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The Development of Organic Farming and its Impacts on Farms in Turkey: A Discussion on Research Results

Harun Tanrivermiş

Department of Agricultural Economics, Faculty of Agriculture, Ankara University, Ankara, Turkey

Abstract: The organic farming has been adopted on farms since the mid 1980s by the supports of trade firms in western part of the country and the diversity of organic crop and livestock farming has been rapidly developed so far today. Dried sultanas, apricots, figs and hazelnut were the first crops to be produced organically and nowadays 110 different crops and livestock products are being produced organically. The organic farming planted area has reached to 162,193 hectares and the production was 217,454 tonnes in 2004. The research results carried out on farm level indicated that average yields of organic crops are generally low (except for some crops), prices received by farmers, labor requirements and the net profit per hectare of planted area is higher than the conventional farming in Turkey. Organic farming has a positive contribution to producers' welfare and producers tend to maintain and to expand the organic farming in general. The development trend of organic farming mostly depends on capacity of firms, export possibilities and domestic demand increase. In this paper, evaluation of organic farming is reviewed in the light of the recent research results on farm level as well as recent developments in national level from the viewpoint of production, export volume, legal and institutional framework in Turkey.

Key words: Organic farming, producers' welfare, input use, EU and Turkey

INTRODUCTION

The role of agriculture in human life is essential because of the providing most of human foods and fiber requirements. The most important objective of the conventional farming was to obtain the highest productivity from a unit of farmland and these farming methods are characterized by a high degree of crop specialization and intensive use of land, labour and capital inputs per unit of land. The intensive use of natural resources in the conventional agriculture caused some problems such as pollution of soil, water and air, farm chemical residues on food, increased natural resources depletions and thus increased the social cost of production (Bülbul and Tanrivermiş, 2002). In order to achieve sustainable agri-environmental management, transition to organic farming is defined as one of the best strategy in national and international level. Organic farming takes growing importance in agriculture and agro-industry of many developed and developing countries, due to environmental and health awareness of the society and the hazardous impacts of conventional agriculture (Rehber and Turhan, 2002). Organic farming is a new production technique which avoids or largely excludes the use of farm chemicals, concentrated feeds and additives. The organic farming is based on crop rotation, crop residues, manures, legumes, green manure, off-farm organic wastes, mechanical cultivation, mineral-bearing

rocks and biological pest control strategies during the cultivation periods (Cacek and Langner, 1986; Anonymous, 1990; Lampkin and Padel, 1994).

The organic farming has been developed as an alternative to the conventional agricultural system since 1900s. As a result of the increasing awareness of a healthy life-style and environmentally sound products, more and more people have tended to consume healthy and organic foods since 1970s. Organic farming has attracted an increasing attention since 1970s and it becomes a solution to the problems currently besetting the agriculture of developed countries. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of non-renewable resources, improved food quality, reduction in output of surplus products and reorientation of agriculture towards the change in market demand (Lampkin and Padel, 1994). There is an increasing demand for organic food in the world particularly in developed countries and thus, trade of organic food and organic farming has an increasing importance. The development of organic farming is also enhanced by new conservation ideas of the countryside, by emerging awareness of environmental issues and promoting sustainable agricultural development.

Organic farmers have cultivated Anatolian farmland since the birth of agriculture, but the modern-day organic movement is a relative newcomer to Turkey. Over the last three decades, parallel with these global changes in

consumption preferences and the demand of importing countries, organic farming in Turkey has developed rapidly. Organic farming was started to be practiced in Turkey in mid 1980s and was promoted by the demand of European countries. However, there is a lack of research related to the contribution of these activities to producers' and consumers' welfare, organic farming has been developed and supported by the trade firms. In recent years there has been an increased number of farms involved in organic farming and number of crops and organic livestock is growing. Although there is a considerable increase both in number of crops and planted areas, gathering data of physical, economic, technical and social aspects in organic industry is not coping up with this development. Turkey has a large farm population living and working on small farms. The export-oriented growth of organic farming has been observed and thus, the contribution of these techniques for producers and consumers welfare has been discussed. On the other hand, the food system is becoming less local in Turkey. With the accession of Turkey to the European Union (EU), that trend is likely to grow even stronger in future years. In these circumstances the most important question, who will be receiving the leader's share of the benefits from the country's expanding organic sector?

Turkey is a major producer and exporter of various conventional and organic agricultural products. Organic production has been organized based on the standards and certification systems of the importing countries, which were mainly the EU countries. Currently 162,193 ha of planted areas are managed organically, which corresponds to 0.63% of the total farmland. The major organic product groups from the view point of planted area and production volume are dried fruits, edible nuts, spices and herbs as well as fresh and processed fruits and vegetables. The regulation made by the State on production, processing and trade of organic products has been in put into force since 1994 and it has been revised four times up to day. Together with the regulation a logo to be used on organic products was introduced. In order to provide a legal framework for the organization and enhancement of the organic sector, an organic farming law numbered 5262 was developed and put into practice on December 1, 2004. Organic farming will have different impacts on the producer and consumer welfare as well as the regional and national economy.

The organic industry brings direct benefits to the producers in terms of improved agricultural techniques, reduced cost of external inputs, improved environmental quality and food quality. The profitability of organic farming compared to conventional systems is of great interest to farmers considering conversion. Thus, the hypothesis of this study aims to research the question

whether organic farming can contribute on producers' welfare and environmental conservation in agriculture. It therefore points out the potential impacts of organic farming on farm structure, environment and farmers welfare. This study outlines the economic aspects of organic industry in Turkey. In this research, it is reviewed that the development of organic farming and the impacts of organic production techniques on producers' welfare are assessed based on the current research results carried out on farm level. Also, the major problems of organic producers are discussed and some new policies related to organic farming are proposed for the accession to the EU.

TRANSFORMATION OF FARMING AND DEVELOPMENT OF ORGANIC INDUSTRY

The role of agriculture in economy and the potential of organic farming: Agriculture has an essential role for economic development process in Turkey. The agriculture has been the largest employer and a major contributor to the national income, industrial growth and exports in Turkey. The importance of agriculture has declined relative to the rapidly growing industry and services sectors in Turkey as well as in other developing countries. In 2004, 35% of total population is living in rural areas and 34% of economically active population is employed in agriculture. The share of agriculture in Gross National Product (GNP) is 11.3% (Tanrivermiş and Bülbül, 2006). The Turkish economy presents agrarian characteristics. The share of crop farming in total agricultural production value varied between 60-70% and the remaining parts of it consisted of livestock, forestry and fishery products in last three decades. In Turkey, which is the largest producer and exporter of agricultural products in the Near East and North African region, the agricultural trade balance is almost positive. Despite the overall trade deficit of Turkey, the agricultural export value is almost more than the agricultural import even the liberalization of agricultural foreign trade (trade barriers was minimized in 1980s). Trade liberalization and rising demand in the region resulted in agricultural product exports (excluding agro-industry) rising to a value of approximately US \$ 2,541 billion in 2004 and accounted for 4.03% of Turkey's total export earnings.

