



## A General Discussion on Green Tobacco Sickness in Tobacco Producers Living in Manisa Province

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**Abstract:** The purpose of this study was to examine the presence of green tobacco sickness in tobacco producers living in Manisa province and their level of knowledge of green tobacco sickness. In this study, simple random sampling was employed to gather and analyze the results of the surveys that had been conducted face-to-face with tobacco producers. As a result, it was understood that tobacco producers living in Manisa province did not have knowledge of green tobacco sickness. The main reasons why green tobacco sickness is not encountered in the region are common usage of protective equipment during harvest, low amount of rainfall and drizzle in vegetation period, and growing tobacco with low nicotine content. It is required to make up deficiencies in relation to green tobacco sickness and occupational health and safety and to make agricultural mechanization widespread in tobacco growing.

**Keywords:** Green Tobacco Sickness, Oriental Tobacco, Nicotine, Manisa

### INTRODUCTION

Tobacco is an annual crop plant within the genus *Nicotiana* of the family Solanaceae. Being the useful part, tobacco leaves differ from other crop plants in terms of the amount of nicotine they contain. Nicotine, which is a pleasure-inducing substance contained in tobacco leaves, is synthesized in roots (Kevseroğlu, 2000; Kinay, 2010). Being more important than other agricultural products in terms of production, usage, and foreign trade, tobacco has been a matter of debate both in Turkey and in the world in recent years especially due to its adverse effects on health. In the world's tobacco production, Virginia, Burley and Maryland, and Oriental are the leading tobacco types with a share of 70%, 15%, and 4%, respectively. They are followed by tobacco types such as Puroluk, Kentucky, Havana, Benevenuto, etc. (Anonymous, 2013a). Approximately 97% of the tobacco grown in Turkey is Oriental, followed by Virginia, Burley, Tömbeki, and Hasankeyf (Anonymous, 2013b). All over the world, 7.3 million tons of tobacco is produced in an area of approximately 4.3 million hectares. In Turkey, it is 45.000 tons produced in an area of approximately 75.000 hectares. Of the said production, approximately 19% is in Manisa province (Anonymous, 2013b).

Green tobacco sickness occurs as nicotine dissolves during transplanting, hoeing, harvesting, stacking, and curing and is absorbed by skin (McBride et al., 1998; Arcury and Quandt, 2006). The sickness was reported in the medical literature for the first time in 1970 by Weizenecker and Deal (Karafakoğlu, 2004). During harvest, tobacco producers break off mature leaves and carry them under their armpits. They rarely use protective equipment such as gloves by the reason that it makes harvesting more difficult. As a result, especially tobacco producers' hands are exposed to nicotine. During harvest, which is performed mostly in the early morning, tobacco producers' clothes are moistened by the dew that accumulates on leaves. It is thought that, dissolved

by dew and absorbed by skin, nicotine causes the symptoms of green tobacco sickness. The symptoms of green tobacco sickness resemble to those of nicotine poisoning observed in new smokers (Karafakoğlu, 2004). They include weakness, headache, nausea, vomiting, dizziness, abdominal cramps, breathing difficulty, abnormal temperature, pallor, diarrhea, chills, fluctuations in blood pressure or heart rate, and increased perspiration and salivation (Gehlbach et al., 1975; Ballard et al., 1995; McBride et al., 1998; Arcury et al., 2001a; Trape'-Cardoso et al., 2003).

According to the results of the research conducted on 685 Virginia (FCV) tobacco producers in India, the prevalence of green tobacco sickness in tobacco workers is 47% (55.7% in women, 42.66% in men) (Parikh et al., 2005). In a research of the nicotine residue on the hands of the workers working at different parts of the FCV tobacco harvesting machine and the removal of such residue by washing hands at different times and in different manners, it was reported that the mean pre-wash and post-wash nicotine levels were 10 and 0.38 mg cm<sup>2</sup>, respectively. It was found that working on the bottom, rather than the top, of the tobacco harvesting machine was directly associated with the amount of nicotine residue and that washing hands with soap and water right after the completion of work reduced nicotine residue levels on hands by approximately 96% (Curwin et al., 2005). It is indicated that the risk of getting green tobacco sickness is higher for younger tobacco workers (Gehlbach et al., 1979; Ballard et al., 1995).

