

INVESTIGATION ON MADIMAK CONSUMPTION STATUS OF CONSUMERS IN CENTRAL TOKAT PROVINCE

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Abstract

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In this study, the status of madimak, a naturally grown endemic plant, consumption of families located in the center district of Tokat province were evaluated, and factors affecting the consumption were analyzed with chi-square test. The relationships between socio-economic characteristics of consumers and madimak consumption amounts were analyzed using variance analysis and LSD test. Data used in the study were gathered from the questionnaires with 245 families in May-June 2010. The results showed that 86.53% of the families surveyed consume madimak. Statistically important relationships were obtained between the madimak consumption and hometown, education level, marital status and total number of individuals at household. The relationships between annual madimak consumption per capita and hometown, education, professions, employment status of the spouses and total number of individuals at household were also statistically important. The results of variance analysis revealed that madimak consumption amounts of consumers significantly differs according to the hometown, professions, employment status of the spouses, marital status and total number of individuals at household.

Key words: Madimak consumption, Tokat province, chi-square test, variance analysis

Introduction

Tendency towards a natural diet has recently developed at all over the world. This strengthened the trend on natural diets, and focused the attentions on naturally grown uncultured herbs. The natural herbs may be consumed to meet food requirement or as well as to heal the diseases. The use of herbs against diseases dates back to the old ages in history. The use of spices and herbs as medicinal and food preservative is an indication of understanding and describing the value of natural plants in ancient cultures (Snyder, 1997).

People show more interest in food so-called organic foods grown in the natural conditions without the application of pesticides and artificial fertilizers and they pay a lot more money for them. Proving the positive effects of some substances found in the structure of wild plants

on health attracted more attention, and this interest will likely increase in future (Baytop, 1984).

Anatolia is one of the world's most important regions in terms of the richness of the vegetation. Many wild plants naturally preserve their existence in this region. These herbs are mostly consumed as fresh along with the consumption as salad or processed foods. The herbs and their processed foods are particularly popular in foreign market (Kokosmanli and Keles, 2000).

Approximately 750 000 plant species are thought to exist in the world and 500 000 of them were identified up to date (Nizharadze et al., 1977). In Turkey, this figure is around 9000; plants used as food, spices and drugs were up to 1300 and at least about 500 of plant species were used for therapeutic purposes. The real medical herb species used in the world is reported around 100 000 (Cemeroglu, 1982).

Madimak is a very sturdy long-lived perennial plant with pink flowers and body lying on soil surface. Leaf sheath surrounds the body and the leaves are elliptical, short-stalked and often pointed. Flowers are located in clusters of leaves seat, pinkish in color and 4-5 mm long. Madimak is a common plant found in at the edges of roads and field (Baytop, 1999).

The purposes of this study are to examine the madimak consumption of families living in Tokat province where madimak is heavily produced and consumed, and to investigate the relationship between the consumption status and socio-economic characteristics of consumers.

Material and Methods

The main material of the study is the data obtained from the questionnaires conducted with 245 families in May and June of 2010 at the Central District of Tokat Province, Turkey. The official record of total population in the Central district was identified to determine the number of individuals (sample size) who participated to the survey. The number of samples in this population was determined using the following formula (Bas, 2008):

$$n = \frac{N * t^2 * p * q}{d^2 * (N - 1) + t^2 * p * q}$$

In the formula, n is the number of individuals will be sampled, N is the number of individuals (128000 people) within the targeted population, p is the probability of occurrence of the event studied (0.80), q is the possibility of the event hold off (0.20), t is the value of the standard normal distribution (1.96), and d is the sampling error (0.05).

The confidence interval for the determination of sample volume was 95% and margin of error was 5%. The relationship between some socio-economic characteristics (gender, age, origin, marital status, educational status, occupation, monthly income, food expenditures, number of individuals in the family and spouses working condition) and madimak consumption of families were determined using Chi-square analysis. Chi-square formula of analyses used is as follows (Gujarati, 1995; Mirer, 1995):

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

In the formula, χ^2 = chi-square value, O_i = Observed frequency value, E_i = expected frequency value.

