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# Factors Affecting Melon Farmers' Knowledge Sources and Their Attitudes Towards Input Use; The Case of Hatay Province

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ABSTRACT

The aim of study is to reveal the factors affecting the knowledge sources used by melon farmers in Hatay province, and their attitudes towards input use. In addition, the research also investigated farmers' attitudes towards plant protection knowledge and support policies. In the study was surveyed with melon farmers. The data were obtained through face to face interviews during the period of Summer-2022. In the study, factor analysis was used to determine farmers' the factors affecting the knowledge sources. Factors affecting the knowledge sources used by farmers were determined as two-way and one-way communication. The factors affecting the sources that farmers depend on in dose adjustment were determined as internal and external factors. Besides, farmers think that the knowledge sources should be understandable and accessible. On the other hand, farmers think that the sources they depend on should be accurate and reliable. In melon cultivation, chemicals are used excessively to combat diseases and pests. Also, farmers stated that if precautions are not taken while spraying, poisoning may occur. Moreover, it is thought that empty pesticide containers should be destroyed and excessive use of fertilizers and pesticides may harm products and the environment. Furthermore, farmers claimed that support policies for melon production were not sufficient. As a result, it has been understood that melon farmers have a good level of education and are conscious individuals. However, it is thought that the training and extension activities will help farmers increase their income and environmental awareness.

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## Introduction

Melon is a product rich in minerals and vitamins, and has high nutritional value. It is among the most produced and consumed vegetables in Türkiye (Abiola and Daniel, 2014; Christenhusz, 2016; Duman et al., 2020). Other main socio-cultural uses of melon include income generation, household food, and as gift to relatives (Achigan-Dako et al., 2008). By the FAO in 2017, melon production in the world was 31.9 million tons, from 1.22 million hectares of cultivated area. The most important shares in production belong to China (53.7%), Türkiye (5.7%), India (3.2%) and the USA (2.4%) (Saediman et al., 2020; Tatar and Şensoy, 2020). Melon is an extremely important product for Türkiye's agriculture. It is widely cultivated in many places and large areas (Ece, 2017). In Türkiye, melon cultivation is mostly seen in the Central Anatolia, Aegean, Southeastern Anatolia and Mediterranean regions (Ünlü et al., 2017). In 2021, 1 638 638 tons of melons were produced in an area of 668 753 ha in Türkiye. In Hatay, 32 537 tons of melons were produced from 13 230 decares of cultivation area (TURKSTAT, 2022). According to TURKSTAT data, Türkiye's melon cultivation area has decreased by 16% in the last 12 years. In Hatay, the melon cultivation area decreased by 21% (Kaya and Tarakçı, 2022). In 2020, Türkiye produced melons worth 333.73 million euros (Anonymous, 2020). Melon consumption per capita is about 22 kg in Türkiye (Akkuş et al., 2023). Melon has different aromas depending on region and variety. For this reason, it is among the products preferred by the consumers. However, the price is low due to excess supply during the melon harvest period. Melon is one of the products most affected by price fluctuations in Türkiye (Anonymous, 2009). Additionally, the lack of knowledge and skills of small farmers, the entrepreneurial ability of farmers, the problem of warehouse and storage, and the market problem seriously affect the costs (Saediman et al., 2019; Saediman et al., 2020). It is possible to reduce these problems with agricultural training and extension activities. In the agricultural sector, farmers need access to

information to achieve development and improve farmers' skills. It is very important to improve the knowledge and skills of farmers to achieve higher efficiency (Baloch and Thapa, 2018). Agricultural extension services are designed to bring information to farmers (Buehren et al., 2019). Agricultural extension is a farmer training and aims to create behavioral changes in farmers and widespread new technologies (Demirbük and Kızılaslan, 2017). Education is the only condition for success in every segment of society. In order to achieve development in rural areas, priority should be given to educational activities (Kızılaslan and Yamanoğlu, 2010; Kızılaslan and Otçu, 2023). It plays a very important role in the effective use of new technologies by organizing the development process of human resources (Çakır et al., 2016; Şimşek and Armağan, 2020). In terms of agricultural development, the level of technology can be a good indicator of development. By the results of the household information technologies usage survey, it was determined that 94.1% of them had the opportunity to access the internet at home in 2022. This rate was 90.7% of households in 2020 and 92.0% in 2021 (Kaya, 2022). In recent years, with the development of technology, internet use has become widespread. Additionally to ensure the continuity of agricultural production, regulations are required to solve the problems of farmers and improve agricultural production and productivity. Ministries of Agriculture need to take the necessary measures and develop appropriate policy and incentive tools (Şenyüz and Bahşi, 2023).

