

*Full Length Research Paper*

# A research on the structure and problems of agrochemical markets in Isparta province

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In recent days, healthy and reliable food has become one of the most important issues. Therefore, social-economic situation and status of agrochemical firms which are important information sources for farmers are examined. In this study, the data obtained from the owners of agrochemical markets in Isparta province were investigated by survey method. Data were evaluated to investigate the employer structure, obtaining selling inputs and credit usage of the firms. 56.2% of these firms were in company form and 6 of them were wholesaler. The agrochemical firms in Isparta region are small scaled newly established and individually owned firms. Most of them operate with their own capital. Agrochemical markets were positively affected by the latest regulations about opening the new agrochemical firms. It may be said that this tendency will be better in the future and agricultural agrochemical firms will employ agricultural engineers. Agrochemical firms are important organizations to inform farmers for new methods and development. Firms were found conscious on the agricultural chemical usage, but the cooperation between the firms and agricultural organization was found to be weak. Level of knowledge about EUROGAP among firm owners was also low. In order to improve the interaction level of firms with other institution and organization, seminar and panels should be organized. The consciousness level of agrochemical firms about production techniques like IPM and EUROGAP were not found to be high. Organizing training programs to increase awareness is important. Information level of farmers about diseases in the region has not developed as desired yet. In the same way, in order to increase the level of knowledge and awareness of farmers, the training programs should be increased to reduce unconscious chemical usage. As a result, one should not forget that any improvement in agricultural drug stores will have reflection on producers as well.

**Key words:** Agrochemical markets, Turkey, structure.

## INTRODUCTION

Chemical use in agriculture has an important role in increasing yield and protecting plants. Agricultural chemical use has considerably increased in the developed countries since 1950s. Recently, detrimental effects of intensive chemical usage in agricultural production systems on the human health have been discovered. Chemicals have negative effects on environment, polluting the ground and underground water and affecting organisms other than their intended target. (Howard et al., 1991; Mullen, 1995). Alternative chemicals are needed for agricultural production. Now,

environmental friendly applications are being implemented with the financial support of European Union. It is expected that such applications will become more widespread in the EU zone (KPMG, 2001).

Chemical remnant and excessive hormone use on fruit and vegetable species in Turkey began to affect the consumer behaviors. With increased income and awareness, consumers have become more conscious on production techniques (Gül et al., 2008). EUREPGAP (Euro Retailer Produce Working Group Good Agricultural Practice) protocol is prepared and implemented to protect consumers in the EU. Turkey has also begun to implement this protocol. Recently, EUREPGAP is renamed as GLOBALGAP (The Global Partnership for Good Agricultural Practice) and began to be used in all over the world. The laws and regulations for import,

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export, production and marketing agricultural chemicals in Turkey began with the enactment of agricultural combat and agricultural quarantine law in 1957 as law 6968. The laws and regulations enacted in 1957 did not change till 1980. Some of the defects and shortcomings have been discussed in several platforms and some solutions were proposed. New arrangements were implemented in 1996 and a rearrangement was made in 2007. A new set of changes have been added to the law 26775 in 2008. The most controversial part of the law was the education level and professional group (chemical engineer, chemist and pharmacist) of a person to get license. Even some people with primary school degree obtained license by exploiting loopholes in the law (Đnan and Boyraz, 2003). Now only agricultural engineers, agricultural technicians are allowed to get agricultural chemical license. There are several studies about agrochemical firms in Turkey (Yılmaz et al., 1995; GAP (Southeastern Anatolia Project) Region; Akbay, 1991; Gül et al., 1998; Adana Province; Yiğit, 2001; Antalya Province; Akta , 2001; zel, 2004;

anlıurfa Province; Đnan and Boyraz, 2003; Konya Province). There are many studies in all over Turkey about agrochemical firms and these studies provide that agrochemical firms are one of the important information sources to provide information and to determine chemical dose (Yurdakul et al., 1994; Yücel et al., 1995; Üremi et al., 1996; Zeren and Kumbur, 1998; Yiğit, 2001; Đnan and Boyraz, 2002; Kadioğlu, 2003; Boyraz et al., 2005; Demircan and Yılmaz, 2005). Because these firms are one of the main reference sources of the farmers, farmers are guided and provided information through these retailers. Therefore, the aim of this study was to investigate the agrochemical retailers. We attempted to determine the current situation, opinions and recommendations of agrochemical firms in Isparta province in Turkey.