When the relationship between chi-square tests and measured relationships were significant, contingency (autocorrelation) coefficient (CC) was used to test the extent of this relationship. The autocorrelation coefficient Formula is as follows (Duzgunes et al., 1983):

$$CC = \sqrt{\frac{\chi^2}{N + \chi^2}}$$

In the formula: CC = Dependency factor, χ^2 = chi-square value, N = total number of observations.

The One Way Analysis of Variance (ANOVA) or F-test tests the equality of three or more group means at one time using variances to determine whether they differ significantly from one another (Vural and Kilic, 2005). This variance analysis was used to investigate the relationship between gender, age, origin, marital status, educational status, occupation, monthly income, food expenditures, number of individuals in the family and spouses working condition and madimak consumption of families. The effects of stated socio economic characteristics on the amount of madimak consumption were evaluated by ANOVA.

Rejecting the null hypothesis in variance analysis does not mean that the differences between groups are all significant. The difference obtained should be explained to find out the source of difference. In this regard, the differences between the means of all the binary combinations of the group's were assessed by Least Significant Difference (LSD) test (Sokal and Rohlf, 1969; Yildiz, 1992; Caglayan, 1983).

Results and Discussion

Socio-Economic Status of Consumers

The information of consumers on some socio-economic characteristics is given in Table 1. Large proportion of (86.53%) of consumers surveyed consumed madimak. The difference in taste (30.30%), disfavor of anyone in the family (27.27%), ignorance/lack of information on madimak (24.24%), difficulty in cleaning (18.18%), dislike eating vegetables (12.12%), lack of hygiene (6.06%), unavailability at desired time (6.06%), dislike madimak (6.06%) and lack of information on

Table 1
Socio-economic characteristics of consumers attended to the questionnaire

Characteristics		Surveyed consumers					
		Madimak Consumer		Madimak Dislike		Total	
		Frequency	%	Frequency	%	Frequency	%
Number of Questionnaires		212	86.53	33	13.47	245	100.00
Gender	Man	98	46.23	20	60.61	118	48.16
	Women	114	53.77	13	39.39	127	51.84
Average age (year)		34.70		29.94		34.06	
Origin	Tokat	173	81.60	13	39.39	186	75.92
	Others	39	18.40	20	60.61	59	24.08
Education status	Literate	4	1.89	1	3.03	5	2.04
	Elementary school	43	20.28	4	12.12	47	19.18
	Secondary school	19	8.96	3	9.09	22	8.98
	High school	75	35.38	7	21.21	82	33.47
	Community college	31	14.62	5	15.16	36	14.69
	BSc	33	15.57	11	33.33	44	17.96
	MSc	4	1.89	1	3.03	5	2.04
Profession	PhD	3	1.41	1	3.03	4	1.64
	Self employment	13	6.13	1	3.03	14	5.71
	Officer	55	25.94	9	27.27	64	26.12
	Worker	45	21.23	4	12.12	49	20.00
	Artisan	20	9.43	3	9.09	23	9.39
	Farmer	1	0.47	0	0.00	1	0.41
	Retired	7	3.30	0	0.00	7	2.86
	House wife	48	22.65	4	12.12	52	59.77
Marital status	Student	23	10.85	12	36.37	35	40.23
	Married	144	67.92	17	51.52	161	65.71
Spouse's work	Single	68	32.08	16	48.48	84	34.29
	Yes	75	52.08	9	52.94	84	52.17
Spouse's profession	No	69	47.92	8	47.06	77	47.83
	Self employment	15	10.42	1	5.88	16	9.94
	Officer	27	18.75	6	35.30	33	20.50
	Worker	22	15.28	0	0.00	22	13.66
	Artisan	7	4.86	2	11.76	9	5.59
	Farmer	5	3.47	0	0.00	5	3.11
	Retired	11	7.64	0	0.00	11	6.83
	House wife	57	39.58	7	41.18	64	39.75
Spouse's education	Student	0	0.00	1	5.88	1	0.62
	Literate	2	1.39	0	0.00	2	1.24
	Elementary school	35	24.31	4	23.53	39	24.22
	Secondary school	28	19.44	2	11.76	30	18.63
	High school	46	31.94	6	35.30	52	32.30
	Community college	14	9.72	1	5.88	15	9.32
	BSc	14	9.72	3	17.65	17	10.56
Monthly income of family (TL)*	MSc	5	3.47	1	5.88	6	3.73
		1626.49		1770.61		1645.90	
Monthly food expenditure of family (TL)*		496.98		438.79		489.14	
Share of food expenditure in income (%)		30.56		24.78		29.72	
The number of individual in the family (person)		4.35		3.73		4.27	