The number of farms was approximately 3.1 million in 2001, while it was 4.1 million in 1991 in Turkey. The average farm size is 6.1 ha and the majority of farms are small family farms. Although the share of agriculture in GNP moved backward during the last 30 years, still 35% of population lives in rural parts of the country and 34% of active population deals with agricultural activities and about 40% of current labour in farms is left idle

(Tanrivermiş and Bülbül, 2006). Turkey has different climatic conditions and rich biodiversity that provides a high potential for organic agriculture. However, Turkey has relatively fewer organic acres, reflecting the small average size of farms. Although organic farming and in-conversion land constitute a small proportion of the total farmland, this proportion is growing year to year in parallel with the increasing health and environmental awareness in domestic and international markets. Turkey has various advantages for rapidly growing organic farming and export opportunities compared with the neighboring nations. Turkey has some advantages for promoting organic production such as less use of chemicals, varieties of cultivated crops, low labor cost and market opportunities and some disadvantages such as fragmented farmland, low farm size, less educated farmers and negative behaviors of farmers towards adoption of new farm technologies.

Input utilization and agricultural technologies on farms had been quite similar to organic practices till to 1950s and the introduction of farm chemicals started since 1950s. Their usage increased towards mid 1960s and reached today's levels with a sharp rise in 1980s. The usage level of chemical inputs, irrigation water, improved seeds and animals, mechanization in Turkish agriculture have increased since 1950s based on green revolution and nowadays there has been observed a dual structure from the inputs usage level between regions and cultivations. For instance, chemical fertilizer usage in farms has been increased from 2.6 to 202.8 kg as physical total per ha during the period of 1950-2004. As nutrient equivalents, these figures have reached to 85 kg ha⁻¹ in 2004. The average chemical fertilizer use in Turkish agriculture is between 2 times and 8 times less than the developed countries average. The pesticide usage amount as an efficient substance in Turkey is 650 g ha⁻¹ as an average in 2002. On the one hand, in western and southern parts of Turkey, it is observed that the farm chemicals usage

amount is more than the national average; on the other hand the usage amount in middle, north and eastern parts of the country is less than the national average (Bülbül *et al.*, 2001). It was seen that farmers are using farm chemicals unconsciously particularly in covered areas and fruits and vegetables farming areas in western and southern provinces (Tanrivermiş, 2000; Koç *et al.*, 2002). The current farming practices is suitable for organic farming in middle, north and eastern Anatolia particularly compared with the European countries.

The development of organic farming and trade: There is considerable interest among producers in adopting the organic farming in Turkey. Due to the worldwide increasing awareness, the organic farming has been increasingly carried out in Turkey since 1985 and there is a steady progress since then (Aksoy, 2001; Dolun, 2003; Olhan *et al.*, 2005). At the beginning of the 1990, the number of organic farmers was 313, the planted area was 1,037 ha and the numbers of product cultivated organically was 8. These figures shows a huge increase within fifteen years and the organic farmland reached to 162,193 ha, the number of organic farmers was 9,134 and the numbers of product varieties was 110 in 2004 (Table 1). Many farmers converted their conventional production methods to organic techniques. The number of farmers which adopted organic farming techniques varied during the period of 2001-2004.

The organic production is based on contract farming which covers the detailed definition of production practices, harvesting, prices, payment, price premium and responsibilities. This method enables contractors to ensure that the product meets certain standards and is a guarantee for producers that a previously agreed payment on a specified price is done. The research results indicated that the majority of farmers were not satisfied with the supports given by contractual firms and price premiums and these farmers have a great tendency to

Table 1: Development of organic farming in Turkey

Year	No. of producers		Organic area (ha)		No. of product varieties	
		Index		Index		Index
1990	313	100.00	1037	100.00	8	100.00
1992	1,780	568.69	6077	586.02	23	287.50
1994	1,690	539.94	5156	497.20	20	250.00
1996	4,035	1289.14	15,250	1470.59	37	462.50
1997	7,417	2369.65	15,906	1533.85	53	662.50
1998	8,199	2619.49	24,042	2318.42	65	812.50
1999	12,275	3921.73	46,523	4486.31	92	1150.00
2000	13,187	4213.10	59,649	5752.07	92	1150.00
2001	15,795	5046.33	111,324	10735.20	105	1312.50
2002	12,428	3970.61	89,827	8662.20	108	1350.00
2003	13,044	4167.41	103,190	9950.82	109	1362.50
2004	9,314	2975.72	162,193	15640.60	110	1375.00
Change in 1990-2004 (%)	2,875.72		15,540.60		1,275.00	

Source: Ministry of Agriculture and Rural Affairs (MARA)

leave the contractual organic production particularly to part-time farmers in western part of Turkey (Tarrivermiş *et al.*, 2004). In fact, these farmers have maintained the organic cultivation practices generally without auditing any certification process and it can be said that farmers have adopted the philosophy of organic movement indeed.

The area of planted organic crops and the organic production is increasing from year to year. Although there is still a small percentage (0.30%) of the total producers and total farmland (0.63%) over the last 15 years, the share of the organic agriculture has increased considerably. The farms around the provinces of Izmir, Aydin and Manisa have readily adopted organic methods. Organic farming was initiated in these provinces located in the Aegean region. Although the dried fruits sector was the pioneer in Turkey's organic farming in 1985, today there exist nine major product groups, which are producing extensively for foreign and domestic markets. These nine subgroups are covering products such as dried fruits, edible nuts, spices and herbs, fresh/processed fruits and vegetables, pulses, cereals, industrial crops, oil seeds, other raw/processed products. The production and processing facilities are located in Izmir and since it is an important harbor, most of the products could be exported with minimum transportation costs (Gündüz and Koç, 2003; Babadoğan and Koç, 2004). Therefore many producer and certification organizations are located in Izmir province. Nowadays, organic farming has expanded to all regions such as Middle Anatolia, Black Sea, Eastern Anatolia, South-east Anatolia and Mediterranean regions of Turkey.

The distribution of organic planted area in 2004 shows that 52% of total area is allocated for dry and dried

fruits, 24% of them is field crops, 8% of them is fresh fruits, 3% of them is grape-like fruits and the remaining part is allocated for other crops. The highest number of producers is in the group of dry and dried products (59%). Field crops and grape-like fruits are in the second and third ranks (respectively, 10 and 8%). The lowest number of producers is in the vegetables group (1%) (Anonymous, 2005a,b).

While the total organic production was 168,306 tonnes in 1999 and it has reached to 217,454 tonnes in 2004. During this period, the total organic production volume was increased as 29.2% and the production amount is restricted by the trade company based on the internal and external demand. Except apricots, honey, olive oil, onions and prunes, there has been an increasing trend in the amount of organic production. Rapidly increasing types of organic products are tomatoes, apples, wheat, hazelnuts, cherries, lentils and olives. Organic livestock production is yet a minor sector in total organic industry from converted farms and the livestock population (Table 2). With this respect, production, processing and trade firms have given emphasizes on products such as frozen and preserved fruits and vegetables, herbal tea, aromatic oils, etc. to keep up with the trends in the years of 2000s. It is expected that the share of ready-to-use and consumer friendly products will increase in the EU and in Turkey. The largest part of the organically produced goods includes dried fruits with a percentage of 61. The rest of the ranking is as follows: 21% is field crops, 5% is grape-like fruits (or processed ones), 2% is vegetables, 2% is fresh fruits, 2% is medical and aromatic products and 7% is other products.

