

## **BENEFIT/COST ANALYSIS OF MUSHROOM PRODUCTION FOR DIVERSIFICATION OF INCOME IN DEVELOPING COUNTRIES**

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### **Abstract**

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This study presents benefit/cost and SWOT analyses of mushroom production in developing countries as diversification of rural income; a case study in Konya, Turkey. Data were obtained through a survey method by application of 33 questioners. Benefit / Cost Analysis and SWOT analysis were used as methods. In research area, the average production area was determined as 1135.1 m<sup>2</sup>. A majority (76.9 %) of the business in the province have four production periods annually. The average yearly output of the business was 45.4 kg/m<sup>2</sup>, that periodic output was 11.6 kg/ m<sup>2</sup> and that compost output was 256.6kg/ton. The cost of 1kg mushroom as an average of business was USD 1.36 that its average sales price was USD 1.54. Strengthening mushroom production sector could be essential in order to enable the rural economy to keep its vibrancy and development, increasing and diversifying business and employment opportunities in the rural areas, and providing income opportunities for disadvantageous groups, small family farms.

*Key words:* Mushroom, Benefit/Cost Analysis, Rural Development, SWOT, Turkey

### **Introduction**

Most of the world's poor are in, or employed mainly on, family farms. The objectives of rural development in developing countries are mainly diversification of rural income and attaining a competitive structure for agriculture in order to increase job opportunities and development. Small family farms are disadvantaged groups since they do not have enough land to produce crops and raise animal. Also rural environment can be protected by improvement of Environmental-Friendly Agricultural Practices. Especially, farmers in forest villages both do not have agricultural land and have to protect forest ecosystems. In this case, for developing and ensuring the sustain-

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nability of living and job conditions of rural community in their territory in compatible with urban areas, on the basis of utilizing local resources and potential, and protecting the environmental and cultural assets, mushroom production could be very good opportunities in developing countries.

Mushroom production can be meaningful to the extent that non-agricultural job and income opportunities. Intensive type of mushroom production could provide good alternative income opportunities for small family enterprises since they do not have adequate land to produce crops and raise animal. Also, mushroom production gives additional/alternative income to farmers looking for a value-added product and a way to supplement farm income while making

use of by products or co-products from other crops. Since mushrooms can be grown on nearly any type of agricultural and forestall residue, they are an ideal crop for rural areas with large amounts of cultivated hectare and residue from field crops. By taking into consideration of drought problem in some countries, mushroom production could help soil and water conservation too. At the same time mushroom demand increasing due to health consideration. Many drugs and dietary supplements contain at least some component produced from fungi because of their immune system enhancing qualities (Fungus among Us, 2005). Conjugated linoleic acid is found in mushrooms, and the study indicated it can stop cancer cell growth through blocking cancer cell reproduction (Chen et al., 2006).

In the world mushroom production started in the 1800's. The demand of mushroom has been increasing due to population grow, market expansions, changing of consumer behavior, and developments in the manufacturing industries, storage, transportation, and retailing. Gradually, the world mushroom production has reached 33.4 million tons in 2007 while it was 26 million tons in 2000. China, United State of America and Netherlands rank as the first threes in mushroom production in the world. Nearly 42% of the world mushroom production takes place in China, 12 % in the USA, and 8% in the Netherlands (Anonymous, 2007). In Turkey, the history of mushroom production is very brief. In subsequent years, with the public sector as well as the private sector investing in mushroom production, and conducting promotional activities, the production has increased with every passing day. In fact, mushroom production which had been approximately 80 tons in 1973 rose to 1400 tons in 1983, to 3052 tons in 1991, to 7728 tons in 1995, and to 10000 tons in the recent years (Erkel, 2004). In developing countries as Turkey, mushroom production is not wide separated. For example, mushroom production is mainly common in the regions of Marmara, and Aegean. Usually, mushroom enterprises are small size. Throughout Turkey, 82.4% of mushroom enterprises have less than 1000m<sup>2</sup> (Erkal and Aksu, 2000). Although mushroom consumption is increasing, and lack of farm land, drought problem, and

high mushroom price pushing farmers to produce mushroom, the sector is not growing in Turkey. Various studies have been done in Turkey and other developing countries, regarding production, marketing, and business structure of mushroom (Simsek., 1988; Griensven, 1988; Aksu et al., 1996; Isik et al., 1997; Hamm 1998; Demir and Uzun, 1998; Ozkan et al., 2000; Gungor et al., 2000; Akkaya et al., 2001; Ozcatalbas et al., 2004; Erkel, 2004). Former studies were usually concern on the situation of mushroom enterprises especially cultivation.