* 1 Turkish Liras (TL) equals to 0.6397 USA Dollars.

cooking (3.03%) are the major causes of consumers not to consume madimak.

The proportion of men among surveyed people who consumed madimak was 46.23%, and overall average of madimak consumers was 48.16%. The average age of madimak consumers was 37.40 years, 29.94 years for consumers who do not consume madimak. The general average age of surveyed people was 34.06 years. The origin (birth place) of individuals attended to the survey was as follow; the proportion of madimak consumers who's originally from Tokat was 81.60%, 39.39% of individuals who do not consume madimak was from Tokat. The general proportion of people who is from Tokat was 33.47% within the surveyed group. This shows the preference of madimak, which is an endemic plant species found in Tokat province from the local people.

As education levels of consumers were investigated, the proportion of high school graduates among madimak consumers was the highest (35.38%), the rate of college graduates among madimak dislike were the highest with 33.33% and the general average of surveyed individuals were high school graduates with 33.47%.

When individuals examined by professions, the most crowded professions among the madimak consumers were officers (25.94%) and the proportion of students within madimak dislike was the highest with 36.37%. The marital status of madimak consumers showed that 67.92% of them were married and the rate of married individuals who dislike madimak was 51.52%. Overall average of married individuals' attendant to the survey was 39.75%. Approximately half of the spouses of married individuals were working. The 39.58% of madimak consumers' spouses were homemaker and the rate was 41.18% for individuals who do not consume madimak. The overall average of homemaker within surveyed group was 39.75%. The highest level of education among surveyed individuals was high school and this was higher (35.30%) in the spouses' of individuals who do not consume madimak as compared to those consumed madimak (31.94%).

The average monthly income of madimak consumers was 1626.49 TL, this was higher for those who do not consume madimak (1770.61 TL). The overall average monthly income of surveyed group was 1645.90 TL. In contrast to the monthly income, food expenditure of

madimak consumers was higher (496.98 TL) compared to the madimak dislike group (438.79 TL). This case supports the idea that the proportion of food expenditure within income decreases as income level increases. The average population size of madimak consumers was 4.35 person and it was 3.73 person for those who do not consume madimak. The overall average of population size for the surveyed group was 4.27 person.

Madimak Consumption Status of Consumers

The amount of madimak consumption per capita in a year was calculated as 12.87 kg/family. More than half of the madimak consumers (60.85%) thought that their madimak consumption is at normal level, and 4.72% of them thought that their consumption is far more and 6.60% of them stated as very low consumption. Analyzing the causes of individuals who are consuming madimak revealed that madimak is consumed due to the favor of madimaks' taste is at the first rank with 36.32%, nutritious of madimak with 31.60%, healing effect of madimak is 26.42%, good taste of madimak is 24.53%, habits with 12.26% and compliance with the price is 7.55%. Consumers to consume, on average, 19.75 years madimak determined. Madimak those who consumed a significant majority (80.66%) stated that they provided madimak by buying from different places, in a portion (12.74%) were collected from nature itself.

It was determined that on average madimak consumers have been consuming madimak for 19.75 years.

Significant majority (80.66%) of madimak consumers purchase madimak from different places, and some (12.74%) collect from nature. The proportion of supplying madimak with both ways is 6.60%. Consumers purchase madimak from several places. The madimak purchasing places are local markets (56.22%), villages (36.22%), known people (14.05%), markets (9.19%) and peddler (2.70%). When buying madimak 75.94% of consumers give importance to the freshness, cleanness is important for 44.34%, color is important for 10.85% of consumers price and taste are decisive for 8.96% of consumers and if madimak is purchased in can, 2.83% of them care the brand name.

