# ECOLOGICAL TABLE GRAPE PRODUCTION IN TURKEY [o]

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## Abstract

The organic (ecologic-biologic) agricultural practices in Turkey began in 1985 with organic raisins and dried figs demand of European countries. As of 2015, 1829291 tons of organic products from 197 different products, which comprise grapes, in 515268 ha, are produced by 69967 farmers. Currently, the number of registered enterprises operating in organic agriculture is over 1500. As in the entire in world and in Turkey, the share of organic production in grape production is increasing. Organic grape production is carried out in 10645 ha area in Turkey. This amount constitutes approximately 2.3% of the total grape production area in Turkey. Organic grape is the second major product of Turkey export, and the export share of organic products in recent years is increased to 20-30%. The share of the organic table grape production in total organic grape production is an increasing trend and the studies in this direction are continuing.

**Keywords**: *viticulture, organic farming, grape growing*

## Introduction

Turkey has had a grape industry since 5000-6000 years before present, according to the archeological findings. As Turkey is located between 36° and 42° north latitudes country's climate is very suitable for grape production and this is more evident by viticulture's high production rate in total agriculture of Turkey. Turkey has nine agricultural regions. Except very high plateaus of North East and Black sea region where annual precipitation is over 900 mm, in all the regions, viticulture can be done economically. The Aegean, Mediterranean, South East Anatolia and Central south are have more grape production than Central Anatolia, Marmara, Middle East and Black Sea regions. According to State Statistics Institute (TUIK, 2016), 1990604 tons of table grapes have been producing in 55% of vineyards area. Fresh table grape production corresponds to 50% of total grape production; it also reveals the importance of table grape cultivation for Turkey. It seems that interest in the production of organic table grapes is in an increasing trend even though the share in this production is still small. So, grape production in Turkey was/is and

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will keep its importance and this study reviews and tries to take attention country's vineyard and organic grape production based on statistical data.

## Materials and Methods

In this paper, Turkey's place in global of viticulture production, global and Turkish organic agriculture, and in particular world's and Turkey's organic grape production were reviewed by employing several data sources given in References along with authors personal experiences.

## Results and Discussion

Turkey is the fifth in grape area; sixth in total grape production (Table 1; OIV, 2017); fourth in table grapes and first in raisin production among the grape growing countries. Table grape production in all 9 regions of Turkey are undertaken much or less however the first three in table grape production are Aegean, Mediterranean and Southeastern regions (Figure 1).

| Order | Country | 2016 | | Production in 2015 | | |
|---|---|---|---|---|---|---|
| | | Area | Production | Fresh | Dried | Wine |
| 1 | China | 847 | 14500 | 11400 | 822 | 1644 |
| 2 | Italy | 690 | 7900 | 1230 | - | 6970 |
| 3 | USA | 443 | 7100 | 2920 | 1314 | 3066 |
| 4 | France | 785 | 6400 | 64 | - | 6336 |
| 5 | Spain | 975 | 6000 | 300 | - | 5220 |
| 6 | Turkey | 480 | 4000 | 1728 | 1800 | 72 |
| 7 | India | | 2600 | 832 | 260 | 1508 |
| 8 | Iran | 223 | 2200 | 1958 | 220 | 22 |
| 9 | Chile | 214 | 2200 | 992 | 310 | 1612 |
| 10 | South Africa | | 1900 | 180 | 260 | 1560 |
| 11 | Argentina | 224 | | | | |
| 12 | Romania | 191 | | | | |
| | Total | 7516 | 75800 | 27828 | 6184 | 36331 |

**Table 1**
*Total grape area (x1000 ha) and production (x1000 tons) of first ten countries in the World.*

** Dried grape converted in fresh grape on average 4 kg to obtain 1 kg or raisin. OIV conversion factor used: production of vine 1,325 kg of fresh grape, average quantity necessary to obtain 1 hL of wine.*