The export demands of Turkish organic products will be increased in parallel with the rising of organic demand

Table 2: Organic agricultural production in Turkey (Tonnes)

Products	1999	2000	2001	2002	2003	2004
Tomatoes	7,095	15,532	90,472	82,809	26,493	22,897
Apples	24,038	50,136	45,040	69,187	71,928	52,670
Cotton	23,520	23,091	19,511	21,794	34,877	30,269
Wheat	15,983	4,551	31,139	19,752	21,379	31,194
Lentils	3,211	7,163	5,862	17,012	11,781	9,135
Olives	3,310	12,875	7,343	10,744	6,456	10,997
Grapes	7,182	7,582	12,894	10,469	9,505	13,998
Figs	7,840	7,635	8,293	9,473	8,113	15,793
Hazelnuts	5,411	4,114	6,995	7,667	5,662	4,822
Sour cherries	744	2,143	3,769	6,580	5,994	4,021
Apricots	10,822	40,799	13,634	5,941	13,278	9,019
Pepper	553	1,592	3,202	3,355	3,909	2,644
Cherries	366	496	1,375	1,335	1,830	1,349
Honey	1,128	2,582	557	923	1,100	937
Olive oil	1,174	1,620	1,602	413	68	0
Onions	703	809	2,680	388	1,020	1,412
Prunes	1	1	1,003	2,329	295	6,297
Cracked wheat (Bulgur)	12,000	18,795	0	0	0	0
Others	43,225	35,694	24,957	39,953	0	0
Total	168,306	237,210	280,328	310,124	223,688	217,454
Change (1999=100)	100.00	140.94	166.56	184.26	132.91	129.20

Source: Ministry of Agriculture and Rural Affairs (MARA)

Table 3: Exports of major organic products in Turkey (Q (Quantity): Tonnes, V (Value): US \$ 1,000)

Products	2000		2001		2002		2003		2004	
	Q	V	Q	V	Q	V	Q	V	Q	V
Raisins	4,252	4,836	5,412	4,887	6,115	5,718	5,677	7,056	3,316	5,258
Dried figs	2,103	4,074	2,227	4,764	2,228	5,537	2,027	5,166	1,863	4,396
Hazelnuts	1,252	4,226	1,590	5,457	1,560	4,755	1,403	5,107	847	5,215
Dried apricots	1,268	2,741	1,934	2,805	1,835	4,044	1,688	4,734	1,646	5,381
Apple juice	315	424	142	138	468	456	2,528	3,055	1,406	1,513
Frozen fruits	185	252	1,163	1,368	892	1,106	1,212	1,983	930	1,382
Cotton	175	299	92	184	411	623	865	1,376	1,573	2,824
Pine kernels	52	787	54	726	93	1,534	70	1,212	34	665
Lentils	979	806	1,097	841	962	655	1,447	1,025	1,508	1,366
Chick peas 707	636	1,035	827	1,413	1,113	1,167	830	871	673	
Frozen vegetables	352	184	575	355	666	391	841	573	489	415
Anise, fennel and Coriander seeds	21	60	56	166	246	592	229	453	320	770
Honey	20	38	30	63	385	852	109	295	32	96
Pistachios	24	176	51	307	21	129	32	265	25	198
Olive oil	15	48	5	12	25	65	54	174	91	360
Canned cherries	25	12	92	126	57	89	88	146	27	53
Tomato paste	1	1	13	11	116	86	134	142	39	56
Cracked wheat (Bulgur) and semolina	25	12	79	37	85	48	116	64	97	61
Prunes	275	321	351	460	139	236	6	24	38	75
Others	1,083	2,623	2,655	3,708	1,466	2,848	1,390	3,253	0	0
Total	13,129	22,556	17,556	27,242	19,183	30,877	21,083	36,933	15,152	30,757
Chance (2000 = 100)	100.00	100.00	133.72	120.77	146.11	136.89	160.58	163.74	115.41	136.36

Source: Aegean Exporters Union and Ministry of Agriculture and Rural Affairs (MARA)

in the EU countries and in the world organic market. Also, it was found that consumers living in the metropolitan areas of Istanbul, Ankara and Izmir provinces that have higher living standards and awareness of health risks particularly are willing to pay an extra price premium about 2% for organic products compared with conventional crops (Akgüngör *et al.*, 1999). Under these circumstances, there is a potential demand toward organic products in domestic market. Turkish exporters are aware of the healthy and environmental considerations of customers and satisfy these customer needs by offering products, which comply with both legislative and market requirements. Instruments such as ISO 9001, 2000 and HACCP are positive arguments for quality products and food safety. Turkish exporters have adopted these developments which affect world trade. All of the crops produced by the organic farming are exported to the EU countries and have a significant contribution to the nation's agricultural exports in general.

Even though there is no separate Harmonized Commodity Description and Coding System for organic farming products in Turkey, export figures are collected from Exporter Unions. Exporting firms submit their foreign trade data on a voluntary basis, which is then published by the Aegean Exporters' Union, the coordinating organization for the export of organic products. Turkish organic farming products are becoming more and more familiar to foreign importers (Demirci *et al.*, 2006). The destinations of Turkey's organic products exports reached

40 countries in 2004. The majority of exports are directed to the EU. Germany, the Netherlands, UK, Italy and France, which are the major export markets of Turkey. Switzerland, USA, Belgium, Denmark, Austria, Thailand, Spain, Canada, Australia, Sweden, Bulgaria, India, Japan, Slovenia and New Zealand are other developing export markets of Turkey.

The majority (about 80-90%) of the production of organic products is being exported. It was observed that the type of exported crops have been changed within last five years. In 2000, it was seen that 83.30% of the total export amount and 85.59% of the export value of the organic production consist of, raisins, dried fig, hazelnut, dried apricot, prunes and lentil. In 2004, the share of these products was 60.59 and 70.28%, respectively. Nowadays, new products such as apple juice, frozen fruits, cotton, anise and fennel and coriander seeds have been arisen in terms of their share in the amount and value of export (Table 3).

Domestic consumers show only little interest in these products due to the high price margin between organic and conventional products. The price margins are estimated to be between 50-300% according to the products. It was found that consumers were willing to pay 50 to 100% more without decreasing their consumption for organic tomatoes, cucumbers, poultry and eggs; but in general, they stated that they would willing to pay for a premium of 2% in Ankara Province (Koç *et al.*, 2001). The consumers who have high income and live in big cities

generally have a tendency to purchase organic products and this pushed supermarket chains to introduce these products to individual consumers. It is expected that as the income level of consumers increases, more consumers will be able to purchase these products. Recently, a few specialized shops which has been opened, sell organic and natural products and a few supermarket chains have more focused to sell organic products in metropolitan areas of the big cities (Babadoğan and Koç, 2004).