This study presents benefit/cost and SWOT analyses of mushroom production in developing countries as diversification of rural income; a case study in Konya, Turkey. Also, some measurements in accelerating mushroom production in developing countries were determined.

## **Material and Method**

The main material of the study consists of the original data obtained by a survey method from the mushroom enterprises in Konya. The number of enterprises in the province was few (23 units); all of them were interviewed for data collection. The mushroom production techniques were similar except amount of cultivation areas, the materials used in the production rooms, and the physical appropriateness. Therefore it was considered useful to analyze the data by dividing the enterprises into two groups ( $\leq 1000$  m<sup>2</sup> and  $> 1000$  m<sup>2</sup>) according to the size of production area. Konya province where the data were collected is a rural area in Middle Anatolia, Turkey. Konya population increased up to two million in 2008 and mushroom consumption has been increasing. In the area, most mushrooms are grown in a compost produced using chicken manure, straw, and minerals. Almost all of the mushroom farmers purchase compost from other farmers. Mushroom spawn is mixed into the compost, and then the compost is placed in tiered beds inside light, temperature, and humidity controlled buildings.

Mushroom farming could be one of the most important agricultural activities in Konya since the con-

sumption is increasing and drought is main problem in the area. Mushroom production can be considered the leading cash crop in Konya since almost half of Konya's mushroom sales came from other cities. Some potential growers are becoming concerned that the decreasing of mushroom profitability and the future of the mushroom industry in Konya. The cost analysis of mushroom was examined by fixed costs and variable costs (Kiral et al., 1999). In the calculation of the variable costs, the costs realized were taken into consideration, and on the other hand, as the opportunity cost of these expenses the interest on the working capital has been calculated. The rate of spot agricultural loan interest of Ziraat Bank (18.5 % for 90 days) was accepted for the interest rate on working capital. It was calculated over its half based on the assumption that the variable costs are spread homogeneously within the period. In the scope of fixed costs, the rental paid for leased buildings, has been taken as expense where the interest on depreciation and building capital do not need to be calculated. For the owner of real estate buildings, amortization was calculated according to the straight-line method. Due to the fact that amortization was calculated according to the straight-line method, the interest on fixed capital was calculated over half of their values (Kiral et al., 1999). Since the data values were related to the end of year, the interest on fixed capital were calculated according to the reel interest rate (5 %). The financial results of the study was calculated on the basis of the national money unit, and then, the results were reported by converting to US Dollar at the average exchange rate over the research period (average 1 USD = 1.43 Turkish Lira) of The Turkish Republic Central Bank.

## Results and Discussion

### The characteristic of mushroom enterprises managers

The most of mushroom business managers, about 69.2 %, were in the 31 to 40 age group. It was followed by the producers in the age 41 and over group with 23.1 %, and by the 20 to 30 age group with 7.7

%. From this point, we can say that **mushroom production could give employee and business investment opportunities for youth and mid-age people in rural area in developing countries.**

Even though mushroom production seems to be professional job, it was observed that the managers who were graduates of elementary and high schools (30.8% elementary school, 30.8 % high schools) formed the majority (61.6%) of the business, so **mushroom production can be managed by people who have lower level education in rural area. They may need short time training on mushroom production.** When the question of "How many years are you involved in this business?" was raised to the business managers, a large majority of about 46.1 %, expressed that they had an experience of 1 to 5 years. It was determined that 30 % of business managers had an experience of 6 to 10 years, 23.1%, of 11 + years.