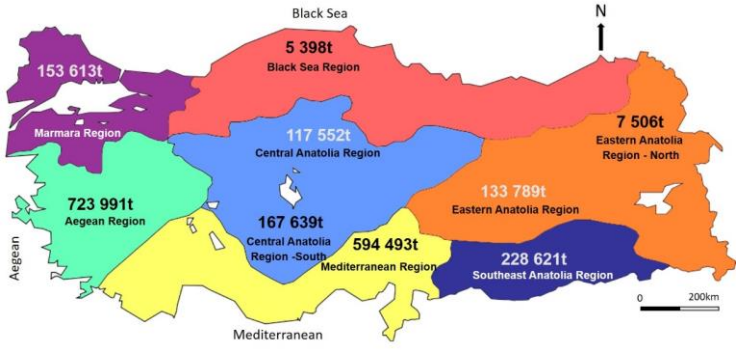


**Figure 1**
*Geographical Regions of Turkey and table grape production (in tons)*

## Organic farming in the world

Organic farming activities carried out in 135 countries in 2006 are observed to be carried out in 179 countries with the latest addition of 7 countries in 2015. The 200000 producers in 1999 increased to 2.4 million in 2015. In 1999, 11 million hectares of organic agricultural land in the world, in 2015 has reached a total of 50.9 million ha (including converted areas). This value corresponds to 1.1% of the world total cultivated area. World organic market volume increased from US $ 17.9 billion in 2000 to US $ 81.6 billion in 2015 (Willer and Lernoud, 2017).
According to the continents, the distribution of total organic farming areas is 12.7 million hectares (25% of the world's total area) in Europe while the largest area is in Oceania with 22.8 million hectares (which corresponds to 45% of the total organic area). South America has 6,7 million ha (13%) followed by Asia (4 million ha. 8%), North America (3 million ha. 6 percent) and Africa (1,7 million ha. 3%). As of country ranking, the largest area allocate for organic farming is in Australia with 22.7 million ha followed by Argentina and United States with 3,1 and 2 million ha respectively. World organic grape production is undertaken at 333000 ha, which corresponds to about 4.7% of global grape production area (Willer and Lernoud, 2017).

## Organic Farming in Turkey

Organic farming practices in Turkey, where considered within the world's top ten countries in terms of ecologic (organic-biologic) agricultural potential, began in 1985 with the European countries demand for organic raisins and dried figs, and continued with apricots and nuts production. As of 2015, 1829291 tons of 197 different crops including grapes were produced in 547299 ha area by 69967 farmers (Table 2; GTHB, 2016). Turkey, in terms of the number of farmers engaged in organic production among 179 countries is among the top 10 countries (Willer and Lernoud, 2017). Currently, the number of registered businesses operating in organic agriculture in Turkey is over 1500 (GTHB, 2016).

**Table 2.** *Organik Farming in Turkey (Conversion data Included)*

| Years | No of Products | No of Producers | Cultivated (ha) | Collected (nature, ha) | Total area (ha) | Production (tons) |
|---|---|---|---|---|---|---|
| 2011 | 225 | 42 460 | 442 581 | 172 037 | 614 618 | 1 659 543 |
| 2012 | 204 | 54 635 | 523 627 | 179 282 | 702 909 | 1 750 126 |
| 2013 | 213 | 60 797 | 461 395 | 307 619 | 769 014 | 1 620 466 |
| 2014 | 208 | 71 472 | 491 977 | 350 239 | 842 216 | 1 642 235 |
| 2015 | 197 | 69 967 | 486 069 | 61 230 | 547 299 | 1 829 291 |

The execution of organic farming activities in Turkey, which is authorized by the Ministry of Food Agriculture and Livestock, served by 34 legal control and certification organizations most of them located in İzmir (West Turkey). At the end of the certification period, following fulfilling the conditions stated in the certification decision, 'Organic Agriculture Entrepreneur Certificate' (master

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certificate) is prepared and sent to entrepreneurs. The 'product certificate' is prepared under the conditions specified in the regulation.

## Organic Table Grape Growing

Organic grape production is carried out in 10645 ha area in Turkey. This figure constitutes approximately 2.3% of the total grape production of Turkey (Willer and Lernoud, 2017). Organic raisins ranked second after the fig and fig products among the Turkey's most exported crops in 2016.

Grape has a significant share in total organic production, rising to 1829292 tons in 2015. 4.28% of the total organic production in our country is organic grapes (79748 tons as fresh grape). Organic grape production was 55948 tons in 2004, rising to 79748 tons in 2015. About 80-90% of this production belongs to the seedless raisins (GTHB, 2016).

Almost all of the seedless organic raisin production is carried out in Manisa (12394 tons) and İzmir (5555 tons). Denizli and Aydın follow these cities. In 2015, a total of 4240 tons of organic grapes, almost most were seedless, were exported to the European Union countries mainly Germany, France, Italy, Denmark, Sweden and Netherlands and a total income was 13930000 US Dollar $ (Table 3).