Consumption of canned madimak is quite low (3.30%), and majority of the madimak consumers (89.62%) purchase fresh madimak. The reason to pre-

fer fresh madimak is mainly due to the naturalness (63.41%). Some people (28.29%) think that consuming fresh herbs has more benefits compared to canned food. Some consumers (23.41%) think the taste of fresh madimak better. The cost (8.78%) and the desire to prepare at home (0.98%) are the reasons to prefer fresh madimak. Cleanness and readiness of canned madimak are the main reasons to prefer by consumers. Availability in all seasons (45.45%), being healthy (18.18%), having good taste (4.55%) and being cheap (4.55%) are the other reasons for the preference of canned madimak by consumers. The majority of individuals who consumed canned madimak stated that they pay attention to the brand name on label and the expiration date on canned madimak. Consumers pay also attention to the list of ingredients (26.32%), price (10.53%), salt content (10.53%) and weight (5.26%) on label.

The season in purchasing madimak is important for almost all of the individuals who consume madimak (91.98%). Majority of consumers (71.70%) surveyed consume madimak in May, and consumers (75.47%) pay attention to where madimak was grown. Madimak is consumed at several ways, and more than half of the consumers (59.91%) prefer to cook madimak at the same day of purchasing. Storing frozen madimak for winter is also common practice (46.23%) used by consumers. Some consumers (14.62%) preserve madimak while others (10.38%) buy canned madimak. Small portion of consumers (5.19%) stores madimak after drying for winter use.

“Planting madimak” and “collecting madimak” terms were heard by 75.47% of the consumers. However, 80.63% of consumers prefer “collected madimak” due to the naturalness to “planted madimak”. Consumers consider “collected madimak” as free of harmful chemicals, and some (18.60%) chose collected madimak due the perception of cleanness. Consumers prefer “planted madimak” due to the naturalness (41.94%), good taste (29.03%), availability (16.13%), cleanness (12.90%) and cost (3.23%). Significant part of consumers (69.38%) easily differentiates planted and collected madimaks from each other. The main criteria to differentiate madimak types were stem (length and color), color of leaf, shape, leaf and size characteristics of madimak. Madimak is mostly cooked like spinach (75.94%). Madimak is also roasted or prepared with

olive oil. In some cases, madimak is cooked with egg or eaten as fresh in salads. News on medicinal effect of madimak has no effect on about half of individuals (51.42%) madimak consumption. However, 28.77% of consumers surveyed have stated that news on beneficial effects of madimak increases their madimak consumption. Almost one fourth of consumers (28.77%) had no idea on this matter.

Madimak is served in a several ways and mainly (75.94%) preferred to cook as in spinach, 21.23% of the people roast the madimak, and 11.79% of surveyed individuals cooks with olive oil. Majority of the consumers (70.28%) believe that prices do not have any effect on madimak consumption, and 86.79% of them think that madimak prices are acceptable. Although chopped, vacuumed and packed products are preferred by 39.15% of individuals surveyed. As many individuals (19.28%) did not accept price difference for desired product.

Relationship between Socio Economic Characteristics and Madimak Consumption Status of Consumers

The relationship between socio-economic characteristics of consumers and madimak consumption conditions were evaluated using Chi-square analysis, and the results of Chi-square analyses were presented in Table 2. The relationship between gender and status of consumers' madimak consumption is not statistically significant. In other words, consumers' gender does not affect the madimak consumption. The origin of consumers determined to be effective on the consumption status of consumers. Autocorrelation coefficient calculated for the relation between the origin of consumer and madimak consumption status is 0.32.

The consumers were divided into four age groups and the Chi-square analysis indicated that consumer ages and madimak consumption status do not have significant relationship. The education level of consumers and madimak consumption status have statistically significant ($P < 0.05$). The corresponding autocorrelation for this relationship is 0.17. Consumers were divided into three groups as professions. The chi-square test showed that professions of individuals and madimak consumption amounts do have significant relations ($P = 0.246$).

