STRUCTURAL STATUS OF BEEKEEPERS AND BEEKEEPING ENTERPRISES IN ARDAHAN

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ABSTRACT

Ardahan province is an important gene center of the Caucasian honey bee (*Apis mellifera caucasia*) and is a place housing one of the four important bee races which are economic values in the world. Ardahan province has an important potential with its delicious, high quality and patent honey production. This research was carried out in Ardahan and its 5 districts to determine the structural condition of the beekeepers and beekeeping enterprises. The data of the study were obtained from the questionnaires of 213 settled and migratory beekeepers selected randomly. The obtained data were analyzed by using chi-square test. In addition to the knowledge run in family and skills, it has been determined that reading and practicing this knowledge is effective in learning beekeeping. This rate was determined as 59.40% for the settled beekeepers and 57.90% for the migratory beekeepers. The difference between learning beekeeping methods of the migratory and settled beekeepers was statistically significant ($P < 0.01$). While a large majority of the settled beekeepers (66.66%) regard beekeeping as an additional source of income, a remarkable proportion of the migratory (51.20%) regard it as their main occupation. The difference observed between the migratory and settled beekeepers was significant ($P < 0.01$) for the purpose of beekeeping. While the vast majority of migratory beekeepers (% 62.80) are beekeeping with 100-200 beehives, a great majority of the settled beekepers (%81.90) are working with 1-100 beehives. The proportion of the beekeepers attending the beekeeping course was determined as 82,6%.
Keywords: Beekeeping, Enterprise, Honeybee, Migratory and Settled Beekepers.

ARDAHAN'DA ARICILARIN VE ARICILIK İŞLETMELERİNİN YAPISAL DURUMU

ÖZET

Ardahan ili Kafkas arısının (*Apis mellifera caucasia*) önemli gen merkezidir ve dünyada ekonomik değeri olan dört önemli arı ırkından biridir. Ardahan ili kendine has lezzetli, kaliteli ve tescilli bal üretimi ile önemli bir potansiyele sahiptir. Bu araştırma Ardahan İli merkez ve 5 ilçesinde arıcıların ve arıcılık işletmelerinin yapısal durumunun belirlenmesi amacıyla yapılmıştır. Çalışmanın materyalini tesadüfen seçilmiş 213 sabit ve göçer arıcı işletmesinden anket yolu ile elde edilen veriler oluşturmuştur. Elde edilen veriler ki-kare testi kullanılarak analiz edilmiştir. Aileden intikal bilgi ve becerilere ilaveten okuma ve bu bilgileri sahada uygulamanın arıcılığı öğrenmede etkili olduğu tespit edilmiştir. Bu oran sabit arıcılarda % 59.40 ve gezginci arıcıların ise % 57.90 olarak belirlenmiştir. Gezginci ve sabit arıcıların arıcılığı öğrenme yöntemleri arasındaki fark istatistiksel olarak önemli ($P < 0.01$) bulunmuştur. Sabit arıcıların büyük bir kısmı (% 66.66) arıcılığı ek gelir kaynağı olarak görmekte iken, gezginci arıcıların önemli bir kısmı (%51.20) arıcılığı esas meslek olarak görmektedir. Arıcılık yapmadaki amaç bakımından gezginci ve sabit arıcılar arasında gözlenen fark önemli ($P < 0.01$) bulunmuştur. Gezginci arıcıların büyük bir çoğunluğu (% 62.80) 100-200 arası arılı kovan ile arıcılık yaparken, sabit arıcılar büyük bir oranda (%81.90) 1-100 arası arılı kovanla arıcılık yapmaktadır. Arıcılık kursuna katılan arıcıların oranı % 82,6 olarak tespit edilmiştir.

Anahtar Kelimeler: Arıcılık, İşletme, Balarısı, Gezginci ve Sabit Arıcı.

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1. INTRODUCTION

Ardahan province is an important gene center of the Caucasian honey bee (Apis mellifera caucasia) and is a place housing one of the four important bee races possessing economic value in the world. (Farshineh et al., 2007; Önk et al., 2016). Caucasian bee retains the most distinctive characteristic with the longest tongue (7.2 mm) among the other races. Thanks to this long tongue, they can pick up nectar from deeply tubed flowers. They visit various flowers mornings and afternoons, in other words, they often change types of flowers. When the glucose percentage of nectar in the flowers reaches 10-11%, they start working immediately, this ratio is 18% for other bee races (Genç and Dodoloğlu, 2017). Its long tongue, making use of the flowers when the glucose percentage of nectar reaches 10-11% and frequently changed flowers cause honey to be produced from more diversified flowers. This is one of the important factors that enhance the quality of the honey.