The aim of this study is to reveal the information sources used by melon farmers and the factors affecting the sources they depend on in dose adjustment. It also examines farmers' attitudes towards chemical input use and applied policies. Kırıkhan melon is an important product that receives a geographical indication in Hatay province. Melon is an unstudied subject in this region. Additionally, it is anticipated that this study will make significant contributions to different areas in terms of social, economic and environmental aspects.

## Materials and Methods

### *Study of Area and Determination of Sample Size*

Hatay province is located in the Mediterranean Region of Türkiye. It is a coastal province with Syria to the south and the Mediterranean to the west (Anonymous, 2022a). Hatay has an important place in terms of agriculture and trade due to its climate and soil structure (Figure 1). The main material of the study was the survey conducted in Summer-2022 with farmers who grow melons in Hatay province.

In the research, data were collected by face-to-face interviews with 50 melon farmers. Additionally, farmer lists from the Ministry of Agriculture and Forestry were used to determine the sample size. Moreover, national and international research was also used in the study.

The places where melon farmers are concentrated in the research area were determined by "Purposeful Sampling" through interviews with the Provincial Directorate of Agriculture. In determining the main population and research area, places where melon production is intense, were taken into account. Therefore, the number of melon farmers in the villages/neighbourhoods selected from the research area constituted the main population of the study. Overall, 95% confidence level and 5% error margin were used in the study. The sample size was calculated as 50 farms using Simple Random Sampling in the Equation 1 (Yamane, 1967):

$$n = \frac{(N \times s^2 \times t^2)}{(N-1)d^2 + s^2 \times t^2} \quad (1)$$

n = Sample size
s = Standard deviation
t = t value in the 95% confidence interval (1.96)
N = Total number of farmers
d = Indicates acceptable error (5%)

In the study, a face-to-face survey was conducted with 50 melon farmers in Hatay province. Ethical approval and permission for this study was obtained from Hatay Mustafa Kemal University Social and Human Sciences Scientific Research and Publication Ethics Committee. (Date: 07.03.2022, Number: 03, Decision No: 07).

In 2021, 1 638 638 tons of melons were produced in an area of 668 753 ha in Türkiye. In Hatay, 32 537 tons of melons were produced from 13 230 decares of cultivation area. According to the data of the Ministry of Agriculture and Forestry, melon production in Hatay province was carried out by 189 farmers in 2021 (TOB, 2021). Kırıkhan melon, which has a geographical indication, has an important place in the region.

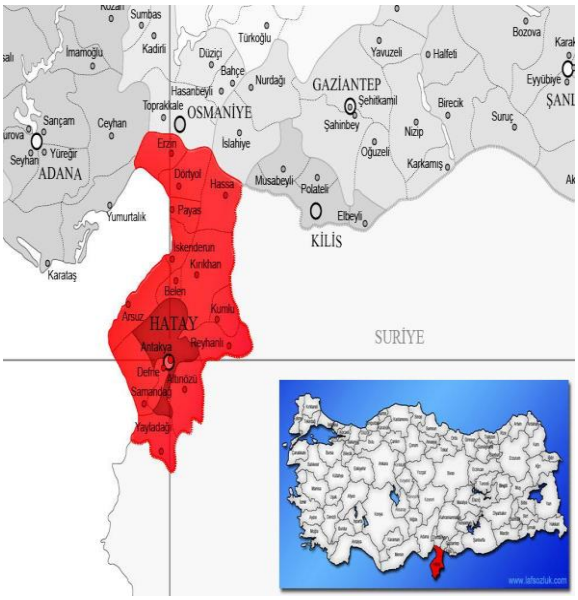

Figure 1. Location of the study (Anonymous, 2022b)