In their studies, some researchers defined green tobacco sickness in farmers and agricultural laborers in different regions of the US (Florida, North Carolina, Kentucky, Tennessee, and Connecticut), Japan, India, and Italy (Weizenecker and Deal, 1970; Gehlbach et al., 1974; Ghosh et al., 1979; Misumi et al., 1983; Ballard et al., 1995; D'Alessandro et al., 2001; Arcury et al., 2001a,b, 2003; Trape'-Cardoso et al., 2003; Parikh et al., 2005). Arcury et al. (2001a,b) report the incidence density of green tobacco

sickness in Latino farmworkers in North Carolina as 1.88 days in 100 days and the prevalence in agricultural season as 24%. In the study conducted in North Carolina, 18.4% of the tobacco harvesters were diagnosed with green tobacco sickness, and rash and abrasions were found to be directly associated with green tobacco sickness (Arcury et al., 2008).

As tobacco production continues, green tobacco sickness is probable to occur among tobacco producers. For this reason, it is necessary to determine its prevalence and to respond in case of presence. This study aims to summarize the socio-economic status of tobacco producers living in Manisa province and to ascertain the awareness And Prevalence Of Green Tobacco Sickness Among Them.

## MATERIALS AND METHODS

### Materials

The data which is obtained from face-to-face interviews with tobacco producers forms the material of this study. The results of the surveys prepared accordingly and made face-to-face with tobacco producers were gathered and analyzed.

### Method

The area of study was determined to be the districts of Manisa province which had the largest area and highest amount of tobacco production according to the 2011 production year contracts (Table 1). In the study, the number of tobacco producers to take part in the survey was determined to be 416, using simple random sampling method (Formula;  $N = \frac{N*(S)^2*t^2}{((N-1)d^2+(S)^2*t^2)}$  (Çiçek and Erkan, 1996). Data was collected by visiting 5 districts and conducting face-to-face interviews with tobacco producers. Survey results were analyzed on SPSS 17.0; data was presented as crosstabs.

### Results and Discussion

Tobacco is a social plant because all family members contribute to the process of cultivation (seedbed period, transplanting, hoeing, harvesting, stacking, curing, boxing, and storage). In the study, it was found that all family members contributed to tobacco production. In 53.1% of the establishments analyzed, the number of family members varied between 4 and 6. 60.6% of the household heads were below the age of 50 4.8% of them were female 83.9% of the tobacco farmers were primary school graduates, proving that the level of education of tobacco producers was low. It was understood that 75.5% of the tobacco producers in the region did not have any source of income other than tobacco. In spite of the search for an alternative to tobacco production in the rural area, tobacco remains to be the most significant source of income for the local community (Table 2).

Pesticides used in tobacco production process pose hazard to the health of tobacco producers. Exposure to pesticides is as dangerous as exposure to nicotine (Ballard et al., 1995; Karafakoğlu, 2004). For this reason, in our study, establishments were asked about the application of pesticides, the frequency of application, the method of application, compliance with directions for use, and the

factor in deciding the time from harvesting to application. In the study, it was found that a great majority of the tobacco producers (98.8%) applied pesticides. 97.6% of them applied pesticides 1 to 2 times during production season. 87.3% of the tobacco producers applied pesticides taking the recommendations of their contracted tobacco company official into consideration. 69% of them used backpack sprayers for applying pesticides. In tobacco production, both the right dose of application and the right time of application are the keys to minimize environmental damage as well as damages to tobacco producers and workers. 87.3% of the tobacco producers consulted to their contracted tobacco company officials before applying pesticides. Only 6.3% of the tobacco producers decided on dosage by themselves; the rest of them consulted to tobacco company officials, pesticide vendors, and engineers of the Provincial Directorate of Agriculture. One of the most frequent problems in tobacco production areas was non-compliance with time of waiting after pesticide application. In this study, although 73.8% of the tobacco producers stated they complied with such time with applicable methods, it was understood that 25.5% of them still decided on the time of entering the land after pesticide application based on their experience, without need for any guidance (Table 3). Tobacco having residue over tolerance limits does not have any commercial value, not to mention its adverse effects on health. So, it is absolutely necessary to observe the dose of application and the time of waiting written on labels.