### The structure of mushroom enterprises

In research area, the average mushroom production is about 602.9m<sup>2</sup>; average room number was 4.3, while average production area of the rooms was 263.5m<sup>2</sup>. The average number of the rooms was 2.3 and average production area in the rooms 263.7m<sup>2</sup> in the group with the size of 1-1000m<sup>2</sup>. The average production area was 1756 m<sup>2</sup>; number of the room was 6.7 and production area in the rooms 263.4 m<sup>2</sup> in the group > 1000 m<sup>2</sup>. In business size groups, it was seen that room sizes were almost the same, but there were some differences in terms of room numbers. The mushroom production period was stated to be 65 to 70 days as 4 periods in the province. In general, 76.9 % of all business enterprises carried out the mushroom production in 4 periods. That was 85.7 % of the businesses in 1-1000 m<sup>2</sup> group, and 66.7 % of the business in > 1000m<sup>2</sup> group. It is possible to produce 5 times a year depending on available workforce, raw material and demand. It was stated that, the mushroom production periods were mainly affected by demand. The producers planning the production periods in conformity of the market demand. The capital structure of the business was 135972.30 USD in average as assets. That consisted by 73.1 % of building capital, 18.4% tool-machinery capital, 2.9

% plant capital, 2.8 % cash and receivable capital. More than half of active capital consists of building capital. The reason of higher percentage in building capital arises from the fact that the mushroom production is made in closed conditions in rooms to ensure the necessary climatic conditions. It was determined that 4 business enterprises in the province owned their buildings while the others produced in workplaces they rented in industrial areas, in rooms which are necessarily insulated.

The values of the rented buildings were indicated in the assets; on the other hand, its equivalent in liabilities was shown in debt side. There were some differences in capital structure of the business size groups. Especially, for the business size group with a production area of 1001 m<sup>2</sup> and over, as a result of using the materials in higher quality and appropriate standard in the buildings, was higher of the values. Liabilities and Capital indicates the sources of the assets. In the business size groups, the structure of liabilities and capital presents difference. In business size group of 1000m<sup>2</sup>, while 64.6 % of liabilities and capital consists of long term liabilities, 35.4 % was owner's equity. The matter affecting this situation was the fact that most of the businesses in this business size group rent their building where they perform production. In this business size group, business managers have stated that they have no current debts. In business size group of 1000 m<sup>2</sup> and over, 74.1 % of Liabilities and Capital consists of owner equity, 17.42 % long term liabilities, 1.1 % current liabilities. As average of all business enterprises, 74.1 % of liabilities and capital consists of owner equity, 25.1 % long term liabilities, and 0.8 % current liabilities.

The mushroom production obtained by the enterprises in one production year consists of the total of the mushrooms produced during different production periods were given Table 1.

From the quantity of mushroom production obtained annually by the businesses included in the scope of study, gross production values was calculated as a result of multiplying the quantity of product sold by its sale price. Even though the sale of composts used in the businesses in the scope of study was possible, it was stated that, in the businesses, compost was no longer sold, but was either given to the farmers or discarded. Hence, the gross production values of the businesses completely consist of mushroom sale values. In the business size groups, gross production value was calculated as USD 43701.6 and USD 129547.8 and USD 83322.9 was the average value of all businesses.

#### Benefit/cost analyses of mushroom production

In order to determine whether the businesses producing mushroom were profitable or not, cost analysis of mushroom production was carried out and production cost and profitability cases were given in Table 2 in respect to business size groups. Production cost varied between USD 32230.0 and USD 114535.8, while this value was USD 70189.5 as average of all businesses. In business size groups, while 88.5 to 87.1 of production cost consist of variable costs, 11.5 % to 12.9 of it was fixed costs. Whereas the average production costs of the business enterprises was formed by 87.4 % of variable costs and by 12.6 % of fixed costs. These results display that mushroom was produced at lower costs in the business group of the size 1-1000 m<sup>2</sup>. Normally, while it would be expected