### *Statistical Analysis*

In the study, questions aimed at determining the farmers' socio-demographic characteristics, the knowledge sources they use and their attitudes towards input use were examined. There are also questions to determine farmers' knowledge of agricultural control and their thoughts about the environmental damage of the practices. The knowledge sources used by farmers, the knowledge sources they used when adjusting the dose, and their attitudes towards input use were determined using a 5-point Likert scale. The reliability of the scales was tested with Cronbach's Alpha value. The fact that the alpha (α) coefficient is $0.60 \leq \alpha <$

0.80 indicates that the scale is quite reliable (Kalaycı, 2016). Tekin (2000); Tavşancıl (2014) reported that reliability is an indicator of the stability of the measurement tool. Additionally, the factors affecting the knowledge sources used by farmers were determined by factor analysis. Factor analysis reduces the number of variables by collecting interrelated variables into one category. On the other hand, it provides advantages such as ease of visualization and interpretation of the analysis (İslamoğlu and Alnıaçık, 2016). KMO (Kaiser-Maier-Olkin) and Bartlett tests were used to verify the suitability of the scales used for factor analysis. The KMO value compares the magnitude of observed correlation coefficients with the magnitude of partial correlation coefficients. It is desired that the KMO ratio be above 0.5 (Kalaycı, 2016). As a result of the analysis, the KMO value of the knowledge sources used by farmers in terms of market conditions was determined as 0.728, and the KMO value of the knowledge sources used in dose adjustment was determined as 0.683. Also, Bartlett sphericity value was found to be 0.000. Thus, it was determined that the scale and data were suitable for factor analysis.

## Results

The data was obtained by face-to-face interviews with melon producing farms in Hatay province. In the study, farmers' demographic characteristics, knowledge sources used, plant protection knowledge, chemical input use, and attitudes towards support policies were evaluated.

### *Farmers' Socio-demographic Characteristics*

The ages of the farmers participating in the study range between 28 and 69 years. Farmers are generally among the active population, and the average age is 45.66. In addition, it was determined that more than 90% of the individuals growing melon in Hatay province had a good education level (high school and university). The family size of farmers varies between 2 and 7 people. Additionally, it consists of families with an average of 5 people. Most of these farmers are experienced in agricultural production. The average farming experience of farmers is 24.36 years. Also, the farmers have over 10 years of experience in melon cultivation. Furthermore, approximately 90% of farmers stated that they keep farm records. In the study, it has also been determined that the technology usage rate of farmers is high. In this context, it was determined that 82% of farmers own a computer, 70% can use a computer and 88% have internet access. Additionally, almost all farmers have social security. Approximately 2/3 of melon farmers in Hatay province stated that they used credit. Additionally, 56% of melon growers were also engaged in non-agricultural work. operate a non-agricultural farms In the study, it has been determined that melon growers also grow carrots. Melon and carrot production are under the monopoly of brokers in Hatay. The annual average non-agricultural activity income of melon farmers was calculated as ₺265 000 (approximately $14000).

The annual income of melon farmers varies between ₺200 000 and ₺6 000 000. The average annual income of farmers was calculated as ₺1 016 704.55 (approximately $56000) (Table 1). The average melon production cost was ₺10 692 (approximately $590) for 1 decare.

