseases

and pests are existing in this regions up o now. As can be assumed, therefore there are no agricultural pesticides in Turkish tea, as tea growers do not and will not use pesticides. In the Hemşin Valley in Rize 2006 ÇAYKUR initiated organic tea production and since 2007 organic tea production statistics are available for the mentioned region. Further, ÇAYKUR and the government is planning to switch gradually to organic tea production in present tea plantations. This review will discuss the present status and possibilities regarding organic tea production in Turkey and health properties of organic tea.

2. Tea Production in Turkey

Although the tea business in Turkey is a relatively new activity compared with the other producer countries, tea cultivation and the industry have shown very important improvement in a short time. While the production of dried tea was below 25.000 tons in the 1950's, this figure reached significant quantities in recent years. Today, Turkey holds a significant place among the world's largest producer countries with a share of 3%. According to the Food and Agriculture Organization (FAO) statistics, Turkey ranks 8th place in the world production area of tea after China, India, Sri Lanka, Kenya, Vietnam, Indonesia and Myanmar (Table 1).

Table 1: Tea Production areas in the world

Country	Tea Area (thousand ha)
China	2240
India	585
Sri Lanka	231
Kenya	218
Vietnam	119
Indonesia	117
Myanmar	86
Turkey	76

(FAO, 2017)

Regarding world tea production Turkey ranks at the 6th place in the World after China, India, Kenya and Sri Lanka (Table 2). In Turkey tea production is located in the North East Black Sea Region (Fig. 1). The tea plantations are distributed in the cities Artvin, Rize, Trabzon, Ordu and Giresun).

Table 2: Tea production in the world

Country	Yield (tonnes)
China	2.415
India	1.252
Kenya	473
Sri Lanka	349
Turkey	243

(FAO, 2017)



Fig. 1. Tea production areas at the Black Sea region

Table 3 shows the distribution of tea production areas and number of tea farmers according to related cities. The main tea production area is Rize with 65.96%, followed by Trabzon, Artvin, Giresun and Ordu. Parallely, the number of tea farmers are following the same ranking.

Table 3. Tea plantation area and number of farmers

City	Tea Area (da)	%	Number of farmers	%
Rize	574.135	65,96	131.443	61,81
Trabzon	165.982	20.01	51.222	24.08
Artvin	98.433	11.51	20.169	9.48
Giresun	20.844	2.51	9.814	4.61
Ordu	111	0.01	44	0.02
Total	829.505	100	212.692	100

(ÇAYKUR, 2016)

3. Organic Tea Production in Turkey

Organic tea production increased from 378 da in 2007 up to 38.034 da in 2016. Also number of organic tea farmers increased from 135 in 2007 up to 11.786 in 2016 (Table 4).

Table 4. Organic tea production areas in Turkey

Years	Number of farmers	Area (da)
2007	135	378
2008	400	1.080
2009	1.434	3.558
2010	1.438	3.555
2011	1.448	3.557
2012	3.843	11.298
2013	9.758	28.768
2014	11.155	32.505
2015	11.224	34.665
2016	11.786	38.034

(ÇAYKUR, 2016)

In Table 5 processed organic black and green tea amounts are given. The amount of bought wet tea, processed black and green tea and in total increased from 2009 up to 2016.

Table 5: Organic tea leaf production and produced tea amounts (tonnes)

Years	Processed tea (tonnes)			
	Bought Wet tea (tonnes)	Black tea	Green tea	Total
2009	361	58	3	61
2010	384	152	5	157
2011	1.743	313	13	326
2012	1.724	339	10	349
2013	1.72	353	9	362
2014	1.927	341	26	367
2015	7.381	1.328	21	1.349
2016	22.330	4.449	39	4.488

(ÇAYKUR, 2016)

There is a remarkable increase in organic tea production in Turkey during the last decade. Organic black tea production increased more compared with organic tea production. Due to the plan of ÇAYKUR expanding the organic tea production area collobaration of ÇAYKUR, Ministry of Agriculture, Food and Livestock begun. The primary aim was to find out the potential of organic fertilizers to be used in tea plantation areas. A research study was conducted in 2017 using 21 different organic fertilizers and chemical fertilizer. These were compared in a randomized block design with three replications in 8 locations, Çamlı and Pınarlı/ Hopa, Fındıklı, Ardeşen, Pazar, Çayeli, Ortapazar and Of/Trabzon. 4 solid, 16 liquid and 1 solid + liquid mix fertilizer were used in this study. Each trial plot was depending on field structure 25-30 m² and three replications were used.

In this ongoing project leaves were collected at possible harvesting times and investigated regarding all components important for tea. Chosen samples will be processed for black tea. Also soil samples were taken before fertilizer application and after every harvest time to determine the changes in soil due to fertilizer application. Basing on experimental statistics, only after 3 year results it can be possible to recommend any fertilizer for organic tea production in this region.

4. Health Benefits of Organic Tea

Modern scientific technology encourages the use of chemical pesticides, herbicides, fungicides and chemical fertilizers for high yield crop production. It creates an chemicalization environment and soil become unhealthy, all biodiversity and ecosystem becomes sick and the whole ecology becomes chemicalized. The modern agriculture technology recommends organic cultivation (Khanal, 2012). The organic cultivation system deals as whole with the elements of farming i.e. fertilizer, soil management, plant or seeds selection, irrigation, pest and diseases management, biological control method. This systems leds to an healthy environment, healthy plant cultivation and at the end the production of healthy products.

The tea leaf contains very important constituents supporting human health. Apart of its invigorating taste and aroma, tea has often been used for its medicinal properties from its initial days till date. Tea is a rich source of various substances including polyphenols (phenols, tannins, catechin, flavonols, anthocyanidins, and phenol-acids), organic acids, essential oils, vitamins and various other saccharides, lipids, pigments, vitamins and inorganic compounds. Tea polyphenols, caffeine, free amino acids are main tea quality parameters. The higher is the better to some extent. These secondary metabolites not only have defence effect for tea plants, but health benefit to tea consumers. Tea polyphenols, particularly catechins are antioxidant and has anticarcinogenic effect, can prevent or cure cancers, cardiovascular diseases, diabetes, obesity and other bacterial and viral diseases; Thea and GABA can improve brain functioning (Khan and Mukhtar 2007). Pro could prevent plant damage from environmental stresses (Ashraf and Foolad, 2007). The study of Han and Yan (2014) showed that organic tea was significantly higher in tea polyphenols, EGCG, ECG, EGC, Pro and GABA compared to conventional tea. Therefore, organic farming is beneficial to improve tea quality and its health properties, and also helps to adapt the adverse environment.

5. Conclusion

ÇAYKUR is planning to switch to Organic tea production in all tea plantations in Rize and around. But the lack of information about the use and kind of organic fertilizers is still present. This will be cleared based on the results of the mentioned ongoing organic fertilizer trials. The switch to organic tea production is an important issue on which ÇAYKUR, the government and the local Recep Tayyip Erdoğan University are working on. But the negative experience in the Hemşin Valley regarding organic fertilizer is still present (we have to mention that in organic tea production areas in Turkey, specially in the Hemşin Valley no organic fertilizer are in use). Therefore in near future the farmers has to be educated intensively about the structure of organic tea production, the use of organic fertilizers and they have to be highlighted about future plans of ÇAYKUR and the Ministry of Agriculture, Food and Livestock and of course specially on health benefits of organic tea production.

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