Green tobacco sickness occurs as nicotine on tobacco leaves is absorbed as a result of contact with skin. The key factors that help nicotine absorption are failure to use protective equipment, breaking off tobacco leaves when they have dew on them, and collecting tobacco leaves under armpits. In the study conducted in the region, it was ascertained that, of the tobacco producers, 99% did not harvest in rainy weather, 91% did not harvest in case of dew, 60% harvested when the height of tobacco was at waist level, 36% harvested when the height of tobacco was at chest level, 85% used protective equipment, and 61% carried harvested tobacco leaves mostly in a basket. Almost half (48%) of the tobacco producers had breakfast before harvest, while the other half (52%) snacked during harvest. In addition, it was found that the majority (80%) of the harvested tobacco leaves were collected under armpits (Table 4).

It was seen that almost all (97.8%) of the tobacco farmers in the region had not ever heard of green tobacco sickness and that, after harvest, a great majority (95.9%) of them had not ever encountered such a sickness. The ones who thought tobacco production had adverse effects on their health were in minority (16.3%). The majority (83.7%) of them thought the opposite (Table 5).

In the study, it was observed that, as the level of education increased, non-agricultural income ( $p < 0.01$ ) decreased while post-harvest sickness ( $p < 0.05$ ) increased depending on the method of pesticide application. There was an inverse proportion between pre-harvest breakfast and the adverse effects of tobacco cultivation on health ( $p < 0.01$ ), having heard of green tobacco sickness ( $p < 0.05$ ), post-harvest sickness ( $p < 0.05$ ). On the other hand, there

Table 1. Tobacco production in Manisa province and in the area of study

	Amount of Production (ton)	Area of Production (da <sup>-1</sup> )	Number of Surveys
Akhisar / Manisa	3370	37000	165
Gördes / Manisa	2070	20500	101
Saruhanlı / Manisa	1580	21800	72
Kırkağaç / Manisa	970	14600	52
Merkez / Manisa	520	6700	26
Manisa	8510	100600	416
Turkey	45435	755800	

**Table 2. Some socio-economic features of tobacco producers**

Regions	Akhisar		Gördes		Kula		Manisa		Saruhanlı		Total	
Variables	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
<b>Number of Households</b>												
1---3	61	14.7%	50	12.0%	17	4.1%	12	2.9%	35	8.4%	175	42.1%
4---6	97	23.3%	48	11.5%	31	7.5%	8	1.9%	37	8.9%	221	53.1%
7---9	8	1.9%	3	0.7%	5	1.2%	2	0.5%	1	0.2%	19	4.6%
10 < ---	1	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.2%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Gender</b>												
Male	157	37.7%	98	23.6%	50	12.0%	22	5.3%	69	16.6%	396	95.2%
Female	10	2.4%	3	0.7%	3	0.7%	0	0.0%	4	1.0%	20	4.8%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Age</b>												
15---49	103	24.8%	68	16.3%	32	7.7%	11	2.6%	38	9.1%	252	60.6%
50---65	55	13.2%	32	7.7%	19	4.6%	11	2.6%	30	7.2%	147	35.3%
65 < ---	9	2.2%	1	0.2%	2	0.5%	0	0.0%	5	1.2%	17	4.1%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Educational Background</b>												
Literate	10	2.4%	1	0.2%	1	0.2%	3	0.7%	1	0.2%	16	3.8%
Primary School	138	33.2%	88	21.2%	43	10.3%	18	4.3%	62	14.9%	349	83.9%
Secondary School	14	3.4%	9	2.2%	5	1.2%	1	0.2%	9	2.2%	38	9.1%
High School	5	1.2%	2	0.5%	4	1.0%	0	0.0%	1	0.2%	12	2.9%
Undergraduate	0	0.0%	1	0.2%	0	0.0%	0	0.0%	0	0.0%	1	0.2%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Non-Agricultural Income</b>												
Yes	46	11.1%	23	5.5%	14	3.4%	2	0.5%	16	3.8%	101	24.3%
No	121	29.1%	78	18.8%	39	9.4%	20	4.8%	57	13.7%	315	75.7%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Non-Tobacco Income</b>												
0%	121	29.1%	78	18.8%	38	9.1%	20	4.8%	57	13.7%	314	75.5%
10-30%	12	2.9%	8	1.9%	5	1.2%	1	0.2%	8	1.9%	34	8.2%
31-60%	26	6.3%	11	2.6%	5	1.2%	1	0.2%	2	0.5%	45	10.8%
61-80%	8	1.9%	4	1.0%	5	1.2%	0	0.0%	6	1.4%	23	5.5%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>