Table 1. Farmers' socio-demographic characteristics

| Variable | Definition | N | % |
|---|---|---|---|
| Age groups | 25-44 | 26 | 52 |
| | 45-64 | 21 | 42 |
| | 65 ≥ | 3 | 6 |
| Education | Below high school | 3 | 6 |
| | High school | 32 | 64 |
| | University | 15 | 30 |
| Computer ownership | Yes | 41 | 82 |
| | No | 9 | 18 |
| Computer usage | Yes | 35 | 70 |
| | No | 15 | 30 |
| Internet access | Yes | 44 | 88 |
| | No | 6 | 12 |
| Non- agricultural work | Yes | 28 | 56 |
| | No | 22 | 44 |
| Non-agricultural annual income (₺) | 100 000> | 6 | 25 |
| | 100 000-500 000 | 15 | 62.5 |
| | 500 000< | 3 | 12.5 |
| Family size | 1-3 | 6 | 12 |
| | 4-6 | 41 | 82 |
| | 7 ≥ | 3 | 6 |
| Reason for choosing melon | High income | 29 | 58 |
| | Product variety | 18 | 36 |
| | Being a broker | 3 | 6 |
| Farm record | Yes | 44 | 88 |
| | No | 6 | 12 |
| Credit usage | Yes | 29 | 58 |
| | No | 21 | 42 |
| Social security | Yes | 47 | 94 |
| | No | 3 | 6 |
| Annual income (₺) | 750 000> | 22 | 50 |
| | 750 000-1 500 000 | 17 | 38.6 |
| | 1 500 000< | 5 | 11.4 |

### *Farmers' Knowledge Sources and Plant Protection Information*

Factor analysis was conducted to determine the factors affecting farmers' knowledge sources. For this purpose, 8 variables were used and as a result of the analysis, 3 variables (institutions, NGOs and cooperatives concerns) were excluded from the analysis because they had close values in more than one factor. The analysis was made on 5 variables. Cronbach's Alpha value for 5 variables was calculated as 0.711 and the KMO coefficient as 0.728. These values show that the sample size is sufficient and the analysis is reliable. As a result of the analysis, two factors with an eigenvalue greater than 1 were determined. The first factor consists of 2 items and explains 34.683% of the total variance. The total variance explained by both factors was determined as 68.427%. The first is two-way communication factors that facilitate communication and have a high agreement rate. The second is one-way communication factors with no feedback. When we look at the knowledge sources used by farmers in terms of market conditions, the importance of the internet (4.52±1.313; median: 5.00) and their knowledge (4.46±0.706; median: 3.00) was found to be high. It was also understood that farmers applied to the suggestions of exporting companies (3.06±1.671; median:1.00), experienced farmers (2.92±1.291; median:1.00) and other farmers (2.84±1.184; median:1.00).

Table 2. Knowledge sources used by farmers regarding market conditions

| Variable | Factor | | Mean | SD | Median |
|---|---|---|---|---|---|
| | Two-way | One-way | | | |
| Recommendations from other farmers | 0.864 | | 2.84 | 1.184 | 1.00 |
| My own knowledge and experiences | 0.799 | | 4.46 | 0.706 | 3.00 |
| Internet | | 0.822 | 4.52 | 1.313 | 5.00 |
| Exporting firms | | 0.823 | 3.06 | 1.671 | 1.00 |
| Printed materials (newspapers, magazines, etc.) | | 0.451 | 1.56 | 0.929 | 1.00 |
| Variance explanation % | 34.683 | 68.427 | | | |
| Cronbach's Alpha | | 0.711 | | | |
| KMO | | 0.728 | | | |
| Chi-Square | | 47.776 | | | |
| p | | 0.000 | | | |

Scale: 1= Very unimportant, 2= Unimportant, 3= Middle, 4= Important, 5= Very important; SD: Standart deviation; KMO: Kaiser-Maier-Olkin test; p: Bartlett test

Table 3. Farmers' plant protection knowledge

| Variable | Definition | N | % | Variable | Definition | N | % |
|---|---|---|---|---|---|---|---|
| Plant protection knowledge | Little knowledgeable | 3 | 6 | Dose adjustment | Yes, I do exactly that | 37 | 74 |
| | Middle | 22 | 44 | | No, I'll make you take it | 6 | 12 |
| | Knowledgeable | 25 | 50 | | No, I will reduce it | 7 | 14 |
| Pesticide packaging | Destruction | 47 | 94 | Pesticde/pest control | Take precautions | 50 | 100 |
| | To the scrap dealer | 3 | 6 | | No poisoning | 50 | 100 |
| Your damage to the environment | Very little | 9 | 18 | Your neighbors' environmental damage | Very little | 9 | 18 |
| | Midlle | 12 | 24 | | Midlle | 12 | 24 |
| | A little | 16 | 32 | | A little | 16 | 32 |
| | Very | 13 | 26 | | Very | 13 | 26 |