## **MATERIALS AND METHODS**

The main material of this research was obtained using face to face interview method in Isparta and districts. According to the database of branch offices of Ministry of Agriculture in Isparta, there are 88 agrochemical firms in the region (Anonymous, 2007). 42 firms of them accepted to be interview (47.72% of total firms). Interviews were conducted from December 2007 to January 2008. Legal situation, employment structure, education level, attitude and behavior of firms and farmers regarding agrochemical retailers were evaluated by considering their facilities in the product marketing stage. The challenges faced by the firms and solutions were investigated.

## **RESULTS**

### **Status of retail owners**

Most of the firm owners interviewed (74%) were from center of Isparta province and most of the firm owners

(95.2%) were male. Most of the owners were university graduates 69.05% (29 persons), high school graduates 19.05% (8 persons), vocational school (agricultural technicians) graduates 9.52% (4 persons) and master's degree graduates 2.38% (1 person). Among university graduates, 64% of them were agricultural engineers and they were mostly graduated from departments of horticulture and plant protection. When asked the professions of the firm owners, about more than 50% owners were agricultural engineers (Table1). Yılmaz et al. (1995) surveyed 207 firms in Adana, Mersin, Đzmir, Aydın, Manisa, Mardin,anlıurfa, Gaziantep, Diyarbakır, Siirt and Adiyaman. They found that 56.72% of firm owners graduated from university. 27.52% of them were agricultural engineers, 21.48% were pharmacist and 12.75% were self-employed person. In the East Anatolian region of Turkey whereas only 17.46% of agrochemical firms were operated by only agricultural engineers and 37.3% of them were operated by pharmacist (Tezcan, 1996).Inan and Boyraz (2003) determined that 67.34% of firm owner interviewed in Konya had university degree and all of them were agricultural engineers. 22.5% of them were agricultural technicians. In a research carried out with agrochemical firms by (Emeli, 2006) in Adana 79% of firm owners were determined as university graduates and 43% of whom graduated from plant protection departments. According to the findings of the researches and the past studies carried out on agrochemical firms, education levels of agrochemical firms and share of agricultural engineers were found to become higher compared to recent years. It can be said that the regulations imposed from 1993 to 1996 by the Ministry of Agriculture on the opening of the agrochemical firms had positive influence, therefore, new regulations may also have positive effects on educational level of agrochemical firm owners and share of agricultural engineers. It may be said that this changing will be better in the future and agrochemical firms will employ agricultural engineers. It may be stated that by providing more awareness on agrochemical use, more appropriate production system in terms of community health will certainly make contribution to the economic growth of country.

### **General structure of the agrochemical retailers**

According to the survey results, 28 firms (66.7% of them) were individually owned companies, 9 firms (21.4% of them) were Limited Companies and the rest (5 firms) were operated as cooperatives. Average experience in agrochemical business was 12 years and each retailer employed 1.8 persons. When capital structures of the firms were investigated, 94.47% of firm capitals were found to have their own capital. Besides, 97.86% of working capital of the firms was domestic capital. 66.93% of firm revenue came from entirely pesticide sales. Other revenue sources were fertilizer sales (19.76%),

**Table 1.** Graduate degrees held by the firm's owners.

Departments	Frequency	(%)
Not agricultural engineer	15	35.7
Horticulture	9	21.4
Plant protection	8	19.0
Agronomy	4	9.5
Agricultural structures and irrigation	2	4.8
Soil sciences	2	4.8
Animal sciences	2	4.8
Total	42	100.0

agricultural machinery and equipments sales (5.24%), agricultural production sales (4.19%) and others (3.88%). The number of the firms which have distributorship rights was 7 (16.7%) in 1990. Most of them obtained certificates at the end of the 1990s. (Table 2) shows the results of the firm owner's opinions about giving the distributorship rights to the agrochemical firms. Among the parameters, being agricultural engineers comes first (30.95%) and it is followed by work experience, being graduated from plant protection department and proficiency in knowledge level, respectively. Most of the firm owners interviewed (73.81%) felt themselves proficient about plant protection issues. Those who did not feel proficient should attend seminars. Upon the assessment of the activity fields of the surveyed firms other than agricultural drug dealership, 22 firms were found to operate on such fields as farming, tiller production, construction, business, insurance and transportation.