Another reason of low consumption level is that most consumers are not very much aware of the difference between conventional and organic products. A study conducted by Akgüngör *et al.* (1999) showed that only a small percentage (8.7%) of consumers knows something about organic production methods. Also, many organic producers are producing on a small scale; they have not established a sales network yet due to high operation costs and therefore have difficulties in reaching the consumers (Akkaya *et al.*, 2001; Anil and Yalçın, 2004). With the establishment of producer organizations and increase in the production scale, this problem will be minimized in near future. Since many organic producers work on a small scale, high certification costs may sometimes cause the farmers to sell their products as conventional ones. When the importance of organic farming will be better understood by the consumers and the demand of these products will be increased, the producers will realize the significance of certification process.

The legal and institutional regulations on organic farming: In the field of organic industry, some state and private institutions have different responsibilities. Ministry of Agriculture and Rural Affairs (MARA) is responsible for the general management of the organic production system. MARA has the main service, advisory and control units. Within MARA, the Secretariat of Organic Agriculture and the Organic Agriculture Committee were established in 1993. National Orientation Committee (NOC), National Trade Committee (NTC) and National Research Committee (NRC) under MARA have been established by a regulation that was published in July 11, 2002 (Anonymous, 2002). The first two operate under the General Directorate of Agricultural Production and Development whereas the third, NRC, under the General Directorate for Agricultural Research. These three committees are established to work with the MARA in setting up the priority lists and developing a national strategy and in determining the weaknesses and opportunities in organic farming. The second state institution which is the general secretariat of the Aegean Exporter's Union undertakes the tasks and functions

related to the foreign trade. The union records the organic foreign trade amount and volume according to the products and importing countries and provide market information for tradesmen to promote export of organic products.

Turkey passed the first national regulation on production, processing and the trade of organic products in 1994. On December 18, 1994, the regulation on "the production, processing and marketing of plant and animal products produced by organic farming methods" was introduced by the MARA. This regulation covers the contents of organic farming, the duties of the control and certification bodies and other rules to be applied in organic industry. The first regulation was based upon the EU's regulation number 2092/92. A revision of Council Regulation (EEC) No. 2092/91 was introduced in 2002 which is still used today. The first regulation was revised in July 11, 2002 and by the second regulation, principles on production, processing, labeling, storing and trade of organic products were updated and the duties of the control and certification bodies as well as certification procedures were redefined. Furthermore, a logo to be used on organic products was introduced and three important committees under MARA were established to regulate organic farming, processing and trade policies (Nicely, 2001; Olhan *et al.*, 2005; Babadoğan and Koç, 2004).

The private institutions working on organic sector are processing companies, trade and certification institutions, associations, foundations and producers organizations in Turkey. In 1992, Ecological Agricultural Organization Association (ETO) was established in Izmir by producers, processors, researchers, certification institutions and consumers. ETO has about 200 members. With a close cooperation with the MARA, ETO tried to increase the awareness in organic production methods among farmers and related organizations. The second private institution which is Organic Food Producers and Industrialists Association (ORGÜDER) was founded in 2004 with the aim to increase the cooperation, establish an information exchange network between the organic producers and processors, both in Turkey and in foreign countries, contribute to the general awareness of organic farming in the civil society and participate in promotional organizations. ORGÜDER currently has 12 members. Third one is the Environment, Education, Health and Social Cooperation Foundation (ÇESAV) which was established in 1989. ÇESAV administered an organic farming project which has the aim of increasing the general knowledge on organic agriculture with various seminars and panels and the publication of informational resources and books. Another private institution is the Buğday Ecological Life Association which was the name of a little pioneer

restaurant opened in Bodrum district located at the Aegean coast. Buğday is a member of International Federation of Organic Agriculture Movements, Centre for Alternative Technology and publishes the newsletter of Global Ecovillage Network in Turkish.

The role of cooperatives such as agricultural sales cooperatives and their unions (Tariş, Kayisibirlik, Marmarabilik, etc.) and agricultural development cooperatives in farming, processing and trade of organic industry is very limited in Turkey. The total number of firms is 363 that are working in production, processing and trade of organic farming. Twenty of them are cooperative business and the share of cooperative movement in organic industry is not important both in individual crops and livestock and in overall. Producers dealing with the organic fruit and vegetable moves toward the product based organization for the first time under the agricultural producer associations law numbered 5200 was put into effect on July 6, 2004 in Turkey (Demirci and Tanrivermiş, 2005).

Being in compliance with EU legislation, the current legislation requires the incorporation of latest amendments; it lacks a clear legal basis, since it was originally developed in the absence of legislative act governing in organic farming. To fill the gap between EU and Turkey and provide a firm legal basis for the organization and enhancement of the organic industry, a framework law numbered 5262 was developed and put in force in December 1, 2004. This framework law provides MARA with the necessary authority to amend and update organic farming regulations, in order to respond to future institutional, technical or scientific changes in the sector, as well as to adapt to future amendments to the EU regulation. The framework law also provides penalties and sanctions, which are not mentioned in the current regulations.

In order to specify the rules for the farming, processing and trade of organic products, regulations are modeled on the EU's and a new regulation had been developed. The organic farming law numbered 5262 dated 2004 which the objective of the present law is to lay down principles and procedures for relevant measures to be taken in relation to the production of organic products and inputs so as to provide high quality and safe organic products to consumers. In the implementation of the present law, all kinds of inspection and certification works relating to organic farming activities are performed either by the Ministry or bodies authorized by the MARA. Authorized bodies must have sufficient number of experienced personnel and necessary infrastructure (Article 5). Products not certified by inspection and certification or certification bodies cannot be marketed as

organic products or inputs. The inspection and certification or certification bodies cannot issue organic product or input certificates to products and inputs that are not organic. Authorized bodies, controllers and certifiers have to work with their licenses issued by the MARA. Upon the expiry of such license, authorized bodies can no longer perform without being given renewal or time extension by the MARA (Anonymous, 2004).

Private organizations can certify products as organic, but these organizations must be registered by the MARA and have to hold permission from the MARA to conduct certifying activities in Turkey. Although, trade and processing firms were applying organic farming principles and were being certified individually by certification bodies abroad, there was no domestic regulation or law before 1994. Currently, there are seven companies active in Turkey; five of them are joint companies from Europe.

In order to produce licensed organic product, a producer must apply for certification from one of these agencies. Due to the high cost of certification, some processors and exporters make applications on behalf of a number of individual producers operating within a project organized by the processor/exporter. The certifying agencies assess the producer's compliance with the Turkish organic regulation and related EU regulations. Soil, leaf and product samples are taken at least twice a year, along with random visits during the growing and production cycle (Nicely, 2001). Since the analysis results is convenient with the organic product standards, the products are certified by the control and certification institutions and these certification is generally adequate for marketing of organic product in the world.