**Table 1**  
**Gross product value of mushroom production and productivity of the businesses**

Sizes of the businesses, m <sup>2</sup>	Production, kg/year	Not sold or lost amount, kg/year	Gross product value, USD	Productivity		Compost productivity, kg/ton
				Annual productivity, kg/ m <sup>2</sup>	Period productivity, kg/ m <sup>2</sup>	
1-1000	29333.3	50.0	43701.6	46.9	10.8	255.8
1001-+	82433.3	466.7	129547.8	41.7	12.6	256.9
Average	51584.6	238.5	83322.9	45.4	11.6	256.6

**Table 2**  
**Mushroom production costs in the business investigated**

Costs elements	Business size groups, m <sup>2</sup>				Average of all businesses	
	1-1000		1001-+		businesses	
	US \$	%	US \$	%	US \$	%
<b>Variable Costs</b>						
Compost+Misel	17182.8	53.3	54778.5	47.8	34534.7	49.2
Covering Soil	2807.2	8.7	10362.4	9.0	6294.3	9.0
Chemicals	324.7	1.0	1078.1	0.9	672.4	1.0
Water	294.7	0.9	786.7	0.7	521.8	0.7
Energy	2642.4	8.2	9089.7	7.9	5618.0	8.0
Packaging	67.9	0.2	343.8	0.3	195.2	0.3
Machine Equipment, Repair - Maintenance	1375.3	4.3	344.7	0.3	820.3	1.2
Temporary labor	1408.6	4.4	14009.3	12.2	7224.3	10.3
Others (residue cleaning, etc )	-	-	559.4	0.5	258.2	0.4
Opportunity Cost (%18.5)	2414.5	8.5	7390.7	6.5	5192.9	7.4
Total Variable Costs (1)	28518.1	88.5	99802.9	87.1	61332.2	87.4
<b>Fixed Costs</b>						
Overhead (1*%3)	855.5	2.7	2,994.1	2.6	1840.0	2.6
Family Labor Fee Equivalent	535.6	1.7	475.4	0.4	507.5	0.7
Machine –equipment amortization	627.3	1.9	3067.0	2.7	1753.4	2.5
Machine –Equipment. Capital Interest	156.9	0.5	766.8	0.7	438.3	0.6
Building Amortization	21.5	0.1	1981.3	1.7	936.0	1.3
Building Rent	1034.0	3.2	2022.2	1.8	1490.1	2.1
Building Capital Interest	366.5	1.1	3228.0	2.8	1738.8	2.5
Building Repair Maintenance	114.9	0.4	198.1	0.2	153.3	0.2
Total Fixed Cost (2)	3712.2	11.5	14732.9	12.9	8857.3	12.6
<i>Total Production Coast 1+2</i>	<i>32230.3</i>	<i>100.0</i>	<i>129547.8</i>	<i>100.0</i>	<i>70189.5</i>	<i>100.0</i>
Gross Product Value	43701.6	-	-	-	83322.9	-
Gross profit	15183.5	-	29744.9	-	21990.7	-
Net Profit	11471.3	-	15012.0	-	13133.4	-
1 kg Mushroom Cost US \$	1.10	-	1.39	-	1.36	-
Average Sale Price	1.50	-	1.59	-	1.54	-

that cost in larger business enterprises would be lower, the reason of higher cost was the fact that some businesses in this group had production for 3 periods in a year according to the market demand. Additionally, due to higher building and machinery expenses as those owning their production rooms have built these rooms in accordance with the standards, as a result of higher building and machine expenses, the rise in the quan-

tity of the interest of building capital, amortization and fixed capital per unit product increases the costs. When the sale price of mushroom produced in the businesses was studied, it was calculated as average USD 1.50 in 1000 m<sup>2</sup> business size group, USD 1.59 in 1001 m<sup>2</sup> and over business size group, and 1.54 USD in average of all businesses. The reason of different sales price in business size groups was the fact

that the mushrooms cultivated by producers in small size business group were generally marketed by the enterprises of the large size business group.