Marital statuses of individuals and madimak consumption have significant relations. Autocorrelation co-

efficient calculated for the relationship between marital statuses of individuals and madimak consumptions was 0.12. The relationship between employment status

of spouses and madimak consumptions was not significant ($P=0.947$). Consumers were divided into three groups based on the number of individuals in the fam-

Table 2
The relationship between socio-economic characteristics and the madimak consumption status of consumers

		Surveyed consumers					
		Madimak Consumer		Madimak Dislike		Total	
		Frequency	%	Frequency	%	Frequency	%
Gender	Man	98	83.05	20	16.95	118	100.00
	Women	114	89.76	13	10.24	127	100.00
		$\chi^2 = 2.365$		$P = 0.124$		$df = 1$	
Origin	Tokat	173	93.01	13	6.99	186	100.00
	Others	39	66.10	20	33.90	59	100.00
		$\chi^2 = 27.828$		$P = 0.000$		$df = 1$ $CC = 0.32$	
Age (year)	< 25	46	80.70	11	19.30	57	100.00
	25 - 34	65	85.53	11	14.47	76	100.00
	35 - 44	55	85.94	9	14.06	64	100.00
	45 \geq	46	95.83	2	4.17	48	100.00
		$\chi^2 = 5.311$		$P = 0.150$		$df = 3$	
Education status	Literate, elementary and secondary school	66	89.19	8	10.81	74	100.00
	High school	75	91.46	7	8.54	82	100.00
	Community college	31	86.11	5	13.89	36	100.00
	BSc, MSc and PhD	40	75.47	13	24.53	53	100.00
		$\chi^2 = 7.728$		$P = 0.052$		$df = 3$ $CC = 0.17$	
Profession	Fixed paid	107	89.17	13	10.83	120	100.00
	Variable rate paid	34	89.47	4	10.53	38	100.00
	Non paid	71	81.61	16	18.39	87	100.00
		$\chi^2 = 2.806$		$P = 0.246$		$df = 2$	
Marital status	Married	144	89.44	17	10.56	161	100.00
	Single	68	80.95	16	19.05	84	100.00
		$\chi^2 = 3.413$		$P = 0.065$		$df = 1$ $CC = 0.12$	
Spouse's work	Works	75	89.29	9	10.71	84	100.00
	Do not work	69	89.61	8	10.39	77	100.00
		$\chi^2 = 0.004$		$P = 0.947$		$df = 1$	
The number of individual in the family (person)	≤ 3	66	81.48	15	18.52	81	100.00
	4	64	84.21	12	15.79	76	100.00
	$5 \geq$	82	93.18	6	6.82	88	100.00
		$\chi^2 = 5.463$		$P = 0.065$		$df = 2$ $CC = 0.15$	
Monthly income of family (TL)	< 1000	41	82.00	9	18.00	50	100.00
	1000 - 1499	60	89.55	7	10.45	67	100.00
	1500 - 2000	71	89.87	8	10.13	79	100.00
	2001 \geq	40	81.63	9	18.37	49	100.00
		$\chi^2 = 3.171$		$P = 0.366$		$df = 3$	
Monthly food expenditure of family (TL)	≤ 300	70	84.34	13	15.66	83	100.00
	301 - 599	88	86.27	14	13.73	102	100.00
	600 \geq	54	90.00	6	10.00	60	100.00
		$\chi^2 = 0.968$		$P = 0.616$		$df = 2$	

ily. The groups for the number of family members and madimak consumption had statistically significant relationship ($P < 0.10$). The results revealed that the number of individuals in a family affects the consumption of madimak. Autocorrelation coefficient calculated for this relationship was 0.15.

Monthly income of families and madimak consumption had no significant relationship. Similarly, monthly food expenditure and monthly income of a family had no significant relationship. The relationship between socio-economic characteristics of individuals who consume madimak and consumption of madimak for per capita in a year was evaluated with chi-square analysis (Table 3).