There were no state support specifically for organic farming and there were no difference in distribution of the state supports between conventional and organic farming until 2004. This means that organic product can benefit from the same advantages as conventional product supports. Some of these supports are based on the size of farmland, whereas some of them are in the form of export subsidies. All kinds of these aids or supports are based within the commitments to the WTO Agreement of Agriculture. There are, however, loans with low interest rates available for farmers who are interested to shift to organic farming. A new regulation was made related to supports for organic producers who receive extra organic and soil analysis premium over the conventional producers as a proportion of direct income payment in Turkey in 2005 (Anonymous, 2005c). After 2005, the government will give a limited support for organic producer through the direct income support payment based on per hectare of organic planted area. Since the

amount of organic premium is absorbed by the yield losses in organic industry, it will be an encouraging tool for producers.

The contribution of organic farming on farms and environmental conservation: The impacts of organic farming on farmers' welfare and the sustainability of natural resources are evaluated from the viewpoint of several criteria such as; (i) standard of living, (ii) mitigation and/or decreasing of unemployment in rural area, (iii) effective use of production factors, (iv) distribution of goods both within and between societies, (v) cost to the environment and society (external and social costs) and (vi) change in behaviors of farmers and increasing awareness to environment. In this study, the contribution of organic farming on producers' welfare was assessed from the viewpoint of cost saving and earnings of net profits; and the role of organic industry for conservation of the environment is evaluated from the viewpoint of controlling of agricultural pollution, soil erosion and degradation in productive farmlands in Turkey. For the assessment of the impacts of organic farming on farms and the evaluation of these techniques for conservation of the environment, the previous research results used and the studies reported (Akgüngör, 1996; Bülbül and Tanrivermiş, 2002; Yamanoglu, 2005; Demirci *et al.*, 2006) are generally individual academic researches.

A common argument opposing to organic farming is that it had too low yields and could therefore not contribute enough to feed the world population and producers' welfare. Yields and costs of organic crops and livestock farming vary from country to country, region to region and in fact farm to farm. Therefore, yield, cost and profitability analysis must be conducted separately for each country, region and product. As long as sufficient researches have not been conducted on this subject on the basis of products and regions, economic comparison between organic and conventional production can not be made reasonably. Generally lower yields are achieved in organic farming than in conventional agriculture in developed countries (Daitota, 1989; Lampkin and Padel, 1994; Tremel, 1995; Lampkin and Measures, 1999), whereas yields of organic enterprises are very close to conventional enterprises in developing countries (Bülbül and Tanrivermiş, 2002).

The research results indicate that yield per unit of plantations rapidly decreases in the initial years of the organic farming as compared to conventional farming. In the later years with the measures taken the productivity level reaches the former level and in fact some crops surpass the conventional agriculture. There were

decreases as 6.62% in yield parallel to conversion of conventional farming to organic industry. In organic farming, yields are generally 5.30 and 25.30% lower than conventional farming except olive, hazelnut, raisins, fig (dried) and plum (dried). After converting of farmland to organic, manure, agricultural limes and green fertilizers implementations make a contribution to maintain the soil productivity and material balance and thus the average productivity of organic crops per planted area was 0.70% (dried fig) and 39.65% (raisins) more than the conventional farming (Table 4). In particular, the synthetic farm chemical usage amount in olive plantations and leguminous is very limited in Turkey (Gündüz, 1994; Bülbül *et al.*, 2001; Aksoy, 2001). According to these results, organic farming does not cause a significant productivity loss per unit of planted area after the conversion period. The producers stated that with the conversion to organic farming there was a decrease in annual fluctuations in yield of perennial crops. Consequently, there is a decrease in the variability of the contribution of organic farming to the standard of living of the producers.

The increasing awareness of consumers will increase the demand of organic products and thus consumers are able to obtain a higher price for unit product compared with the conventional ones. The most important reasons why producers prefer organic products are the price differences and the other advantage brought by organic farming. In the previous years, organic prices were determined as market or cooperative price plus premium price. The price is determined and announced during harvest time generally at the beginning of July-October in each year (Bülbül and Tanrivermiş, 2002). In some cases, there are not any differences of contract prices for organic products and market prices and thus, the firm permitted the producers who wanted to sell their products to the cooperatives or to the merchants as conventional product. The research results represented that producers are not satisfied the received prices for organic crops and livestock. The price premium for organic crops varied between 1.10% (wheat) and 16.10% (dried tomato) in annual crops and it was varied between 1.20% (dried fig) and 36.80% (cherry) in perennial crops. On the other hand, there could be a slight difference in prices ranging between 1-5% among the contractual firms (Tanrivermiş *et al.*, 2004). The price premium for organic products are not compensated the yield decreasing in some crops such as strawberry, grape, sour cherry, barley, lentil and poppy. For this reason, the variation in the numbers of organic farmers will be observed in future based on the amount of price premium and state support.

Table 4: Comparative analysis of average yield, labor requirements, costs and return of conventional and organic farming in Turkey

Products	Research area	Date and Author(s)	Productivity (Conv.= 100)	Labor requirement (Conv.= 100)	Production costs (Conv.= 100)	Gross margin (Conv.= 100)	Net profit (Conv.= 100)
Raisins	Adana	Akgüngör, (1996)	71.60-73.78	-	118.29	-	78.75
Anise	Afyon	Yamanoglu, (2005)	94.67	109.38	88.70	126.93	166.51
Cumin	Afyon	Yamanoglu, (2005)	92.70	107.58	88.15	129.80	153.69
Hazelnut	Ordu and Samsun	Bülbül and Tanrivermiş, (2002)	125.20	124.24	105.70	119.001	79.80
Raisins	Izmir	Demirci <i>et al.</i> (2006)	75.40	103.90	76.15	88.85	114.40
Raisins	Manisa	Demirci <i>et al.</i> (2006)	91.80	85.70	117.89	83.40	79.30
Barley	Manisa	Demirci <i>et al.</i> (2006)	80.50	144.71	86.08	96.39	48.56
Wheat	Manisa	Demirci <i>et al.</i> (2006)	94.70	82.80	79.53	108.61	120.50
Strawberry	Bursa	Demirci <i>et al.</i> (2006)	75.50	133.221	96.15	67.63	115.75
Strawberry	Konya (Akşehir)	Demirci <i>et al.</i> (2006)	78.30	118.70	79.26	97.22	127.90
Apple (Dried)	Kütahya	Demirci <i>et al.</i> (2006)	91.46	98.26	89.16	69.72	210.12
Hazelnut	Samsun and Ordu	Demirci <i>et al.</i> (2006)	107.04	128.23	110.13	107.75	272.63
Hazelnut	Düzce	Demirci <i>et al.</i> (2006)	92.80	94.00	96.24	100.02	105.00
Fig (Dried)	Aydın	Demirci <i>et al.</i> (2006)	128.30	124.56	106.29	146.44	140.64
Fig (Dried)	Izmir	Demirci <i>et al.</i> (2006)	100.70	121.70	91.84	120.08	178.8
Apricot (Dried)	Malatya	Demirci <i>et al.</i> (2006)	87.070	74.45	79.52	106.86	123.17
Cherry	Afyon and Konya	Demirci <i>et al.</i> (2006)	78.72	110.64	96.12	110.20	135.51
Sour Cherry	Afyon and Konya	Demirci <i>et al.</i> (2006)	77.21	100.80	94.64	87.04	111.85
Olive Oil	Aydın	Demirci <i>et al.</i> (2006)	104.90	113.00	103.01	118.44	122.10
Olive Oil	Çanakkale	Demirci <i>et al.</i> (2006)	97.10	123.10	100.26	114.86	140.50
Olive Oil	Izmir	Demirci <i>et al.</i> (2006)	107.10	104.80	121.88	134.59	152.10
Olive Oil	Manisa	Demirci <i>et al.</i> (2006)	105.60	144.70	108.47	116.69	122.10
Tomato (Dried)	Manisa	Demirci <i>et al.</i> (2006)	103.00	94.70	86.50	132.93	131.30
Poppy	Afyon	Demirci <i>et al.</i> (2006)	74.70	88.90	95.67	87.26	114.50
Lentil	Malatya	Demirci <i>et al.</i> (2006)	81.90	103.60	86.58	95.62	100.72
Chickpea	Malatya	Demirci <i>et al.</i> (2006)	90.00	128.30	98.57	113.72	172.30
Cotton	Manisa	Demirci <i>et al.</i> (2006)	93.40	113.70	85.25	134.36	157.80
Sesame	Manisa	Demirci <i>et al.</i> (2006)	98.10	104.50	101.59	79.13	92.40
Plum (Dried)	Kütahya	Demirci <i>et al.</i> (2006)	108.60	86.80	106.13	121.60	124.30
Rose	Afyon	Demirci <i>et al.</i> (2006)	92.10	110.20	113.29	131.84	329.40
Average	-	-	93.38	109.10	95.82	108.14	141.57