N: Number of farmers; %: Ratio of farmers

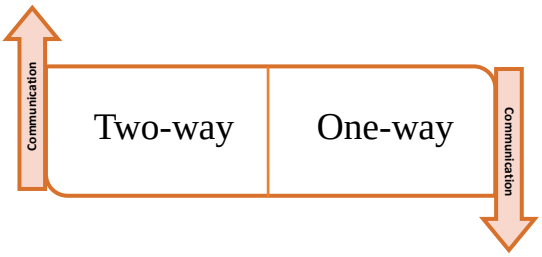


Figure 2. Factors affecting farmers' knowledge sources about market conditions

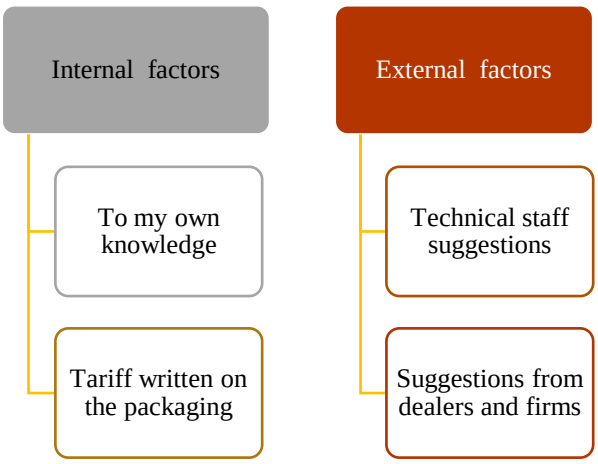


Figure 3. Factors affecting the sources farmers depend on for dosing

Two-way and one-way factors were effective in farmers' choice of knowledge sources (Figure 2). Among the two-way factors, recommendations from other farmers and their knowledge and experience were found to be important. Among the one-way factors, exporting firms and printed materials (newspapers, magazines, etc.) were determined to be effective (Table 2). Besides, farmers growing melon think that the knowledge sources should be understandable and accessible.

In melon cultivation, chemicals are used excessively to combat diseases and pests. Farmers' plant protection knowledge varies. In the study, 6% of the farmers consider themselves less knowledgeable on this subject, 44% considered moderately knowledgeable, and 50% considered knowledgeable about plant protection. In addition, 74% of the farmers stated that they applied the recommended dose exactly as it was, while 14% stated that they reduced it, while 12% stated that it increased it. Additionally, 94% of the farmers reported that they destroyed the packaging of the chemicals used, and 6% reported that they gave it to scrap dealers. All melon farmers who participated in the research in Hatay province said that they took precautions when spraying. Also, farmers stated that they have not encountered any poisoning so far. On the other hand, most farmers think that their and other farmers' practices harm the environment (Table 3).

Factor analysis was conducted to determine the factors affecting the knowledge sources that farmers depend on in dose adjustment. For this purpose, 6 variables were used and as a result of the analysis, 2 variables (neighbor and other farmers) were excluded from the analysis because they had close values in more than one factor. The analysis was made on 4 variables. Cronbach's Alpha value for 4 variables was calculated as 0.606 and the KMO coefficient as 0.683. These values show that the sample size is sufficient and the analysis is reliable. As a result of the

analysis, two factors with an eigenvalue greater than 1 were determined. The first factor consists of 2 items and explains 53.360% of the total variance. The total variance explained by both factors was determined as 86.616%. The first is internal factors that are thought to be precise and reliable, and the other is external factors determined as the private sector and public institutions. The knowledge sources that farmers rely on when adjusting the dosage of agricultural inputs are their own knowledge (3.34±1.171; median: 3.50), the written recipe on the packaging (3.08±1.140; median: 3.50), dealer and firm recommendations (3.30±0.789; median: 1.00) and technical staff recommendations of provincial and district directorates of the Agriculture Ministry (1.40±0.639; median:1.00). Internal and external factors were effective in the selection of knowledge sources used by farmers when adjusting dosage. My knowledge and the tariff written on the packaging are knowledge sources where internal factors are effective (Figure 3). The recommendations of agricultural provincial/district technical staff and dealers-firms are knowledge sources where external factors are effective. Additionally, the knowledge sources that farmers rely on when adjusting dosage vary (Table 4). Besides, farmers think that the source they depend on should be accurate and reliable. In Hatay province, farmers reported that consultants are also important when adjusting the dose.