The analysis showed that the origin of individuals and the madimak consumption amounts have statistically significant relationship ($P < 0.05$) and the corresponding autocorrelation coefficient is calculated as 0.17. The significant relation ($P < 0.05$) between groups of education levels and the madimak consumption amounts indicates that education level of an individual affects the madimak consumption. The autocorrelation coefficient calculated is 0.25. The profession groups of consumers and madimak consumptions have significant relationship ($P = 0.042$), and the autocorrelation coefficient of the relationship is 0.21.

The relationship between employment status of spouses and madimak consumption amounts is statistically significant ($P < 0.01$) and the autocorrelation coefficient of the relation is 0.21. The groups of number of individuals in a family and the madimak consumption amounts have statistically significant relations ($P < 0.01$). The results indicated that the number of individuals in a family significantly affects the amount of madimak consumption and the autocorrelation coefficient of this relationship is 0.18. On the other hand, no significant relationships were obtained between gender, age, marital status, monthly income and monthly food expenditure of individuals and madimak consumption amounts.

The results of variance analysis and LSD tests for socio-economic characteristics of consumers and madimak consumption amounts are presented in Tables 4 and 5, respectively. Hypothesis and interpretations of variance analysis are discussed in the following section.

- Hypothesis 1: Madimak Consumption Amounts according to the Age Groups

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the age groups.

H_1 : Madimak consumption amounts of consumers differ significantly according to the age groups.

$P = H_0$ hypothesis is accepted based on 0.384 value. Madimak consumption amounts of consumers do not differ significantly according to the age groups.

- Hypothesis 2: Madimak Consumption Amounts according to the Gender

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the gender.

H_1 : Madimak consumption amounts of consumers differ significantly according to the gender.

$P = H_0$ hypothesis is accepted based on 0.279 value. Madimak consumption amounts of consumers do not vary significantly according to the gender.

- Hypothesis 3: Madimak Consumption Amounts according to the Origin

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the hometown.

H_1 : Madimak consumption amounts of consumers differ significantly according to the hometown.

$P = H_0$ hypothesis is rejected based on 0.072 value. Madimak consumption amounts of consumers significantly differ ($F = 3.266$, $P < 0.10$) according to the hometown of consumers. The average madimak consumption ($\bar{X} = 3.28$) of consumers who are from Tokat province is greater as compared to whom ($\bar{X} = 2.28$) from other provinces.

- Hypothesis 4: Madimak Consumption Amounts according to the Education Level

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the education level.

H_1 : Madimak consumption amounts of consumers differ significantly according to the education level.

$P = H_0$ hypothesis is accepted based on 0.893 value.

- Hypothesis 5: Madimak Consumption Amounts according to the Profession Groups

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the profession groups.

H_1 : Madimak consumption amounts of consumers differ significantly according to the profession group.

$P = H_0$ hypothesis is rejected based on 0.047 value. Madimak consumption amounts of consumers differ significantly ($F = 3.095$, $P < 0.05$) according to the profes-

Table 3
Relationship between socio-economic characteristics and madimak consumption amounts of individuals