In general, requirement of labour and the share of labour in variable and total cost were higher in organic farming than that for conventional farming. The excessive labor requirement per hectare of organic farming is 9.10% of an average in Turkey. In some cases, the labour requirement in organic farming is lower than the conventional farming based on maintenance (such as green fertilization, manure implementation etc. will not adopt in these activities) (Table 4). These results are compatible with the other research results carried out by organic producing countries. For instance, Tremel (1995) showed that labour cost was higher and the cost of fertilizers and pesticide was lower in organic farming than conventional agriculture. Altieri *et al.* (1983) concluded in their research in California that the cost of labour in organic apple production was 20-30% higher than conventional production. Klepper *et al.* (1977) and Keipert *et al.* (1990) observed that labour cost in organic farming was much higher than conventional farming and Lindner (1992) concluded that organic vegetables production in Germany required 20% more manpower than conventional production.

There are important differences between conventional and organic farming in respect of the use of inputs and cost of production per hectare of land. Costs per unit of output or planted area vary widely in regions, farms and organic enterprises. A reduction in the use of external resources (e.g., fertilizers and pesticides) normally occurs in organic farming leading to significantly lower variable costs. However there can be additional costs such as reseeding grassland and fertility building measures for example green manures (Lampkin and Padel, 1994). The average organic production cost per kg of organic products and per hectare of land is 4.18% less than the conventional agriculture (Table 4). It was determined that variable and maintenance costs such as implementation of fertilizer, pesticides, irrigation and sowing cost are higher in conventional farming than the organic industry. In general, producer use more manure and organic fertilizer compared to the conventional farms. For these reasons, the share of fertilizer and maintenance costs in variable cost was found higher than the conventional farms. Particularly, part-time farmers adopted organic techniques in Manisa, Konya and Malatya provinces have not

livestock population on farms and thus, they have to provide their requirements from other farms. This issue has to increase the production cost and affected the profitability of organic industry on farms.

The samples of soil, leaves and products were taken from the each parcel of producer' operating farmland prior to conversion to this type of production and these were analyzed and the implementation amount of the organic fertilizers, manure, green fertilizers and agricultural limes for producers based on the analysis results. Furthermore, it was observed that the organic farming made significant contributions to the producers who did not perform organic farming in that the conventional producers adopted the use of manure and lime applied them. The most important problem in the use of inputs in organic industry focuses on the cost of inputs. This is why both the firms and organic producers feel that the subsidy given to farm chemicals and fuels in Turkey should also be given to the inputs used in organic farming. Thus, these inputs mostly imported could be given to the farmers at lower costs and these may increase the competition of organic products in the markets (Bülbül and Tanrivermiş, 2002).

The impacts of production techniques on farm profitability can be measured in term of gross margin. This approach assumes that fixed costs are not affected by the production techniques and size of enterprise (Akgüngör, 1991; Webster and Bowles, 1996). In general, gross margins and net profits were analyzed and discussed in researches carried out on farm level. The gross margin in organic farms was 8.14% higher per hectare than conventional farms. The net profit per hectare of plantations in organic farms was 41.57% higher than the conventional farms (Table 4). The positive contribution made by organic farming to the standard of living of the producer can be measured with the increase in gross margin and net profit per unit of the plantation. Organic production is more profitable in respect to profit per unit of production. Besson (1990) concluded that the profits made in farms where organic farming is performed in Germany was 10% more than the profits in conventional production and Tremel (1995) found that the organic farming was more profitable than conventional. Heissenhuber and Ring (1992) observed that there was a drop in income in the initial year after transitioning to organic agriculture but that in the second year there was an increase of 36% in the income as compared to pre-organic farming.

Some of the farms converted to organic as whole and majority of them converted their specific activities on farms. In these circumstances, all researches reviewed in

this study were based on partial budget analysis. Detailed economic analysis should be designed so as to show that how the complexity of organic production affects the whole farm financial performance, considering financial issues that influence the farmers' decision to convert and discussing the contribution that state supports make to the relative profitability of organic production. Converting to organic production can involve significant restructuring of the farm business, which can result in less specialization (economy of size) and higher overhead costs (Lampkin and Padel, 1994). The eligibility for support payments may also be affected by restructuring which could be important for profitability.

The intensive or conventional farming systems has caused the increase of monoculture farming, caused erosion and destroyed natural habitats. In organic farming, soil is less or no tillage and some erosion control strategies are implemented regularly. The mechanical and biological agents are used instead of pesticides and manure, green fertilizer and organic wastes are employed instead of chemical fertilizers in organic industry. In addition to these improvements, overuse of irrigation water and other inputs are rationalized by the technical supports of trade firms. The usage of some nutrients and manures with organic characteristics is allowed under the legal agreements and the cultivation contracts with the producers. The research results represented that the share of material expenses in organic production is mostly lower than conventional production. Also, the fuel consumption is lower in organic farming than conventional (Tanrivermiş *et al.*, 2004). Organic production therefore is a system of production that includes or excludes certain inputs and/or common agricultural practices (Scialabba and Hattam, 2002). All these agricultural practices and agri-environmental policy implementation focused on controlling water pollution from farm chemicals, minimizing residues on foods and maintaining soil productivity and thus, the organic farming may contribute the sustainable use of agricultural resources.