***Farmers' Attitudes towards the use of Chemical Inputs and Applied Policies***

By the farmers' attitudes towards melon farming, the importance of the melon sales price not following a regular course was found to be high (4.88±0.328, median:2.00). Additionally, it is also thought that if precautions are not taken while spraying, poisoning may occur (4.70±0.763, median: 1.00). On the other hand, it appears that melon support is not sufficient, respectively (4.70±0.463, median: 4.00). It was stated that empty medicine containers should be destroyed (4.64±0.485, median:5.00). Also, it is thought that excessive use of fertilizers and pesticides may harm crops and the environment (4.28±1.031, median:5.00). Moreover, it is thought that policies for melon production are insufficient (4.28±1.031, median: 1.00) and that its cost is high compared to other products (4.16±1.113, median: 1.00), respectively. Then, it was understood that the agreement was high that pesticides should not be applied close to harvest (4.08±1.338, median: 4.50). On the contrary, it was stated that the support given was not sufficient because there was no fertilizer, diesel or premium support for melon. Additionally, it has been stated that it is not right to spray pesticides even if they do not appear to be diseased or harmful. Also, farmers said that it is wrong to think that the more chemical fertilizers are used, the more melon yield will increase. It is also seen that farmers believe that melon yield is not low (Table 5).

Table 4. Knowledge sources used when adjusting doses in agricultural inputs

| Variable | Factor | | Mean | SD | Median |
|---|---|---|---|---|---|
| | Internal | External | | | |
| To my own knowledge | 0.968 | | 3.34 | 1.171 | 3.50 |
| Tariff written on the packaging | 0.881 | | 3.08 | 1.140 | 3.50 |
| Agriculture province/district technical staff suggestions | | 0.911 | 1.40 | 0.639 | 1.00 |
| Suggestions from dealers and firms | | 0.616 | 3.30 | 0.789 | 1.00 |
| Variance explanation % | 53.260 | 86.616 | | | |
| Cronbach's Alpha | | 0.606 | | | |
| KMO | | 0.683 | | | |
| Chi-Square | | 98.359 | | | |
| p | | 0.000 | | | |

Scale: 1= Least, 2= Little, 3= Middle, 4= Very, 5= Most; SD: Standart deviation; KMO: Kaiser-Maier-Olkin test; p: Bartlett test

Table 5. *Farmers' attitudes* towards the use of chemical inputs and applied policies

| Attitude statements | Mean+SD | Median |
|---|---|---|
| Melon sales price follows a regular trend | 4.88±0.328 | 2.00 |
| If precautions are not taken while spraying, poisoning may occur | 4.70±0.763 | 1.00 |
| Melon support is not enough | 4.70±0.463 | 4.00 |
| Empty pesticide containers should be destroyed | 4.64±0.485 | 5.00 |
| Excessive use of fertilizers and pesticides can harm crops and the environment | 4.32±0.978 | 5.00 |
| Policies regarding melon production are insufficient | 4.28±1.031 | 1.00 |
| Its cost is high compared to other products | 4.16±1.113 | 5.00 |
| Spraying should not be done close to harvest | 4.08±1.338 | 4.50 |
| Farmers should be trained on pesticide and fertilizer use | 3.82±1.063 | 4.00 |
| Sometimes, more than the recommended dose of fertilizer and pesticide should be used | 3.52±0.863 | 1.00 |
| Melon is not a profitable crop in the region | 2.16±1.543 | 5.00 |
| Only chemical pesticides should be used to combat diseases and pests | 2.08±1.175 | 1.00 |
| Fertilizer support is sufficient for melon | 1.72±1.341 | 1.00 |
| Melon yield is low | 1.62±1.398 | 5.00 |
| The more chemical fertilizer is used, the more melon yield increases | 1.48±0.505 | 1.50 |
| Diesel fuel support is sufficient for melon | 1.48±1.054 | 1.00 |
| Even if it does not appear to be diseased or harmful, pesticides should be applied | 1.08±0.274 | 4.00 |
| The premium given on melon is sufficient | 1.06±0.240 | 5.00 |