As given in the section of cost analysis of mushroom production, the average sale price of mushroom in the businesses included in the study was 1.54 USD/kg. However, in the district bazaars of the province Konya, the sale price observed in the survey period (The price paid for by the consumer) was 2.45 USD/kg. When the price of the producer is compared to the price paid by the consumer, it appears that the marketing margin of the mushroom for the province Konya was USD 0.91. Accordingly, 37% of the price that the consumer pays does not reach the producer. When the prices at the grocers, supermarkets, hypermarkets and large consumer centers are taken into consideration (2.80-3.50 USD) the marketing margins increase further. The average values of the annual mushroom productivity, the periodic productivity and the compost productivity for all the businesses were determined as 45.4 kg/m<sup>2</sup>, 11.6 kg/m<sup>2</sup> and 256.6 kg/ton, respectively.

The compost productivity was found to be 226 kg/ton for the businesses of 501-1000m<sup>2</sup> size group in Turkey (Erkal and Aksu, 2000). This means that the compost productivity of Konya was greater than the average of Turkey. The average cost and selling price of 1kg mushroom was respectively determined as \$1.36 and \$1.54 as an average of all the mushroom producing businesses. Thus, a profit of 0.18 USD is obtained against a production cost of \$1 which means an 18 % profit rate.

#### **Market structure of mushroom production**

Concerning marketing, all producers complain about the decrease and instability in the sales prices despite the regular cost increases. On the other hand, it was stated that the mushrooms brought from the other district of Turkey and its vicinities and introduced to the market at lower prices have diminished the competition power of the producers and also brought along the issue of their no longer being effective in price determination. The other problems related to marketing were the negativities met in collecting payment in exchange for the product (deferred

payment sale, delays etc) and deficiencies in marketing organization.

The most important problem of the producers who cultivate by renting a workplace was the lack of places such as organized industrial areas, where the producers are together and where necessary buildings are built for producing mushroom. As there is no such structuring, production rooms are formed by renting empty workplaces and making necessary alterations. In that case, due to bad smell released from waste compost the industrialists operating in other areas are disturbed and furthermore environmental problems also appear.

#### **SWOT Analyses of Mushroom Production**

A SWOT analysis of mushroom production has been done as follows in order to determine opportunity of mushroom production growing in rural areas.

#### **Conclusions**

The demand of mushroom increased with the respect of fast population grows and business managers, especially in the recent years, have started to produce for the large amount of supermarkets in Konya. Although mushroom producers don't have an association or cooperative, they had a strong cooperation with themselves and the university in Konya. The mushroom production in Konya was mostly performed by managers of the middle-age group from every education levels; however the ratio of the primary and high-school graduates was higher than the others. The average production area of the mushroom producing businesses in Konya was determined as 1135.1m<sup>2</sup>. The research (Erdal and Aksu, 2000) performed in 1999 stated that the 82.6 % of the mushroom businesses in Turkey had a production area of less than 1000m<sup>2</sup>, thus, the production area per company in Konya was above the average for Turkey. The mushroom production was performed in the facilities rented in the industrial district of the city which caused environmental problems due to wastes and bad odor emitted during production. Consequently, allocating a special area within the province to the mushroom producers is important for preventing the environmental

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Abundance potential for product diversity in rural area,</li> <li>• Diversity of raw materials for mushroom production,</li> <li>• Rural labor force potential,</li> <li>• Low environmental pollution and existence of potential for organic agriculture,</li> <li>• Richness of mushroom production and consumption culture,</li> <li>• High potential in respect of mushroom consumption by youths</li> <li>• The experience obtained in European Union's rural development projects,</li> <li>• Increasing supports of Ministry of Agriculture engaged in rural development,</li> <li>• Small scale and fragmented agricultural holdings</li> <li>• Insufficiency of capital and financial resources,</li> <li>• Low soil quality, widespread erosion, and inappropriate utilization of land resources due to ignoring of soil capability,</li> <li>• Problems regarding balance of conservation-utilization of natural resources (land, water, forest, pasture and grassland, fishery resources etc.),</li> <li>• Structural problems of agriculture</li> <li>• Prevalence of poverty in rural settlements, especially in forest villages</li> </ul>	<ul style="list-style-type: none"> <li>• High dependency of rural income sources on agricultural activities (crops and animal production)</li> <li>• Low education level and low schooling ratio of rural population,</li> <li>• Inadequacy of alternative agricultural training and extension services, and cooperation,</li> <li>• Difficulties in conformance with standards and quality of mushroom,</li> <li>• Problems regarding mushroom industry integration and in efficiency of marketing activities,</li> <li>• Necessity of improving efficiency of education, health and social security services,</li> <li>• Insufficiency of rural infrastructure and modernization requirements of the existing infrastructure,</li> <li>• Inadequate coordination between public institutions providing services to rural population.</li> <li>• Lack of technological development on mushroom production</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Development trends of mushroom industry,</li> <li>• Increasing consumer consciousness and demand for healthy, quality and organic products,</li> <li>• Development of mushroom production on the basis of domestic and foreign demand,</li> </ul>	<ul style="list-style-type: none"> <li>• Changing trend in agricultural support policies,</li> </ul>