**Table 3. Pesticide application by tobacco producers and factor in deciding to do so**

Regions	Akhisar		Gördes		Kula		Manisa		Saruhanlı		Total	
Variables	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
<b>Pesticide Application</b>												
Yes	164	39.4%	101	24.3%	52	12.5%	22	5.3%	72	17.3%	411	98.8%
No	3	0.7%	0	0.0%	1	0.2%	0	0.0%	1	0.2%	5	1.2%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Number of Application</b>												
0	0	0.0%	0	0.0%	1	0.2%	1	0.2%	1	0.2%	3	0.7%
1 time	55	13.2%	38	9.1%	21	5.0%	11	2.6%	33	7.9%	158	38.0%
2 times	108	26.0%	62	14.9%	29	7.0%	10	2.4%	39	9.4%	248	59.6%
3 times	4	1.0%	1	0.2%	2	0.5%	0	0.0%	0	0.0%	7	1.7%
4 times	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Method of Application</b>												
Not applying	0	0.0%	0	0.0%	1	0.2%	1	0.2%	1	0.2%	3	0.7%
Life water	24	5.8%	21	5.0%	27	6.5%	7	1.7%	7	1.7%	86	20.7%
Pump	15	3.6%	13	3.1%	1	0.2%	3	0.7%	7	1.7%	39	9.4%
Backpack Sprayer	128	30.8%	67	16.1%	24	5.8%	10	2.4%	58	13.9%	287	69.0%
Spraying Machine	0	0.0%	0	0.0%	0	0.0%	1	0.2%	0	0.0%	1	0.2%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.28%</b>	<b>53</b>	<b>12.74%</b>	<b>22</b>	<b>0.0529%</b>	<b>73</b>	<b>0.1755%</b>	<b>416</b>	<b>100.0%</b>
<b>Factor in Deciding on Application</b>												
Not applying	0	0.0%	0	0.0%	1	0.2%	1	0.2%	1	0.2%	3	0.7%
Based on his/her experience	25	6.0%	9	2.2%	1	0.2%	2	0.5%	0	0.0%	37	8.9%
Recommendation of the Provincial Directorate of Agriculture	2	0.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.5%
Recommendation of Pesticide Vendor	6	1.4%	1	0.2%	2	0.5%	2	0.5%	0	0.0%	11	2.6%
Recommendation of Tobacco Company	134	32.2%	91	21.9%	49	11.8%	17	4.1%	72	17.3%	363	87.3%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Factor in Deciding on Dosage</b>												
Not applying	0	0.0%	0	0.0%	1	0.2%	1	0.2%	1	0.2%	3	0.7%
Directions for Use	79	19.0%	32	7.7%	22	5.3%	3	0.7%	13	3.1%	149	35.8%
Based on his/her experience	10	2.4%	10	2.4%	4	1.0%	2	0.5%	0	0.0%	26	6.3%
Recommendation of the Provincial Directorate of Agriculture	1	0.2%	0	0.0%	0	0.0%	1	0.2%	0	0.0%	2	0.5%
Recommendation of Pesticide Vendor	20	4.8%	13	3.1%	10	2.4%	3	0.7%	7	1.7%	53	12.7%
Recommendation of Tobacco Company	57	13.7%	46	11.1%	16	3.8%	12	2.9%	52	12.5%	183	44.0%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Factor in Deciding on Post-Application Harvest</b>												
Not applying	0	0.0%	0	0.0%	1	0.2%	1	0.2%	1	0.2%	3	0.7%
Directions for Use	100	24.0%	64	15.4%	18	4.3%	8	1.9%	40	9.6%	230	55.3%
Based on his/her experience	38	9.1%	15	3.6%	23	5.5%	11	2.6%	19	4.6%	106	25.5%
Other	29	7.0%	22	5.3%	11	2.6%	2	0.5%	13	3.1%	77	18.5%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>