Scale: 1= I strongly disagree 5= I strongly agree; SD: Standart deviation

## Discussion

Ibironke and Oyeleke (2014) calculated the average age of melon farmers in Nigeria as 41, and Omerogbe et al. (2017) calculated it as 39. Abdulgafar et al. (2017), also reported an average age of 43.6 years for farmers. Şenyüz and Bahşi (2023) it was said that the average age of farmers in Türkiye is 50.28. Akkuş et al., (2023) calculated the average age of melon farmers as 56.4 years, and Yılmaz et al., (2011) the average age of the farmers was 47.59 years and the average experience of farmers in agriculture was 27.75 years. Mohammed (2020) stated that melon farmers are generally literate farmers with a certain age and experience. Additionally, Şenyüz and Bahşi (2023) reported that the average number of family members is 4.33 and that families engaged in farming generally consist of nuclear families. Ibironke and Oyeleke, (2014) it was also reported that farmers have an average family size of 5 people. Yılmaz et al., (2011). Additionally, it was reported that they are generally farmers in the middle age group and the average family population is 4 people. Moreover, it has been said that the agricultural experience of the farmers varies between 2 and 70 years, while the melon production experience varies between 2 and 45 years. Ndanitsa et al., (2021) The highest level of education attained by farmers is important, as it has a direct relationship with the ability to acquire skills, especially for modern methods. Ece, (2017) it was stated that melon farmers in the area, have important knowledge and experience. Akkuş et al., (2023) calculated the average agricultural experience of farmers as 37.2 years and the average melon production experience as 27.6 years. It was also determined that 22.5% of melon farmers worked in another activity other than agriculture. It was dedicated that all melon farmers within the scope of the research had social security. Kaya and Bay (2020); Kaya and Bostan Budak (2022); Acıbuca et al., (2022) stated that the majority of farmers have social security. de Mello (2000) Melon farmers depend on the income generated from the crop to send their children to school, provide shelter and improve their lives. Şenyüz and Bahşi (2023) revealed that farmers also earn a small quantity of income from non-agricultural activities. Additionally, 59.7% of farmers reported using loans to carry out their agricultural activities. It was stated that with the development of technology, internet use has also become widespread. Also, Şimşek (2019); Şenyüz and Bahşi (2023) it has been reported that the sources of knowledge used by farmers on agriculture-related issues are individuals/institutions and organizations, pesticide dealer engineers, neighbors-relatives, agricultural provincial/district directorates, consultancy companies and newspapers-radio-magazines. Bahşi and Kurt (2019) state that farmers in Osmaniye receive information on agricultural issues mainly from pesticide dealers (56.5%) and agricultural organizations (24.7%). Cento and Bahşi (2022) state that the most important source of knowledge for farmers in Gaziantep on all agricultural issues except the use of technological equipment is their family elders. Akkuş et al., (2023) stated that 98.8% of melon farmers consulted pesticide dealers regarding plant protection, while 8.8% stated that they obtained information from the farmers' circle. Additionally, the melon farmers, 22.5% stated that they had used non-recommended pesticides, and 77.5% stated that they had never used non-recommended. Besides, it was said that 83.8% of the farmers did not receive information about melon production, but 38.7% wanted to receive training. Moreover, 70.9% of the farmers stated that they wanted to receive training on melon diseases and pests, 45.2% on melon growing, and 41.9% on melon spraying. Aksöz and Bahşi (2019) state that the farmers' most important source of knowledge on pesticide selection (35.3%) and usage dose (34.1%) are agricultural engineers, and that they act according to their own experience regarding the time of pesticide application (34.1%). Yılmaz et al., (2011) Also, pesticides are used to plant protection with weeds, diseases and pests. But, the farmers don't pay the necessary attention to pest control. Akkuş et al., (2023) reported that 17.5% of the farmers used gloves and masks during spraying, and 82.5% did not use masks and gloves. Also, 17.5% of farmers stated that they destroyed the remaining empty pesticide containers and 65% of them. Baran and Gökdoğan (2014) stated that the highest energy consumption input among general energy inputs in melon farming is fertilizer energy. It was reported that the high chemical fertilizer inputs were due to not using farm manure. Akkuş et al. (2023) reported that agricultural policies for plant production should be encouraging, sustainable and reduce the cost of production. Yılmaz et al., (2011) seasonal price fluctuations are one of the major factors that limit the melon production in Türkiye. Acıbuca et al., (2022) reported that chemical inputs used in agriculture should be reduced and used carefully. Yılmaz et al., (2011) reported the necessity of extension activities in the fight against pests and diseases. Şenyüz and Bahşi (2023) emphasized the necessity of individual education in increasing farmers' agricultural knowledge and skills. Demirtaş and Kaya (2018) said that cooperation with universities and increasing the use of information and communication technologies are necessary for effective publication services. Yılmaz et al., (2011) reported that farmers' level of use of technology should be increased. Besides, it was stated that research, publication and breeder coordination should be ensured to ensure the amount of input used is the cultivation techniques. Ndanitsa et al., (2021) farmers reported that input costs are high, disease and pest control problems, price instability, government supports and agricultural extension services are inadequate. Ibironke and Oyeleke (2014); Mohammed (2020) emphasized the need to increase support and subsidies. Omorogbe et al. (2017); Anthony et al., (2023) said that it is important for farmers to have access to low-interest loans and inputs for seeds, pesticides, and fertilizers at low prices.