		Amount of madimak consumption per capita (kg/year)							
		≤ 1.5		1.6 – 3.0		3.1 ≥		Total	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
Gender	Men	26	26.54	36	36.73	36	36.73	98	100.00
	Women	38	33.33	41	35.97	35	30.70	114	100.00
		$\chi^2 = 1.389$		P = 0.499		df = 2			
Origin	Tokat	46	26.59	64	36.99	63	36.42	173	100.00
	Others	18	46.16	13	33.33	8	20.51	39	100.00
		$\chi^2 = 6.556$		P = 0.038		df = 2		CC = 0.17	
Education level	Literate, elementary and secondary school	22	33.33	22	33.33	22	33.34	66	100.00
	High school	13	17.33	34	45.33	28	37.34	75	100.00
	Community college	9	29.03	10	32.26	12	38.71	31	100.00
	BSc, MSc and PhD	20	50.00	11	27.50	9	22.50	40	100.00
		$\chi^2 = 14.399$		P = 0.025		df = 6		CC = 0.25	
Age (year)	< 25	11	23.91	14	30.44	21	45.65	46	100.00
	25 - 34	20	30.77	21	32.31	24	36.92	65	100.00
	35 - 44	19	34.54	24	43.64	12	21.82	55	100.00
	45 ≥	14	30.43	18	39.14	14	30.43	46	100.00
		$\chi^2 = 7.217$		P = 0.301		df = 6			
Occupation	Fixed paid	28	26.17	38	35.51	41	38.32	107	100.00
	Variable paid	6	17.64	14	41.18	14	41.18	34	100.00
	Nonpaid	30	42.25	25	35.21	16	22.54	71	100.00
		$\chi^2 = 9.920$		P = 0.042		df = 4		CC = 0.21	
Marital status	Married	46	31.95	55	38.19	43	29.86	144	100.00
	Single	18	26.47	22	32.35	28	41.18	68	100.00
		$\chi^2 = 2.658$		P = 0.265		df = 2			
Spouse's employment status	Unemployed	32	42.67	27	36.00	16	21.33	75	100.00
	Employed	14	20.29	28	40.58	27	39.13	69	100.00
		$\chi^2 = 9.642$		P = 0.008		df = 2		CC = 0.21	
Number of person in the family (unit)	≤ 3	12	18.18	19	28.79	35	53.03	66	100.00
	4	28	43.75	21	32.81	15	23.44	64	100.00
	5 ≥	24	29.27	37	45.12	21	25.61	82	100.00
		$\chi^2 = 21.047$		P = 0.000		df = 4		CC = 0.18	
Family income (TL/month)	< 1000	9	21.96	16	39.02	16	39.02	41	100.00
	1000 – 1499	16	26.67	25	41.67	19	31.66	60	100.00
	1500 – 2000	25	35.21	21	29.58	25	35.21	71	100.00
	2001 ≥	14	35.00	15	37.50	11	27.50	40	100.00
		$\chi^2 = 4.453$		P = 0.616		df = 6			
Food expenditure in family (TL/month)	≤ 300	22	31.43	27	38.57	21	30.00	70	100.00
	301 – 599	24	27.27	31	35.23	33	37.50	88	100.00
	600 ≥	18	33.33	19	35.19	17	31.48	54	100.00
		$\chi^2 = 1.348$		P = 0.853		df = 4			

sion group. The difference in madimak consumption amounts of fixed paid ($\bar{X} = 3.45$) and variable paid consumer groups ($\bar{X} = 3.57$) is significant. However, the differences among other groups look significant.

Table 4**The results of variance analysis (socio-economic characteristics and amount of madimak consumption)**

	Source of Difference	Degrees of freedom	Sum of square	Squared means	F	P
Gender	Between groups	1	11.698	11.698	1.179	0.279
	Within group	210	2083.837	9.923		
	Total	211	2095.535			
Age	Between groups	3	30.437	10.146	1.022	0.384
	Within group	208	2065.098	9.928		
	Total	211	2095.535			
Origin	Between groups	1	32.093	32.093	3.266	0.072
	Within group	210	2063.442	9.826		
	Total	211	2095.535			
Education level	Between groups	3	6.164	2.055	0.205	0.893
	Within group	208	2089.371	10.045		
	Total	211	2095.535			
Professions	Between groups	2	60.277	30.139	3.095	0.047
	Within group	209	2035.258	9.738		
	Total	211	2095.535			
Marital status	Between groups	1	1.184	1.184	0.119	0.731
	Within group	210	2094.351	9.973		
	Total	211	2095.535			
Spouse's employment status	Between groups	1	90.244	90.244	7.968	0.005
	Within group	142	1608.330	11.326		
	Total	143	1698.574			
Number of person in family	Between groups	2	59.955	29.978	3.078	0.048
	Within group	209	2035.580	9.740		
	Total	211	2095.535			
Monthly income of family	Between groups	3	19.125	6.375	0.639	0.591
	Within group	208	2076.410	9.983		
	Total	211	2095.535			
Monthly expenditure of family	Between groups	2	1.206	0.603	0.060	0.942
	Within group	209	2094.329	10.021		
	Total	211	2095.535			