The province has an important status in respect of beekeeping in the Eastern Anatolian Region with its high plateaus, deep valleys, highly rich feed plants, planted areas and other high quality nectar and pollen resources. (Özhatay et al., 2010). In this way, approximately 20 thousand colonies are brought to the different parts of the province from Artvin province in the summer months every year, and the available resources are utilized. (Anon, 2018). Furthermore, honey produced in Ardahan has received a geographical indication as of 01.06.2017 in accordance with the decree on the protection of the geographical indications numbered 555 in accordance with the provisional Article 1 of the Industrial Property Law No. 6769. Patent granted on Ardahan honey will stimulate the demand for the honey in the upcoming years. Ardahan is one of the prominent provinces in the Eastern Anatolia in terms of beekeeping with its suitable climate, vegetation, topographic structure, beehive availability and annual honey production. However; the increase in the availability of the colonies and annual honey production over the years have not been achieved in terms of the yield produced per colony. (TUİK, 2018).

The local beekeeping is far behind the desired level despite the ecological morphology of Ardahan which is suitable for the beekeeping. Beekeepers need to be equipped with modern breeding techniques, especially in the autumn season, with regard to beehive maintenance and control, wintering and diseases. Education and raising awareness of the beekeepers will ensure that beekeeping is a sustainable and profitable profession in the region.

It has been chiefly aimed to determine the structural characteristics and problems of the beekeeping in Ardahan and to put forward the data which will constitute the basis of scientific studies to be done in order to determine the priorities and to improve the beekeeping from the current situation by conducting questionnaire to the settled and migratory beekeepers.

2. MATERIAL AND METHODS

The results of this jointly carried out questionnaire applied to 111 settled and 102 migratory beekeepers in the beekeeping villages of the province of Ardahan and its 5 districts in the 2016-2017 production period, form the material of this study. While a researcher (Yamane, 2006) suggested that 3% of the sample size would be sufficient in the survey study, another researcher claimed that 10% of the sample size should be taken into consideration. (Cochran, 1977).

This questionnaire has been conducted face to face with 213 beekeepers who constitute 22,75% of all the beekeeping enterprises in Ardahan city and districts. The number of enterprises according to the districts, the number of enterprises participating in the survey and the number of colony are given in Table 1.

Table 1. The number of enterprises according to the districts of Ardahan province, the number of enterprises participating in the survey and the number of colonies.

District	The number of enterprises	The number of enterprises participating in the survey	Total number of the colonies of the province
Merkez	540	95	46.270
Hanak	162	47	9.800
Posof	113	32	7.450
Çıldır	82	21	5.450
Göle	30	14	2.120
Damal	9	4	727
Total	**936**	**213**	**71.817**

The data obtained from the migratory and settled beekeepers were analyzed in the package program "SPSS 20.0 for Windows". Deductions were made in accordance with the results obtained in the research. A chi-square independence test was used to determine the correlation between the variables (Yildiz & Bircan 2006).

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. The method of learning beekeeping and the purpose

In the research, the method of learning beekeeping in determining the qualities of the beekeepers and the beekeeping enterprises and the reasons of beekeeping were regarded as important criteria and the obtained results are totalized in Table 2.

Table 2. The method of learning beekeeping and the purpose.

Method of Learning Beekeeping	Settled beekeepers		Migratory beekeepers		All beekeepers	
	Number	%	Number	%	Number	%
Paternal Succession	42	37.80	32	31.40	74	34.70
Course	11	9.90	21	20.60	32	15.00
From other beekeepers	28	25.20	14	13.70	42	19.70
Reading and Practice	24	21.60	27	26.50	51	23.90
Internet	3	2.70	8	7.80	11	5.20
Mixed	3	2.70	0	0.00	3	1.40
Total	**111**	**100**	**102**	**100**	**213**	**100**
Purpose of Beekeeping						
Main Occupation	20	18.02	59	57.84	79	37.08
Satisfaction of interest	8	7.21	6	5.88	14	6.57
Additional source of income	74	66.66	33	32.36	107	50.24
Hobby	9	8.11	4	3.92	13	6.11
Total	**111**	**100**	**102**	**100**	**213**	**100**

3.1.2. The Size of the Business

Beekeeping is an agricultural activity carried out independently of the land. For this reason, the number of the beehives has been prioritized when the size of the business, an important criterion to determine the qualifications of beekeeping is evaluated (Table 3).