CONCLUSIONS

The planted area of organic farming has reached to 162,193 ha and a small percentage (0.63%) of the total farmland has been converted to organic industry in Turkey. Turkey has suitable conditions for the rapid growth of organic industry from the viewpoints of crop diversity, farm chemical usage amount in agriculture, farm structure and market opportunities. Organic farming, which is carried out through contractual relations, is supported by projects of trade and processing firms.

Trade and certification organizations active in Turkey also provide technical assistance for producers on proper organic farming techniques. The organic farming is mainly realized for export markets and the volume of domestic market is limited due to the per capita income, environmental and health risk awareness and other socio-economic factors. It is expected that with increasing health and environmental awareness in the society and real income per capita, demand in domestic market towards organic products will also be risen considerably in the near future. A few food retailers have started to introduce organic products to their customers in domestic market. Due to the high price premium for organic products in the domestic market, development trends of organic products is growing less than the foreign market. Changing consumer demand towards fresh and processed organic products has also been influenced by the structure of organic farming, processing industry and marketing institutions.

A growing number of farmers have a tendency to convert their production techniques to organic, presumably having considered the economic implications on their farm. In fact 1% of the total conventional farmland will be converted to organic industry in short run and thus, the overall capacity of organic industry is insufficient compared with the size of conventional agricultural sector. The size of organic agriculture is restricted by various factors in Turkey as well as other developing countries. The basic factor which limits the production capacity of organic farming is the fact that foreign demand and especially domestic demand for these products has not increased gradually. Additionally, the capacities of the trade and processing firms in organic industry are also limited. In respect to the producers, it was observed that they have the capability of increasing the organic production area and quantity of production. Producers converting to organic production have to assess the economic problems and risks associated. Unknown factors such as site-specific yield levels during and after conversion, future perspective about price premiums and support levels in the longer term are important considerations for economic sustainability.

Since organic production in Turkey can be said to be relatively new, socio-economic researches carried out on farm level in this area has started in the last decade. As a result, the organic farming can make a positive contribution to current agricultural and environmental policy objectives. The hypothesis of this article was tested by using the researches results and macro indicators of the organic industry. The researches evidences considered here indicate that organic farming

has positive impacts on farmers' welfare, farm structure and environmental management when compared to conventional farming. The key conclusion of the researches is represented that organic production can remain a viable alternative to conventional farming from the viewpoint of yield loss, labor requirement, external input use, variable cost, gross and net profit per unit of products or per hectare of planted area in Turkey. These researches results represented that organic farming achieved a satisfactory level of gross and net profit per hectare of planted area or per unit of product. However, these farms need to use more of production factors such as labour, organic fertilizers and lime than conventional farms do, in order to achieve the more satisfactory results. Thus, organic farming may be easily adopted and producers adopted organic farming not only as an economic activity but also as a life style. The reviewed research results indicated that average yields of organic crops are generally low (except some crops), prices received by farmers and labor requirements are high and the net profit per hectare of planted area is higher than the conventional farming in Turkey. In these circumstances, it is seen that organic farming has a positive contribution to farmer's welfare, in general organic producers tend to maintain and to expand the organic activities on farms. The results of these researches findings may help to remove the doubt of policymakers, producers and producers association on the organic farming. Also, the organic farming serve as an environmentally sound production techniques by the way of the less or no tillage of soil, limited or no use of external inputs, effective use of crop rotation, biological and mechanical control of pests and rational use of water on converted farms. By this way, dependency of agriculture on industrial inputs will be decreased and the majority of agricultural surplus will be saved by producers.

The economic performance of organic farming will depend upon the agricultural policies and the market conditions. The price premium for majority of organic products is absorbed by decreased yields and producers stated that the price premium is not sufficient generally. For this reason, the numbers of organic farmers will be changed in future based on the amount of price premium and state support particularly totally market-oriented activities in the western part of Turkey. In order to develop organic farming and to increase its contribution to the standard of living of the producer, the technical, financial and social supports of the government could be given to producers for enhancing organic farming. The state support should be equal to the producer willingness-to-pay for converting their current intensive

farming to organic industry. It should be noted that there is not a research result indicated that producer willingness-to pay for converting of production techniques to organic industry. Furthermore the communication and cooperation between producers, firms and state institutions, should be strengthened. For the aim of the coordination of foreign trade and market research, the sectoral foreign trading firm may also be established. Since the expectations of the organic producers from the economic organizations are different from those of conventional farmers, these producers should have professional organizations making different economic decisions and developing policies. The organic producers should be organized according to products and regions at local and regional levels under Co-operative Law numbered 1163 and/or Agricultural Producers Law numbered 5200 in Turkey. Producer's union or cooperatives for this purpose may be established. For example, the organization of organic producers should have especially storage and packaging facilities. Also, it is essential that individual producers and/or producer's organizations should keep the physical and financial production records on their organic production activities and keeping of records should be supported by the concerned agencies.