### **The cooperation of agrochemical firms with agricultural institutions and level of participation to the agricultural activities**

Agrochemical firms were one of the most important institutions to inform farmers on agricultural pest management and for this reason, the cooperation with agricultural institutions was investigated. Level of interaction was found very low. More than half of the firms interviewed had no interaction with the agricultural faculties. Rest of the firms generally interacted with the local plant protection departments and agricultural directorates in the districts (Table 3). Emeli (2006) studied the relationships of agrochemical firms with others dealers. The relationship between plant protection branches of agricultural province directorates and agrochemical firms was found significant, but the relationship with agricultural faculties was not significant. In the research of Zeren and Kumber (1998) in Mersin province, 44.77% of agrochemical firms were found to

have regular relation, 41.11% of them were found to have rare relation and 11.11% of them were found to have no relation with agricultural institutions. (Table 4) shows the participation level of agrochemical firms in the activities of official institutions. Seminars and promotion activities were determined as the most attended activities.

In a research in Adana province by Emeli (2006) participation level of the agrochemical firms to agricultural activities was found adequate but meetings like field days and conferences were found insufficient.

### **Matters taken into consideration by firms and producers when choosing among pesticides**

Technology and knowledge level have been rapidly increasing in agriculture. From this perspective, the developments about agrochemicals in markets were asked to farmers by survey. 64.29% of dealers were informed through agrochemical firm experts concerning the latest developments. Brochures, extension publications, seminar and internet resources were also used (Table 5).

Advertisement and promotions are important activities to advertise and promote the products in the market. Although job training is important for the firms to satisfy consumers and to improve their quality, 69.05% of the firm owners interviewed was found to be sufficient. Besides, 52.38% of firm owners did not provide any training service to their employees.

More than half of the agrochemical firms interviewed (69.05%) stated that the target of pesticide use was to hold pest population under the definite level. The rest stated that the target was to remove the harmful population entirely. Necessary suggestions on the pests or diseases of agrochemical were asked to owners of the firms. The factors effective in choosing the agrochemicals were determined and ordered according to importance level. Having license of the agrochemical was found to be the most important factor (85.71%). It was followed by

**Table 2.** Firm owners' opinions on the distribution rights to the agrochemical markets.

<b>Things should be paid attention</b>	<b>Frequency</b>	<b>(%)</b>
Distribution rights should be given to graduates from faculties of agricultural	13	30.95
Experience should be considered	8	19.05
Graduated of department of plant protection should be preferred	6	14.29
Knowledge level of persons should be considered	5	11.90
Controls should be performed	4	9.52
Economic level of distributors should be considered	3	7.14
Distribution rights should be accompanied with diploma of distributors	2	4.76
Proficiency exam should be repeated in every year	2	4.76
Number of agrochemical market in the region should be considered	2	4.76
Distribution rights should be given to persons who pay attention to the conservation of productions	1	2.38
Distribution rights should be given the persons who care the human health	1	2.38

**Table 3.** Cooperation with institutions.

<b>Cooperation institutions</b>	<b>Every day</b>	<b>Once a week</b>	<b>1-2 times a month</b>	<b>4 times a year</b>	<b>1-2 times a year</b>	<b>Never</b>	<b>Total</b>
Agricultural faculty	2.38	2.38	14.29	9.52	19.05	52.38	100.00
Plant protection department of agricultural directorates	2.38	16.67	35.71	14.29	14.29	16.67	100.00
Agricultural directorates in districts	9.52	21.43	30.95	7.14	9.52	21.43	100.00
Plant protection research institution	2.38	2.38	2.38	2.38	19.05	71.43	100.00
Total	4.17	10.71	20.83	8.33	15.48	40.48	100.00