Table 3. Business structure and experience.

The Number of The Beehives in Business	Settled Beekeepers		Migratory Beekeepers		All Beekeepers	
	Number	%	Number	%	Number	%
1-50	43	38.70	18	17.60	61	28.60
50-100	48	43.2	20	19.60	68	31.90
100-150	14	12.60	52	51.00	66	31.00
150-200	6	5.40	12	11.80	18	8.50
Total	**111**	**100**	**102**	**100**	**213**	**100**
Beekeeping Experience						
1-9 years	23	20.70	19	18.60	42	19.70
10-19 years	58	52.30	56	54.90	114	53.50
20-29 years	18	16.20	20	19.60	38	17.80
30 and over	12	10.80	7	6.90	19	8.90
Total	**111**	**100**	**102**	**100**	**213**	**100**

In Table 3, The number of the beehives of the migratory and settled beekeepers is demonstrated. According to the table, a large majority (62.80%) of the migratory beekeepers are beekeeping with 100-200 beehives while the settled beekeepers work with beehives with 1-100 beehives (81.90%). The difference observed between the settled and migratory beekeepers in terms of business size was remarkable ($P < 0.01$).

3.1.3. Main occupations of the beekeepers and the issue of beekeeping course certificate

According to Table 4, it is reported that beekeeping is a main occupation for 47.00% of the migratory beekeepers, but this ratio is found to be 11.70% for the settled beekeepers. A significant majority (55.00%) of the settled beekeepers' main occupation is farming. The percentage of the beekeepers who are public servants doing beekeeping as an additional source of income is determined to be 18.60% for the migratory beekeepers and 14.40% for the settled beekeepers. The main reason for public servants taking beekeeping in the questionnaire is due to economic reasons.

Table 4 Main occupations of the beekeepers and the issue of beekeeping course certificate

Main Occupations	Settled Beekeepers		Migratory Beekeepers		All Beekeepers	
	Number	%	Number	%	Number	%
Beekeeper	13	11.70	48	47.00	61	28.60
Farmer	61	55.00	28	27.50	89	41.80
Public Servant	16	14.40	19	18.60	35	16.50
Self-employed	21	18.90	7	6.90	28	13.10
Total	**111**	**100**	**102**	**100**	**213**	**100**
Issue of Beekeeping Course Certificate						
Issued	84	75.70	92	90.20	176	82.60
Non-issued	27	24.30	10	9.80	114	17.40
Total	**111**	**100**	**102**	**100**	**213**	**100**

3.1.4. Beekeepers' loans, income, expenditure and production levels

As time passes, keeping up with technological advances in beekeeping and supply of different beekeeping products increase the business costs. The supply of tools and equipment, appropriate to the latest technologies is also an important element for beekeeping because the utilization of them is an important factor affecting production on a large scale.

The beekeepers were asked whether they received loan from various institutions and bodies in order to meet the various expenditure and the data is totalized in Table 5. While 18.90% of the settled beekeepers received loan, this percentage was calculated as 17.60% for migratory beekeepers. The migratory and settled beekeepers were determined to have a similar tendency to take out loan. It was stated that 75% of the settled beekeepers pay 75-150 TL per hive whereas 72.5% of the migratory beekeepers pay 150-200 TL per hive. In the chi-square test, the difference between the annual costs per beehive paid by the migratory and the settled beekeepers was statistically significant ($P < 0.01$).

Table 5. Beekeepers' loans, income, expenditure and production levels.