**Table 3** *Turkey's organic production and grape exports*

| Years | Organic Grape Export | | | Total Organic Production Export | |
|---|---|---|---|---|---|
| | Amount (kg) | Share in total (%) | Sum ($) | Amount (kg) | Sum ($) |
| 2011 | 1 091 078 | 32,36 | 3 761 657 | 3 371 298 | 15 529 387 |
| 2012 | 907 067 | 14,49 | 2 904 249 | 6 258 314 | 24 703 607 |
| 2013 | 2 699 669 | 25,72 | 8 673 404 | 10 495 217 | 46 020 389 |
| 2014 | 4 118 835 | 26,48 | 13 557 823 | 15 552 638 | 78 779 537 |
| 2015 | 4 239 709 | 31,3 | 13 929 996 | 13 548 757 | 69 229 817 |

Distributions of organic table grape production of Turkey by years are given in Table 4 (GTHB, 2016). The statistics for the last 5 years covering the years 2011-2015 indicate that the average organic table grape production is around 10 tons and increased to 20 tons in 2014. Studies are ongoing to increase the quantity. Manisa, İzmir (Aegean Region), Mersin (Mediterranean), and in recent years Diyarbakır, Adıyaman (South East) and other provinces have attracted attention.

Some work has been carried out for the development of organic grape growing in Turkey. In these studies, the feasibility of organic farming has been examined using plant nutrition and In these studies, the feasibility of organic farming has been examined using plant nutrition, chemicals and methods allowed for pest management (Özdemir *et al.*, 2008 and 2010; Tangolar, 2007 and 2009).

One of the recent studies on this subject undertaken in Turkey was carried out in the framework of the EU project RESOLVE (Restoring optimal Soil functionality in degraded areas within organic vineyards), Core organic plus. The experiments are employed with Early Cardinal in Ceyhan, and Yalova incisi in Tarsus (Mediterranean Region of Turkey). In this work, 4 different organic treatments

were applied, namely: 1) the Control (CONTR, without any application on the bare soil), 2) Composted organic amendment (COMP, Farm Manure: pruning mixture, 1:1 v:v). In this treatment, 50 ton/ha compost was mixed by a cultivator to the 0-20 cm soil, 3) Dry mulching (DM) of Vetch and Triticale; this mixture was 100:20 kg/ha (vetch:triticale) was left on the surface soil after mowing by "Cutting line scythe" at 50% blooming, 4) Green manure (GM); vetch was sown as 100 kg/ha in November and was mixed by a rotovator to the 0-20 cm soil approximately at 50% blooming.

**Table 4**.*Turkey's major organic grape producing cities from 2011-2015 and production quantities (tons)*

| **2011** | | **2012** | | **2013** | | **2014** | | **2015** | |
|---|---|---|---|---|---|---|---|---|---|
| **Table Grape Production** | | **Table Grape Production** | | **Table Grape Production** | | **Table Grape Production** | | **Table Grape Production** | |
| Mersin | 1529 | İzmir | 3001 | Manisa | 12359 | Manisa | 13450 | Diyarbakır | 1264 |
| Niğde | 376 | Mersin | 1356 | İzmir | 2390 | İzmir | 2747 | Mersin | 683 |
| Çanakkale | 327 | Manisa | 754 | Çanakkale | 414 | Mersin | 2459 | Adıyaman | 318 |
| Malatya | 173 | Kilis | 626 | Niğde | 361 | Niğde | 441 | Karaman | 224 |
| İstanbul | 130 | Niğde | 359 | Aydın | 196 | Tekirdağ | 419 | Çanakkale | 156 |
| Tekirdağ | 100 | Çanakkale | 350 | İstanbul | 146 | Çanakkale | 378 | Niğde | 146 |
| Eskişehir | 98 | Aydın | 214 | Tekirdağ | 143 | İstanbul | 368 | Aydın | 129 |
| Ankara | 70 | Karaman | 168 | Malatya | 135 | Aydın | 247 | Eskişehir | 100 |
| Kayseri | 40 | Adıyaman | 153 | Muş | 107 | Ankara | 181 | Muş | 74 |
| Şanlıurfa | 38 | Tekirdağ | 131 | Karaman | 105 | Diyarbakır | 142 | Uşak | 54 |
| **Total** | **2881** | | **7112** | | **16356** | | **20832** | | **3148** |