**Table 4.** Participation to the meetings concerning agricultural activities by agrochemical markets.

<b>Activities</b>	<b>In the last 6 months</b>	<b>In the last 1 year</b>	<b>In the last 2 years</b>	<b>In the last 5 years</b>	<b>Not participate</b>	<b>Total</b>
Field day	26.19	21.43	9.52	11.90	30.95	100.00
Conference	33.33	33.33	11.90	0.00	21.43	100.00
Seminar	52.38	23.81	7.14	2.38	14.29	100.00
Promotion	61.90	28.57	4.76	0.00	4.76	100.00
Total	43.45	26.79	8.33	3.57	17.86	100.00

less effective to the useful insects (64.29%) and less negative effects to the human health and environment (57.14%), respectively. 54.76% of the firms suggested more effective agrochemicals, 47.62% took farmer's demands into consideration in their suggestions (Table 6). According to the results, farmers were warned by retailers to use agrochemical in respecting the importance levels below: setting dose, using gloves, mask, not smoking and eating etc. during operations. When firms suggested the agrochemicals to the farmer, their reflections were determined. According to the results, 52.38% of the firms applied all the suggestions, 40.48% of firms demanded more effective agrochemical and 30.95% of them demanded another one of current agrochemicals (Table 7).

52.38% of the firms suggested the amount of pesticide

dose in usage when pests or diseases appeared. The main reason for not suggesting the pesticide dose was small yield loss. 59.53% of the firms suggested the same agrochemical to the farmers when there is more than one pest in the same product. The firm owners were asked about the advantages they provided to farmers and it was determined that most of the firms provide easy payment schedules and information for the needs of farmers (Table 8).

In this study, payment forms for purchases were also investigated. Most of the farmers paid their debts on a fixed term basis (71.43%). Pesticide choice of the farmers was investigated in view of retailers. According to the firm owners interviewed, efficiency is the most important factor (95.24%) followed by having a license (45.24%) and offering economic choices (40.48%) to farmers.

**Table 5.** Information resources of agrochemical firms on the latest agrochemicals.

Answers	Always	Mostly	Sometimes	Rarely	Never	Total
Getting information from the agrochemical wholesale firms	64.29	28.57	4.76	2.38	0.00	100.00
Attending the seminars	28.57	21.43	16.67	19.05	14.29	100.00
Brochures and promotion publications	40.48	23.81	26.19	4.76	4.76	100.00
Internet resources	28.57	21.43	11.90	11.90	26.19	100.00
Total	40.48	23.81	14.88	9.52	11.31	100.00

**Table 6.** The factors affecting the agrochemical suggestions of firms to farmers.

Answers	Always	Mostly	Sometimes	Rarely	Never	Total
Preferred by farmer	14.29	47.62	23.81	11.90	2.38	100.00
Effectiveness of chemicals	28.57	54.76	14.29	2.38	-	100.00
Price of chemicals	7.14	45.24	23.81	16.67	7.14	100.00
Availability	-	2.38	21.43	16.67	59.52	100.00
Total	12.50	37.50	20.83	11.90	17.26	100.00

**Table 7.** Farmers approach to the specific agrochemical suggestions.

Answers	Always	Mostly	Sometimes	Rarely	Never	Total
Take suggestions and apply them	19.05	52.38	19.05	7.14	2.38	100.00
Ask another one	0.00	9.52	30.95	40.48	19.05	100.00
Ask more effective one	11.90	23.81	40.48	11.90	11.90	100.00
Total	10.32	28.57	30.16	19.84	11.11	100.00