Beekeepers granted credit	**Settled beekeepers**		**Migratory beekeepers**		**All beekeepers**	
	Number	**%**	**Number**	**%**	**Number**	**%**
Granted	21	18.90	18	17.60	39	18.30
Non-granted	90	81.10	84	82.40	174	81.70
Total	**111**	**100**	**102**	**100**	**213**	**100.00**
Annual Cost Per Beehive						
1-75 TL	26	23.40	4	3.90	30	14.10
75-150 TL	84	75.70	16	15.70	100	46.90
150-200 TL	1	0.90	74	72.50	75	35.20
200 TL and over	0	0.00	8	7.80	8	3.80
Total	**111**	**100**	**102**	**100**	**213**	**100**
Annual Income Per Beehive						
1-300 TL	5	4.50	0	0.00	5	2.30
300-600 TL	79	71.20	16	15.70	95	46.60
600-900 TL	24	21.60	69	67.60	93	43.70
900 TL and over	3	2.70	17	16.70	20	9.40
Total	**111**	**100**	**102**	**100**	**213**	**100**
Average yield of honey per beehive						
1-10 kg	24	21.60	0	0.00	24	11.30
10-20 kg	84	75.70	35	34.30	119	55.90
20 kg and over	3	2.70	67	65.70	70	32.90
Total	**111**	**100**	**102**	**100**	**213**	**100**

3.1.5. Beekeepers' marketing condition and style for bee-related products

In table 6, the answers given by the local beekeepers to the question 'Are you marketing any other bee-related product than honey?' are demonstrated. It has been determined that the local beekeepers mostly produce swarm bee and they have a similar tendency in this regard. This percentage was calculated as 47.70% for the settled beekeepers and 52.90% for the migratory beekeepers. It has been observed that queen bee production is done by permission-issued enterprises, and tendency in pollen and propolis production is low in the area. The dominant tendency of producing swarm bees in the region is thought to be caused by the preparation for the next season by the beekeepers and by the demand of the Caucasian beehive.

Table 6. Beekeepers' marketing condition and style for bee-related products

Beekeepers' marketing other bee products	Settled Beekeepers		Migratory Beekeepers		All Beekeepers	
	Number	%	Number	%	Number	%
No Marketing	37	33.30	26	25.50	63	29.60
Pollen	7	6.30	11	10.80	18	8.50
Queen Bee	11	9.90	11	10.80	22	10.30
Propolis	2	1.80	0	0.00	2	0.90
Swarm Bee	53	47.70	54	52.90	107	50.20
All	1	0.90	0	0.00	1	0.50
Total	**111**	**100**	**102**	**100**	**213**	**100**
Honey Marketing Style						
Self-employed	111	100	78	76.50	189	88.70
Markter	0	0.00	13	12.70	13	6.10
By Unions	0	0.00	11	10.80	11	5.20
Sales to Wholesalers						
Total	**111**	**100**	**102**	**100**	**213**	**100**

3.1.6. Discussion

According to the outcomes; it has been determined that the reading and practice as well as skills and knowledge run in family play a crucial role in learning beekeeping. This ratio was determined as 59.40% for the settled beekeepers and 57.90% for the migratory beekeepers. It has been also understood that the beekeepers appreciate the knowledge and skills of other beekeepers and beekeeping courses while learning beekeeping. The difference between the settled and migratory beekeepers in beekeeping learning methods has been found statistically significant ($P < 0.01$). According to a research done, it was reported that beekeeping family is effective by 28.20% to start beekeeping. (Kadirhanoğulları, 2016). This ratio was found as 34.70% in the survey. These results show that our beekeepers also use other learning methods in addition to family knowledge and skills. According to the analysis, considering the Table 2. The ratio of beekeepers doing this job as the main source of income among the migratory beekeepers was determined as 57.84% while this ratio was calculated as 18.02% for the settled beekeepers. A significant majority of the settled beekeepers (66.66%) regard beekeeping as an additional source of income. The difference observed between the settled and migratory beekeepers was found significant ($P < 0.01$) in terms of the purpose of beekeeping. In the study conducted by Cengiz and Genç (1999), while 51.20% of the migratory beekeepers regarded beekeeping as the main source of income, 56.50% of the settled beekeepers reported it as an additional source of income. The perspectives of the settled and migratory beekeepers to the occupation are consistent with the literature report.

The reason why the migratory beekeepers do beekeeping with more beehives is that they take this occupation as their main source of income and earn more income per colony accordingly. In the questionnaire, it has been calculated that the average number of colonies per enterprise is 84 and the experience of the beekeepers is between 20.18 years on average. The difference between the migratory and the settled beekeepers in terms of beekeeping experience has been found insignificant. Average experience years of 20.18 obtained from questionnaire is lower than that of Kuvancı et al. (2017) reported for Rize, Gümüşhane and Trabzon respectively 28.85, 25.24,25.00, but higher than 18.64 years reported for Bayburt.