Project studies revealed that about 30-50 tons/ha of biomass could be obtained in green manure and dry mulching applications, depending on years and ecology, and soil erosion caused by winter and spring rains in sloping places could be prevented. The effect of treatments on yield components was not clear. Non-degraded plots have better values compared to treated plots. Soil moisture slightly increased with compost and green manure applications.

| Treatments | 2016-2015 | 2017-2015 |
|---|---|---|
| ND | -5,31 c | -24,57 c |
| CONTR | -1,51 c | 13,62 b |
| DM | 12,39 bc | 10,65 b |
| GM | 33,80 b | 5,48 b |
| COMP | 70,18 a | 36,37 a |

**Table 5**
*Relative increasing (%) of TOC after 1 (2016) and 2 (2017) years of treatment*

Soil total organic carbon (TOC) showed an increase in COMP significantly higher (+ 70% in the first year, and +36% in the second year) than CONTR (-1.5%), whereas GM showed an increase significantly higher (+33%) than CONTR only in

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the first year. DM did not show TOC increase significantly different than CONTR (Table 5). Nitrogen did not show any significant differences respect to CONTR.

## Conclusions

Grape production in Turkey is mainly undertaken in areas with limitations such as sloping lands, shallow-moderate deep and low organic matter containing soils which necessitate precise land and soil care alike terracing against erosion and increasing soil nutrition capability by employing organic additives. As these managements are not properly executed vineyard soils are degraded at an alarming state. Thus, special attention should be given to vineyards, as grape production share in Turkish agriculture cannot be neglected. However, even these problems exist, organic raisin farming in Turkey reached a significant level. But more research involving increasing plant and soil fertility practices for the development of organic table grape cultivation is needed for overcoming degradation of vineyard soils. Along with increasing soil organic matter, governmental subsidies may also helpful to sustain country's organic grape production.

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## References

GTHB (2016) Statistics of Organic Agriculture. www.tarim.gov.tr/Konular/Bitkisel-Uretim/Organik-Tarim/Istatistikler. Accessed on 01/02/2018.

OIV (2017) OIV Statistical report on World VitiViniculture. 2017 World VitiViniculture Situation. International Org of Vine and Wine 18, rue d'Aguesseau 75008 Paris. www.oiv.int/public/medias/5479/oiv-en-bilan-2017.pdf. Accessed on 24/02/2018.

ÖZDEMİR G., TANGOLAR S., GÜRSÖZ S., ÇAKIR A., TANGOLAR S.G., ÖZTÜRKMEN A.R. (2008) Effect of Different Organic Manure Applications on Grapevine Nutrient Values. Asian J. of Chemistry, 20(3):1841-1847.

ÖZDEMİR G., AKPINAR Ç., SABIR A., BİLİR H., TANGOLAR S. ORTAŞ, İ. (2010) Effect of Inoculation with Mycorrhizal Fungi on Growth and Nutrient Uptake of Grapevine Genotypes (Vitis spp.). Europ.J.Hort.Sci., 75(3):103-110.

TANGOLAR S., ÖZDEMİR G., GÜRSÖZ S., ÇAKIR A. and TANGOLAR S.G. (2007) The Effects of Some Organic Fertilizer Applications on Phenological Growth with Cluster Berry and Must Characteristics of Grapevine (*Vitis vinifera* L. Cilores). Akdeniz Univ. J.of the Fac. of Agric., 20(2):319-325.

TANGOLAR S., ÖZDEMİR G., GÜRSÖZ S., YÜCEL A., TANGOLAR S.G., ÇAKIR A. (2009) A Research On The Pest Management İn Organic Grape Growing in Şanlıurfa Conditions 1. GAP Organic Agriculture Congress, 17-20 November 2009. Şanlıurfa/Turkey.

TUIK, (2016) Turkish Statistical Institute. www.turkstat.gov.tr/UstMenu.do?metod= temelist. Accessed on 01/03/2018.

WILLER H., LERNOUD J. (2017) The World of Organic Agriculture. Statistics and Emerging Trends 2017. FIBL-IFOAM. http://www.organic-world.net/yearbook/yearbook-2017.html. Accessed on 31/01/2018.

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