Table 4. Some harvesting period behaviors which may cause green tobacco sickness

Regions	Akhisar		Gördes		Kula		Manisa		Saruhanlı		Total	
Variables	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
<b>Pre-Harvest Breakfast</b>												
Yes	97	23.3%	48	11.5%	18	4.3%	3	0.7%	34	8.2%	200	48.1%
No	70	16.8%	53	12.7%	35	8.4%	19	4.6%	39	9.4%	216	51.9%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Snacking during Harvest</b>												
Yes	105	25.2%	41	9.9%	17	4.1%	11	2.6%	43	10.3%	217	52.2%
No	62	14.9%	60	14.4%	36	8.7%	11	2.6%	30	7.2%	199	47.8%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Harvesting in Rainy Weather</b>												
Yes	2	0.5%	1	0.2%	0	0.0%	0	0.0%	0	0.0%	3	0.7%
No	165	39.7%	100	24.0%	53	12.7%	22	5.3%	73	17.5%	413	99.3%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Harvesting in Case of Dew, Moisture, etc.</b>												
Yes	22	5.3%	8	1.9%	4	1.0%	1	0.2%	2	0.5%	37	8.9%
No	145	34.9%	93	22.4%	49	11.8%	21	5.0%	71	17.1%	379	91.1%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Plant Height During Harvest</b>												
Under-Waist Level	1	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.2%
Waist Level	103	24.8%	54	13.0%	39	9.4%	12	2.9%	42	10.1%	250	60.1%
Chest Level	59	14.2%	42	10.1%	10	2.4%	9	2.2%	30	7.2%	150	36.1%
Head Level	4	1.0%	5	1.2%	4	1.0%	1	0.2%	1	0.2%	15	3.6%
Overhead Level	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Protective Equipment During Harvest</b>												
Yes	136	32.7%	85	20.4%	46	11.1%	16	3.8%	67	16.1%	350	84.1%
No	31	7.5%	16	3.8%	7	1.7%	6	1.4%	6	1.4%	66	15.9%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Method of Carrying Harvested Tobacco Leaves</b>												
By Hand	26	6.3%	30	7.2%	24	5.8%	11	2.6%	34	8.2%	125	30.0%
Under Armpit	19	4.6%	1	0.2%	3	0.7%	6	1.4%	8	1.9%	37	8.9%
Basket	122	29.3%	70	16.8%	26	6.3%	5	1.2%	31	7.5%	254	61.1%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Collecting under Armpit</b>												
Yes	127	30.5%	94	22.6%	41	9.9%	10	2.4%	61	14.7%	333	80.0%
No	37	8.9%	7	1.7%	9	2.2%	10	2.4%	9	2.2%	72	17.3%
Sometimes	3	0.7%	0	0.0%	3	0.7%	2	0.5%	3	0.7%	11	2.6%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>