According to the researches carried out, it was reported that 50% and 51.51% of the migratory beekeepers' main occupation is beekeeping (Çelik, 1994; Cengiz, 1999). It was calculated as 47.00% for the local beekeepers. According to a study, while the main occupational beekeeping was not reported among the settled beekeepers (Çelik, 1994), this percentage was calculated to be 11.70% for local beekeepers. In the study, in terms of main occupation, the difference between the migratory and the settled beekeepers was found to be significant ($P < 0.01$). It is an important factor among the migratory beekeepers to prefer beekeeping as their main occupation because they earn high income as related to more beehives they produce honey with. The obtained results demonstrate that the migratory beekeepers take it as a main occupation, while the settled beekeepers doing beekeeping along with farming. As shown in Table 4, 92% of the migratory beekeepers and 75.70% of the settled beekeepers have been issued beekeeping course certificate. It is shown that there is a difference in terms of beekeeping knowledge levels between the migratory and the settled beekeepers. The difference was reported significant ($P < 0.01$) in the chi-square test applied to determine whether this difference was statistically significant.

According to a study conducted, ıt was found that only 16.87% of the beekeepers took the related courses; and those in great enthusiasm to increase their knowledge in beekeeping found such training to be inadequate (Kumova and Özkütük, 1988). In another study, this percentage was reported as 38.30% (Cengiz and Genç, 1999). For local beekeepers this ratio was calculated as 82.60%. This indicates that beekeepers are encouraged to be issued certificate in order to benefit from the projects and supports related to beekeeping with the introduction of the course certificate in recent years.

It was calculated that the annual income of 67.60 % of the migratory beekeepers per beehive is 600-900 TL, while the annual income of 71.20% of the settled beekeepers per beehive is 300-600 TL. The difference observed between the settled and the migratory beekeepers' annual income per beehive was statistically reported significant ($P < 0.01$). The reason of the difference observed in annual income per hive between the migratory and the settled beekeepers is believed to be due to more hives the migratory beekeepers producing honey with, and their watch of the nectar flow.

75.70% of the settled beekeepers stated that they had received 10-20 kg of honey per colony, while 65.70% of the migratory beekeepers reported that they had 20 kg and over of honey per colony. The difference observed in honey yield per colony between the migratory and the settled beekeepers was statistically found significant ($P < 0.01$). In the study, the average honey yield per beehive of the migratory and the settled beekeepers was detected consistent with the literature report indicating that transferring production colonies to places where nectar and pollen sources were abundant resulted in a 50.21% increase in total honey yield (Cengiz & Dülger, 2018). In the study, the average yield of honey of 213 colonies was calculated as 17.16 kg. This amount is higher than that reported by Çiçek and Yücer (1993) and Özbakır et al (2016) respectively, 14.60, 7.7 kg, but found lower than the amount (20.21 kg) reported by Demen et al. (2016).

100% of the settled beekeepers market honey by themselves. The migratory beekeepers reported that 76.50% of them were marketing by themselves, 12.70% were through unions and 10.80% were marketing to wholesalers. 88.70% of the local beekeepers market honey by themselves. In some researches; this fact is consistent with the finding that beekeepers prefer self-employment in marketing in order to find better prices and get cash immediately. (Kumova and Özkütük, 1988, Kaftanoğlu et al., 1995). It is thought that the marketing done by the beekeepers themselves in the region is due to the high demand for Ardahan honey, which is geographically indicated.

4. CONCLUSION

Ardahan region has a particularly strong production potential because of not only having very important honeyed plants for beekeeping but swarms of the nomadic bees flocking from Artvin province as well. It has been observed that the production per colony is low despite the enormous potential of the region. It has been determined that beekeeping in the family has an important effect on learning beekeeping in the region and the practices of the experienced beekeepers are well respected in the training of the beekeepers. It has been detected that loan usage is not prevalent throughout the region, and the more migratory beekeepers spend per beehive, the more they earn. It has been found out that in Ardahan the production of other beekeeping related products except from swarm and queen bees production is low, and honey is mostly marketed by the beekeepers themselves. First of all, all the beekeepers in the region should be equipped with the modern beekeeping techniques in accordance with the changing technology. Loan support should be granted for the beekeepers on suitable terms in order to develop beekeeping in the region with modern tools and equipment. Education and marketing support for the products such as pollen, propolis, royal jelly, bee venom should be provided by the associations in order to expand the production of these products. The number of beehives per colony should be increased in order to make better use of the present potential in the region, and so beekeeping should be made an alternative source of income.

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