Table 5**Comparisons (the results of LSD test)**

	Compared groups	Means Difference	Standard Error	P	Significance
Professions	Fixed paid – Variable paid	-0.12143	0.61435	0.844	Non Significant
	Fixed paid - Unpaid	1.09696	0.47767	0.023	Significant
	Variable paid - Unpaid	1.21839	0.65082	0.063	Significant
The number of individuals in family (person)	$\leq 3 - 4$	1.10145	0.54750	0.046	Significant
	$\leq 3 - \geq 5$	1.18132	0.51609	0.023	Significant
	$4 - \geq 5$	0.07987	0.52054	0.878	Non Significant

- Hypothesis 6: Madimak Consumption Amounts according to the Marital Status

H_0 : Madimak consumption amounts of consumers do not differ significantly according to their marital status.

H_1 : Madimak consumption amounts of consumers differ significantly according to the marital status.

$P = H_0$ hypothesis is accepted based on 0.731 value. Madimak consumption amounts of consumers do not differ significantly according to the marital status of consumers.

- Hypothesis 7: Madimak Consumption Amounts according to the Spouse's Employment

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the spouses' employment status.

H_1 : Madimak consumption amounts of consumers differ significantly according to the spouses' employment status.

$P = H_0$ hypothesis is rejected based on 0.005 value. Madimak consumption amount of consumers significantly ($F=7.968$, $P<0.01$) varied according to the spouses employment status. Madimak consumption amount ($\bar{X} = 3.87$) of consumers whose wives are employed is higher compared with the consumers ($\bar{X} = 2.29$) whose wives are not employed.

- Hypothesis 8: Madimak Consumption Amounts according to the monthly Income Groups

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the monthly income groups.

H_1 : Madimak consumption amounts of consumers differ significantly according to the monthly income groups.

$P = H_0$ hypothesis is accepted based on 0.591 value.

- Hypothesis 9: Madimak Consumption Amounts according to the Monthly Food Expenditure Groups

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the monthly food expenditure groups.

H_1 : Madimak consumption amounts of consumers differ significantly according to the monthly food expenditure groups.

$P = H_0$ hypothesis is accepted based on 0.942 value.

- Hypothesis 10: Madimak Consumption Amounts according to the Number of Family Member Groups

H_0 : Madimak consumption amounts of consumers do not differ significantly according to the number of family member groups.

H_1 : Madimak consumption amounts of consumers differ significantly according to the number of family member groups.

$P = H_0$ hypothesis is rejected based on 0.048 value. The difference between groups is significant. Madimak consumption amount was significantly varied ($F=3.078$, $P<0.05$) among subjects with different number of family members. The average madimak consumption of families with four individuals ($\bar{X} = 2.79$) and the groups of five and more individuals ($\bar{X} = 2.71$) are not statistically different. However, the difference among groups is significant.

Conclusions

This research was conducted to evaluate the consumption of madimak in Tokat province where madimak is found as endemic species. Particularly the local community fondly consumes Madimak for a long time. The vast majority of madimak sold in the market is collected from nature, and some is being cultivated in a surrounding area of the central district. A part of the product is purchased from local markets and/or from peddlers. However, some industrial facilities in the region provides sacked product and sold to the market. Canned products give opportunity to find the madimak every season in the market. Some of individuals surveyed stated that chopped and vacuum-packed products can be purchased.

The relationships between some of social characteristics (origin, education level, marital status and number of individuals in a family) of individuals surveyed and madimak consumption amounts are statistically significant. However, madimak consumption per capita and origin, education level, profession, employment status of spouses and number of family members have statistically significant relationships. In addition, variance analysis of socio-economic characteristics and madimak consumption of consumers indicated that madimak consumption of consumers are significantly affected by the origins, professions, employment status of spouses and number of family members.

The consumption of madimak in the region is increasing each year and even madimak is sent from Tokat to the people living in metropolitans. Growing madimak professionally will create employment especially for women working in the farming of madimak. The increase in the scale of trade will also make an important contribution to the region and well as national economy.

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