**Table 5. Recognition and prevalence of green tobacco sickness among tobacco producers**

Regions	Akhisar		Gördes		Kula		Manisa		Saruhanlı		Total	
Variables	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
<b>Post-Harvest Sickness</b>												
Yes	8	1.9%	2	0.5%	4	1.0%	3	0.7%	0	0.0%	17	4.1%
No	159	38.2%	99	23.8%	49	11.8%	19	4.6%	73	17.5%	399	95.9%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Applying to the Hospital in Case of Sickness</b>												
Yes	8	1.9%	2	0.5%	4	1.0%	3	0.7%	0	0.0%	17	4.1%
No	159	38.2%	99	23.8%	49	11.8%	19	4.6%	73	17.5%	399	95.9%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Have you ever heard of green tobacco sickness?</b>												
Yes	1	0.2%	2	0.5%	3	0.7%	1	0.2%	2	0.5%	9	2.2%
No	166	39.9%	99	23.8%	50	12.0%	21	5.0%	71	17.1%	407	97.8%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>
<b>Does tobacco production affect health adversely?</b>												
Yes	18	4.3%	16	3.8%	20	4.8%	6	1.4%	8	1.9%	68	16.3%
No	149	35.8%	85	20.4%	33	7.9%	16	3.8%	65	15.6%	348	83.7%
<b>Total</b>	<b>167</b>	<b>40.1%</b>	<b>101</b>	<b>24.3%</b>	<b>53</b>	<b>12.7%</b>	<b>22</b>	<b>5.3%</b>	<b>73</b>	<b>17.5%</b>	<b>416</b>	<b>100.0%</b>

**Table 6. Correlations between green tobacco sickness and tobacco producers**

Non-agricultural income (%)	-.146**											
Pesticide application	.061		.065									
Pre-harvest breakfast	-.109*		.095									
Snacking during harvest	-.033		.060		-.093		.141**					
Harvest after rainfall or dew	-.044		.040		.045		.071		.079			
Height of tobacco leaves during harvest	.008		.024		.011		.068		.063			
Protective equipment usage during harvest	-.023		-.061		-.064		-.043		-.113*		-.142**	
Tobacco leaf stringing	-.097*		.027		-.033		.221**		.189**		.055	
Post-harvest sickness	.072		-.060		.102*		-.101*		-.118*		.063	
Having heard of green tobacco sickness	.035		-.007		.025		-.110*		-.089		.012	
Adverse effects of tobacco cultivation on health	.039		-.053		.056		-.217**		-.240**		-.024	
	Level of education		Non-agricultural income (%)		Method of pesticide application		Pre-harvest breakfast		Snacking during harvest		Harvest after rainfall or dew	
	Tobacco leaf stringing		Post-harvest sickness		Having heard of green tobacco sickness							

\*0.05 &gt;p

\*\*0.01&gt;p

was a direct proportion between tobacco stringing ( $p<0.01$ ) and snacking during harvest ( $p<0.01$ ). There was also a directly proportionate relationship between post-harvest sickness and the adverse effects of tobacco cultivation on health ( $p<0.01$ ) and having heard of green tobacco sickness ( $p<0.01$ ). The results obtained were found to be statistically significant. From that point of view, it was observed that the tobacco producers who had breakfast before harvesting had not encountered any health problems and thus had not ever heard of green tobacco sickness, and they stated that tobacco cultivation did not affect health adversely. However, the tobacco producers who had fallen sick and applied to the hospital for any reason whatsoever thought that tobacco production had adverse effects on health and stated that they had been informed about green tobacco sickness at the hospital. Moreover, it was found that those who did not have breakfast before harvest snacked during harvest. An inversely proportionate relationship was observed between using protective equipment during harvest and snacking during harvest ( $p<0.05$ ), harvesting after rainfall ( $p<0.01$ ), and the height of harvested tobacco leaves.

### Conclusion

The researches performed all around the world report that green tobacco sickness exists and leads to some negative effects on tobacco producers. Manisa is the province having the highest amount of tobacco production in Turkey. The purpose of this study was to examine the presence of green tobacco sickness in the region and tobacco producers' level of knowledge of green tobacco sickness.

As a result of the study, no green tobacco sickness was encountered among tobacco producers living in Manisa province. The main reasons why green tobacco sickness was not encountered in the region are usage of protective equipment during harvest, low amount of rainfall and drizzle in vegetation period, and growing tobacco with the lowest nicotine content in Turkey.

Additionally, it was understood that tobacco producers living in Manisa province did not have knowledge of green tobacco sickness. Thus, it is required to inform them about green tobacco sickness and give occupational health and safety training to them. For protecting the health of individuals working in tobacco production, it is of high importance to conduct national and international campaigns intended to raise public awareness of green tobacco sickness. Besides, generalizing and diversifying the use of mechanical methods especially in harvesting tobacco shall considerably hinder the incidence of green tobacco sickness.

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