REFERENCES

- Akgüngör, S., 1991. Organic Farming and Economic Analysis, In: Ecological (Organic, Biological) Farming, ETO, Eds: Aksoy, U. and A. Altındışli, Izmir, pp: 105-113 (in Turkish).
- Akgüngör, S., 1996. Yields, Costs and Marketing of Ecologically Produced Sultanas Grape in Turkey: The case of Salihli and Kemalpaşa Districts, Can Ofset, Izmir (In Turkish).
- Akgüngör, S., B. Miran, C. Abay, E. Olhan and N.K. Nergis, 1999. Estimation of the Potential Demand of Environmentally-friendly Products for the Consumers in the Provinces of Istanbul, Ankara and Izmir, Agricultural Economics Research Institute, Publication No. 15, Project Report: 1999-3, Ankara (In Turkish).
- Altieri, M.A., J. Davis and K. Burroughs, 1983. Some agro-organical and socio-economic features of organic farming in California: A Preliminary Study. *Biol. Agric. Hort.*, 1: 97-101.
- Akkaya, F., H. Tokgöz, B. Sayin and B. Özkan, 2001. Production and marketing of organic agricultural products in Turkey. In: Proc. of Second Organic Farming Symposium, November 2001, Antalya, pp: 14-16 (In Turkish).
- Aksoy, U., 2001. General Situation of organic farming. In: Proc. of Second organic farming symposium, November 2001, Antalya, pp: 14-16 (In Turkish).
- Anil Ş. and R. Yalçın, 2004. Organic farming researches in Turkey, *Türktarım Dergisi*, Ankara, pp: No.156 (In Turkish).
- Anonymous, 1990. Organic Farming: Current Technology and Its Role in a Sustainable Agriculture, American Society of Agronomy, Crop Sciences Society of America and Soil Sciences Society of America, USA.
- Anonymous, 2002. A Regulation on the Principles and Implementation of Organic Farming, TC Resmi Gazete No. 24812, Date: 11.07.2002, Ankara (In Turkish).
- Anonymous, 2004. Organic Farming Law, Law No. 5262, Adoption Date: 1.12.2004, Ankara.
- Anonymous, 2005a. A regulation on direct income payments for crop farming (Regulation No: 2005/21). TC Resmi Gazete No: 25801, Date: 30.04.2005, Ankara (in Turkish).
- Anonymous, 2005b. Statistical data of organic products, general directorate of agricultural production and development. Ministry of Agriculture and Rural Affairs. Ankara, (In Turkish).
- Anonymous, 2005c. Statistical data of organic products. The Prime Ministry of Turkey, The Undersecretary of Foreign Trade Export Promotion Centre (IGEJ.1E). Ankara, (In Turkish).
- Besson, J.M. (Ed.), 1990. Biological Farming in Europe-An Expert Consultation, REUR Technical Series 12, FAO, Rome, Italy.
- Babadoğan, G. and D. Koç, 2004. Organic Agriculture in Turkey 2004 (Country Report), Republic of Turkey, Prime Ministry, Undersecretary of Foreign Trade, Export Promotion Centre of Turkey (IGEME), Agriculture Department, Ankara.
- Bülbül, M., H. Tanrıvermiş and E. Gündoğmuş, 2001. The Impacts of Agricultural Development on Environment-Problems and their Solutions, National Productivity Centre, *Verimlilik Dergisi* No. 2001/3, Ankara, pp: 171-200 (In Turkish).
- Bülbül, M. and H. Tanrıvermiş, 2002. Comparative Economic Analysis of Conventional and Organic Hazelnut Farming in Turkey, *Berichte über Landwirtschaft*, Band: 80, Heft:2 (Juli 2002), Bonn, Deutschland, pp: 304-320 (In German).
- Cacek, T. and L.L. Langner, 1986. The economic implications of organic farming. *Am. J. Alternative Agric.*, USA., pp: 25-29.
- Daitota, I., 1989. Organic farm markets a come back and money. *Development Forum*, 17: 24.

- Demirci, R. and H. Tanrivermiş, 2005. Agricultural cooperatives and producer unions in producer organizations in Turkey: Inter-organizational relations, competitions and their problems. In: XVIII. International Turkish Cooperative Congress, Turkish Cooperative Association Publication No. 98, Ankara, pp: 31-59.
- Demirci, R., H. Tanrivermiş, A. Erkuş, N. Parilti and E. Gündoğmuş, 2006. Economics and Future Development of Organic Farming in Turkey. Ankara (In Press) (In Turkish).
- Dolun, L., 2003. Organic Farming, Research Report No. SA03315, Development Bank of Turkey, October 2003, Ankara (In Turkish).
- Gündüz, M., 1994. Organic Farming in Turkey and in the World, Organic Markets and An Evaluation for Turkish Export, IGEME, Ankara (in Turkish).
- Gündüz, M. and D. Koç, 2003. Organic Agricultural Products from Turkey, Brochure, IGEME, Ankara.
- Heissenhuber, A. and H. Ring, 1992. Economical Aspects of Organic Farming, *MEDIT Anno: 3, Numero: 2*, Bologno.
- Keipert, K., A. Wedler and G. Overbeck, 1990. Alternative cultivation of apples and vegetables. *Schriftenreihe der Landwirtschaftskammer Rheinland*, Bonn, Germany, pp: 195.
- Klepper, R., W. Lockeretz, B. Commoner, M. Gertler, S. Fast, D.O'Leary and R. Blobaum, 1977. Economic Performance and Energy Intensiveness on Organic and Conventional Farms in the Corn Belt: A Preliminary Comparison, *Am. J. Agric. Eco.*, 59:1-12.
- Koç, A., N. Akyil, E. Ertürk and M.U. Kandemir, 2001. A Research on Organic Product Demand in Turkey, In: Proc. of Second Organic Farming Symposium, 14-16 November 2001, Antalya (In Turkish).
- Koç, A., H. Tanrivermiş, F. Budak, E. Gündoğmuş, I.H. Inan, A.Kubaş and B. Özkan, 2002. Pesticides Use in Turkish Agriculture: Inefficiency, Problems and the Impacts of Alternative Regulations, Agricultural Economics Research Institute, Publication No. 63, Project Report: 2002-4, Ankara (In Turkish).
- Lampkin, N.H. and S. Padel, 1994. The Economics of Organic Fanning, an International Perspective, CAB International, Aberystwyth, UK.
- Lampkin, N. and M. Measures, 1999. Organic Farm Management Handbook, 3rd Edn., Aberystwyth, UK.
- Lindner, V., 1992. 13-Year Comparative Trials Between Biological-dynamic and Conventional Vegetable Cultivation, Comparative Observations of Cultivation Techniques for Various Types of Vegetable, Bonn, Germany.
- Nicely, R., 2001. Turkey Organic Products. Organic Food Reports, United States Department of Agriculture Foreign Agricultural Service Global Agricultural Information Network Report, USA.
- Olhan, E., S.Gün and Y.Ataseven, 2005. Organic Farming in Turkey. *Pak. J. Biol. Sci.*, 83: 505-509.
- Rehber, E. and Ş. Turhan, 2002. Prospects and challenges for developing countries in trade and production of organic food and fibers: The case of Turkey. *Br. Food J.*, 104: 371-389.
- Scialabba, N. and C. Hattam, 2002. Organic Agriculture, Environment and Food Security, FAO Environment and Natural Resources Service Sustainable Development Department, Rome, 10.
- Tanrivermiş, H., 2000. Economic Analysis of Pesticides Use in Tomato Farming in the Middle Sakarya Basin, Agricultural Economics Research Institute, Publication No. 42, Project Report: 2000-3, Ankara (In Turkish).
- Tanrivermiş, H., R. Demirci, E. Gündoğmuş and A. Erkuş, 2004. A comparative economic analysis of major organic and conventional crop farming and approaches to development of organic farming in Turkey. In: Proc. of Turkish V. Agricultural Economics Congress, Tokat, pp: 207-219. (In Turkish).
- Tanrivermiş, H. and M. Bülbül, 2006. The role of agriculture in Turkish economy before accession to European Union. *Agrarwirtschaft German J. Agric. Eco.* (In Press).
- Tremel, S., 1995. Wirtschaftliche bedeutung des ökologischen landbaues in der brmdesrepublik deutschland, deutsch-tfukische agrarforschung symposium. Redaktion: U. Planck. Verlag Ulrich E. Grauer. Stuttgart, Deutschland, pp: 39-46.
- Webster, J.P.G. and R.G. Bowles, 1996. Estimating the economic costs and benefits of pesticides Use in apples. Brighton Crop Protection Conference 1996 Pests and Diseases, British Crop Protection Council, Brighton, UK, pp: 325-330.
- Yamanoğlu, A., 2005. A comparative analysis of conventional and organic anise and cummin farming in Dazkiri District of Afyon Province. Graduate School of Natural and Applied Sciences. Ankara University, M.Sc. Thesis, Ankara (In Turkish).