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| <ul style="list-style-type: none"> <li>• Increasing tendency for demand of mushroom,</li> <li>• Increasing interest in protection and improvement of environment,</li> <li>• Accessibility to European Union, and domestic funds,</li> <li>• Enhanced opportunities to access foreign markets,</li> <li>• Progress in production, and processing technologies,</li> <li>• Creating strong functional relations between urban and rural areas,</li> <li>• Increasing concern for the empowerment of local support and improvement of public administration for mushroom production.</li> </ul> | <ul style="list-style-type: none"> <li>• Migration of young from rural areas, loss of productive factors and ageing population,</li> <li>• Increasing pressure of rapid urbanization, and industrialization,</li> <li>• Rising input prices in the world,</li> <li>• Growing intra and inter-regional development disparities,</li> </ul> |
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pollution and for the synergy of the producers.

In accelerating mushroom production in developing countries depending on local resources and the following issues have gained more importance to create the investment support to mushroom enterprises;

- Improving local knowledge and skill
- Strengthening cooperation and partnership based on local mushroom production
- Enhancing entrepreneurship culture and empowerment of the productivity of rural community
- Establishing the value added chain of mushroom from farm to the final consumer,
- Developing production technology and increasing productivity,
- Ensuring low cost raw material needs of mushroom production,
- Utilizing the potential of mushroom industry by meeting the expectations of consumers at unique markets
- Increasing the efficiency of storage, transportation, packaging, labeling, promotion and marketing activities of mushroom,

**Strengthening mushroom production sector could be essential in order to enable the rural economy to keep its vibrancy and development, increasing and diversifying business and employment opportunities in the rural areas, and pro-**

#### **viding income opportunities for disadvantaged groups, small family farms.**

Those mainly depending on local opportunities and circumstances, supporting microenterprises, strengthening structures for processing mushroom in parallel with developments in consumer preferences. On the other hand, the local knowledge and experience in mushroom production have the potential to provide significant opportunities to develop micro enterprises and entrepreneurship. Vocational training opportunities shall be provided in order to develop human resources in addition to the investment supports for mushroom production.

Taking necessary precautions can be advantageous in order to further improve the mushroom production. These measures can be listed as in the follows;

- The lack of knowledge in cultivation as well as in fighting diseases and pests should be eliminated,
- The mushroom producers are not organized in any manner whatsoever. In the event that an association of mushroom producers is formed in Konya, effectiveness will be obtained in both marketing and price determination,
- The most important input in the mushroom production is the “compost”. Producers face various problems in obtaining the supply of quality and healthy compost. Although some researches related to the

technique of preparing low cost but quality compost have been made, none of them were appropriate enough to be put into practice. The elimination of this deficiency will be useful.

- The structuring market-oriented agriculture, productivity increase in production, and development of food industry are directly affects rural economies in developing countries.