**Table 8.** Advantages provided to the farmers by retailers.

Answers	Always	Mostly	Sometimes	Rarely	Never	Total
Providing easy payments	59.52	38.10	2.38	0.00	0.00	100.00
Providing information needed	69.05	30.95	0.00	0.00	0.00	100.00
Helping to use chemicals	2.38	0.00	21.43	14.29	61.90	100.00
Scouting for problems and making suggestions	14.29	28.57	23.81	14.29	19.05	100.00
Following the results after applying insecticides	35.71	21.43	19.05	7.14	16.67	100.00
Providing only chemicals demanded	7.14	11.90	19.05	26.19	35.71	100.00
Total	31.35	21.83	14.29	10.32	22.22	100.00

Preferences of the farmers in the agrochemical use according to firms were investigated. According to the results, farmers took consideration from the firm. Mostly, farmers come to the firms to demand certain agrochemical trade marks (Table 9). Possible results of indiscriminate and frequent pesticides use were asked by the firms and results were ranked according to the importance level of perception. Owners of the firms stated that pesticides threaten human and animal health which was the most important effect of them. Pesticide residues on food were the second most important effect which was followed by negative side effects on environment (Table 10). Owners of the firms were asked

to express their views on environmental effects of pesticides and it was found that 17 firms (40.48%) rarely, 9 firms (21.43%) sometimes and 8 firms (19.05%) never, 6 firms (14.29%) mostly and 2 firms (4.76%) always considered the effects of pesticides on environment.

#### **Opinions of the firms on the agrochemicals purchasing by prescription system**

According to the findings of the survey, 47.62% of the firms interviewed were strongly agreed with agrochemical purchase by prescription system, 23.81% were agreed

**Table 9.** Agrochemical preferences of the farmers concerning firms.

Answers	Always	Mostly	Sometimes	Rarely	Never	Total
Demanding a specific agrochemicals	11.90	47.62	23.81	2.38	14.29	100.00
Explaining the problems and accepting suggestions	19.05	52.38	19.05	9.52	0.00	100.00
Bringing samples and asking chemicals required	4.76	16.67	45.24	19.05	14.29	100.00
Demanding to help for seeing the problems in field	7.14	23.81	28.57	21.43	19.05	100.00
Total	10.71	35.12	29.17	13.10	11.90	100.00

**Table 10.** The results of often and unconscious agrochemical pesticides use of the firms.

	First priority	(%)	Second priority	(%)	Third priority	(%)	Total	(%)
Threats on human and animal health	22	52.38	6	14.29	3	7.14	31	73.81
Pesticide residues on food	5	11.90	15	35.71	10	23.81	30	71.43
Deteriorating the natural balance	7	16.67	10	23.81	8	19.05	25	59.52
Killing beneficial insects	3	7.14	5	11.90	13	30.95	21	50.00
Being obstacle for the agricultural trade	2	4.76	1	2.38	3	7.14	6	14.29
Causing the genetic deteriorations in the plants	0	0.00	2	4.76	3	7.14	5	11.90
Resistance to the diseases, pesticides, nematodes and herbicides	2	4.76	2	4.76	1	2.38	5	11.90
Increasing costs	1	2.38	1	2.38	1	2.38	3	7.14
Total	42	100.00	42	100.00	42	100.00	126	100.00

and 21.42% were disagreed and strongly disagreed with this opinion. From this point, it was asked to firms whether prescription system could limit the chemical use. Holding online precise enrollments for the production data were seen by 50% of the firms, registering the agrochemicals on the internet by farmers were seen by 45.24%, written the prescription by specialist persons was seen 66.67% as initial factors to provide the ideal agrochemical usage.

### New implementations on the agrochemical use

EUREPGAP system began in 1997 as an initiative of retailers belonging to the Euro-Retailer Produce Working Group (EUREP). The aim was to set standards and procedures for the development of good agricultural practices (GAP). This protocol was also accepted in Turkey. Opinions of the firms about EUREPGAP protocol were asked. Sixteen firms (38.10%) had adequate information about EUREPGAP, nine firms (21.42%) did not have any information about EUROGAP and seventeen firms (40.48%) had partial information about it.