## Conclusion

In the study, it has also been determined that the technology usage rate of farmers is high. It has been determined that the knowledge sources used by farmers regarding market conditions should be understandable and accessible. In addition, it is thought that melon farmers with a good level of education will be able to adopt new methods and that they will be easy to use. It has also been understood that melon farmers are individuals open to innovation. In Hatay province, knowledge resources used by farmers need to be popularized. Additionally, the

knowledge sources used by farmers regarding market conditions and used in dose adjustment vary. Also, farmers think that the source they depend on should be accurate and reliable. According to this, it is understood that farmers avoid risks within the scope of plant protection. Furthermore, it has been determined that farmers do not use some knowledge sources because they do not trust them. On the other hand, it has been determined that all of the farmers participating in the research have taken precautions against chemicals and have not encountered any poisoning situations so far. Since the use of inputs in melon cultivation is intense, farmers growing melon need to be informed about environmental awareness and health. Additionally, it should not be forgotten that chemical inputs used in agriculture will have an impact on all living things and will also affect future generations. Farmers' computer availability, its usage and internet access indicate that there will be no problems with technology. It is thought that organizing training programs for farmers on issues such as cultivation, marketing and input use will make significant contributions. Based on farmers' own experiences, the use of chemical inputs has made wrong practices inevitable. Training on chemical inputs use affects the conscious used of chemical inputs. On the other hand, farmers' economic concerns and desire to earn more income override their attitudes and behaviors towards the environment and human health. In Hatay province, The inputs and input quantity used by farmers vary depending on their cultivation techniques. Due to the diseases and pests seen in melon production, drug use is intense. However, high input costs are a serious problem for farmers. Lack of storage creates a marketing problem and causes the product to be sold at low prices. Additionally, the lack of animal husbandry activities in the region limits the use of animal manure. Melon production is important for both plant production and animal. However, high input costs and inadequate support policies threaten the sustainability of production. Also, it has been reported that there is no government support for melon cultivation. In this context, melon and livestock support needs to be improved in Hatay province. Poor quality and damaged products formed after harvest can be used as animal feed. Even if farmers think they are knowledgeable, extension activities on issues such as plant protection and organization should be increased.

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