## References

- Akaya, F., I. Yilmaz and B. Ozkan**, 2001. The Economic Analysis of Cultured Mushroom in Antalya Province. *Akdeniz University, Journal of Agricultural Faculty*, **14** (1): 39-51.
- Aksu, S., S. E. Isik and S. Erkal**, 1996. The Improvement and General Characteristics of Cultured Mushroom in Turkey. *5<sup>th</sup> National Conference on the Cultured Mushroom*, Ataturk Central Horticultural Research Institute - Yalova, Turkey.
- Anonymous**, 1995. "Cultured Mushroom and Mushroom Breeding in Netherlands" *Journal of Hasad*, **11**:126-132.
- Demir, A.**, 2003. Mushroom. *TEAE Outlook*. Number: 14. June 2003. Ankara, Turkey.
- Demir, Y. and A. Uzun**, 1998. The Present Situation of Commercial Mushroom (*Agaricus bisporus*) Growing and Some Suggestions on the Improvement of Production Buildings and Complication at Black Sea Region. *Journal of Agriculture and Forestry*, **22**: 273-279. Ankara, Turkey.
- Erkal, S.**, 1992. The Economic Evaluation of Cultured Mushroom Farms in Turkey. *4<sup>th</sup> National Conference on the Cultured Mushroom*, Ataturk Horticultural Research Institute - Yalova, Turkey.
- Erkal, S. and S. Aksu**, 2000. The Structure And Development Trend Of Cultured Mushroom Farms In Turkey. *6<sup>th</sup> National Conference on the Cultured Mushroom Papers*, University of Ege, Bergama Vocational College, Turkey.
- Erkel, E. I.**, 2004. The Determination of Cultured Mushroom Production Potential in Kocaeli, Turkey. *7<sup>th</sup> National Conference on the Cultured Mushroom*, University of Akdeniz, Korkuteli Vocational College, Turkey.
- Erkus, A., M. Bulbul, T. Kiral, F. Acil and R. Demirci**, 1995. *Agricultural Economics*. Ankara University, Agricultural Faculty Issue No: 5, Ankara, Turkey.
- Gungor, H., L. Arin and M. Ugurlu**, 2000. The Production Economics of Cultured Mushroom in Thrace Region, Turkey. *6<sup>th</sup> National Conference on the Cultured Mushroom Papers*, University of Ege, Bergama Vocational College. Turkey.
- Griensven, J. L. D., P. M. Van. Schaper and L. J. Vlieger**, 1988. Sales In: "The Cultivation of Mushrooms" (ed. L. J. L. D. Van Griensven). *Mushroom Experimental Station*. Horst, Netherlands, Pp. 423-445.
- Hamm, R. S.**, 1998. The Future of Mushroom Production in United States: Fewer Producers and Expanding Output. <http://migration.ucdavis.edu/rmn/Hamm2.html>
- Isik, S. E., S. Aksu, E. Damgaci, C. Ergun and S. Erkal**, 1997. Mushroom Breeding. *Ataturk Central Horticultural Research Institute Issue*, No:75 - Yalova, Turkey.
- Isik, S. E., I. Erkel, S. Erkal and H. Cetin**, 1983. The Economic Valuation of Mushroom Breeding. *Ataturk Central Horticultural Research Institute Issue*, No: 4 - Yalova, Turkey.
- Kiral, T., H. Kasnakoglu, F. F. Tatlidil, H. Fidan and E. Gundogmus**, 1999. *The Methodology of Agricultural Product Cost Calculation*. TEAE Issue No; 37. Ankara, Turkey.
- Simsek, A.**, 1988. The Structure and Problems of Mushroom Farms and The Determination of Needed Extension Work in Turkey. *Ataturk Central Horticultural Research Institute Issue*, Yalova, Turkey.
- Ozkan, B., F. Akaya, O. Ozcatalbas and I. Kutlar**, 2000. Mushroom Consumption Pattern Analysis of Consumers in Antalya and Ankara Provinces. *6<sup>th</sup> National Conference on the Cultured Mushroom Papers*, University of Ege, Bergama Vocational College, Turkey.
- Ozcatalbas, O., N. Eker and S. Ozenalp**, 2004. The Mushroom Sector and Its Problems. *7<sup>th</sup> National Conference on the Cultured Mushroom*, 22-24 September Korkuteli/ Antalya, Turkey.
- Erkel, E. I.**, 2004. The Determination of Mushroom Production Potential in Kocaeli. *7<sup>th</sup> National Conference on the Cultured Mushroom*, 22-24 September Korkuteli/ Antalya, Turkey.

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