### Marketing structure of the agrochemical firms

Marketing channels of agrochemical firms were investigated. Premier input obtaining channel from production firms was 37.93%. Manufacturer firms were

32.48% and agents of wholesalers were 29.6%, respectively. Having information about the market is very important for the firms in order to prepare the projections about future. Therefore, information channels of agrochemical markets were investigated in this study.

According to the findings, primary information resources of agricultural markets were composed of their own market researches with 64.29%. Information channels related to other markets were as follows: 42.86% through agent/distributor in the market, 28.57% through internet, 21.43% through market research firms and 7.14% through agricultural directorates in districts.

Advertisement and promotion meetings of agrochemical markets related to productions of agri-chemical markets were also investigated in this research. According to the results, 79% of agrochemical markets informed their customers with international meetings about product advertisement. The firms generally carried out such as activities in their offices or in the fields of customers accounted for 57.14%. Other activities such as demonstration and campaign accounted for 11.9% and 9.52% respectively.

In this study, the problems of agrochemical markets in the region were also investigated. According to the results, the most important problem of the firms was cash problems in payments. Unable to change the habits of farmers, price disequilibrium, lack of knowledge for the farmers, lack of competitive and control were also determined as important issues. Lack of investment and

working capital, delays in the capital return, delays in the pay back of production value and difficulties in obtaining convenient credit were classified as important financial issues. According to the expressions, there is unconscious agrochemical use in the region and this problem could be solved by strict control and training. Developing early warning systems and implementation of the integrated pest management could be helpful for farmers.

## DISCUSSION

Technology and knowledge have rapidly been growing for the last decades. This evaluation reflected considerable developments in the agricultural sector in terms of production, production quality and safety. Healthy and reliable food is one of the most important issues at present. For this reason, agrochemical markets, which are important information sources for the agricultural producers were investigated in terms of social-economic situation and tendency. The agrochemical markets in the Isparta region are small scaled firms, operating with their own capital, young and individually owned firms. Certification ownership for the firms has become widespread since the second half of 1990, therefore, average experience for the firms is 12 years. According to the research findings and reviews of literature, education level of the firm owners and the share of agricultural faculty graduates have increased in total. This development can be explained by the regulations about the opening of the agrochemical markets imposed by the Ministry of Agriculture in years 1993 to 1996. New regulations are expected to have positive effects as well. In other words, if new regulations are implemented, most of the agrochemical owners will be agricultural engineers.

The majority of firms have shared the opinion about the selling chemical with prescriptions. Firms are conscious about agrochemical use. As a matter of fact, the firms stated that human and animal health is threatened by the frequent and indiscriminate use, which caused pesticide accumulation in foods and deformation of the natural environment. Besides, firms have generally advised the farmers not to apply agrochemicals regularly without controlling the plants for disease symptoms and pests. For the most of the firms investigated, main reason for applying agrochemicals against pests is to hold the population under a certain level of control. According to the opinions of the firms, production registrations and the debts of farmers should be correctly kept on a network as online and the prescriptions written by the qualified persons can prevent the unwanted agrochemical use. It is determined that the system may have some disadvantages.

The firms stated that they rarely emphasized on sensibilities of the agrochemicals for farmers. As stated earlier, both agribusiness and agrochemical markets are small scaled in the region. Besides, the education level of

the farmers is also found low. Most of the firms expressed that they provide easiness for farmers on payments and information. Agrochemical markets are one of the most important organizations to inform the farmers about pest management. However, it is obvious that there are weak relationships among firms. Furthermore, information level of the firms about EUROGAP is inadequate. It may be suggested that: a) Firms should follow the new information and inventions, and the level of interaction with other firms and organizations should be increased. Therefore, seminars and panels should be organized; b) Farmers were not well-informed not only about disease and pests of the region but also about how to use agrochemicals efficiently. Equally, in order to decrease unnecessary agrochemical use, training programs should be implemented to increase information and consciousness level of farmers; c) Training programs about production techniques like Integrated Pest Management (IPM), EUROGAP should be developed in order to follow the new approaches in all over the world; d) Collaborations of agrochemical markets would be beneficial to their own interest. Consequently, improvements in the agro-chemical markets will be reflected to the farmers indirectly or directly.

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