

Farmers' Approaches to Good Agricultural Practices and Adoption and Application Levels of Agricultural Innovations in Çanakkale Province

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Abstract: In this study, approaches of the farmers' to good agricultural practices and agricultural innovations in Çanakkale province was evaluated. Survey studies were conducted with 55 farmers applying good agricultural practices in Çanakkale. The same survey was also conducted with the same number of farmers who did not apply good agricultural practices and total of 110 surveys were conducted. A great majority of the farmers applying good agricultural practices (87.27%) were determined as high level innovators and this ratio was found as 34.55% for the farmers not applying good agricultural practices. As a result of the chi square test which was done in order to determine the difference between the farmers applying and not applying good agricultural practices according to the innovativeness level statistically, it was determined that the difference between the farmers was statistically significant in 1% significance level. In the study, 47.27%, 40%, 34.55%, 32.73%, 25.45% and 10.91% of the farmers stated that they applied good agricultural practices for the security of the workers, obtaining qualified crop, receiving subsidy, less damage to the environment, obtaining more crop and being controlled in each stage respectively. The farmers applying good agricultural practices stated that marketing guarantee must be given to good agriculture crops and subsidy amount for good agricultural practices must be increased. Besides, they stated that studies for informing the farmers about good agricultural practices can be beneficial.

Key words: Good agricultural practices, agricultural innovation, Çanakkale

INTRODUCTION

Nowadays, production and rational use of information and technology is one of the most important indicators of development. In developing countries, it is generally possible to observe the community which have different development level in the same country. Rural population who live in the rural area have significant negotiations according to the urban in terms of self-development opportunities). This necessitates reaching to the rural population and availing of them from training and extension services (Özçatalbaş, 2001). From past to today, in almost each country, it is overemphasized on the generalization of the innovations in rural area and development of the production techniques for reaching the rural population to better life standards. Countries deal with a main subject as raising

the life standard (level of welfare) of the rural population. For this reason, the government interferes the current production type in the rural area and paves the way for the change in the rural area. Today, the efforts of the public for realizing this purpose continue and it is observed that the roles of the producer organizations and private sector for reaching the innovations to the rural area increase especially in developed and developing countries.

Agriculture sector is different from other sectors in terms of economy, politics and technical. Besides, it has a strategic significance due to the basic necessities. Today, agriculture gradually increases the qualifications based on the information (Kızılaslan, 2009). Information exists on the agricultural development. Adoption and usage of the new information and

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technologies by the producers is quite significant in terms of increasing the agricultural productivity and providing the rural development. Adoption of the innovations to the sector should be provided for sustainable development in the agriculture. Agricultural innovation involves the new or developed methods and inputs used in agricultural production process and these are the technical applications which increase the production or the productivity (Tatlıdil, 1997).

Adoption and expand of the agricultural innovations provides the acceleration of technology transfer and utilize of technology production. One of the most significant characteristics of nowadays is the rapid development of the technology and agriculture sector cannot be isolated from these developments. Therefore, agricultural production techniques and methods develop continuously. Many technological characteristics in every phase of the agricultural production are presented to the usage of the producers. Requirement to the agricultural crops considerably increase every year in the countries which are in industrialization process and have population increase and low income level, such as Turkey. Obtainment of raw material and currency required for industrialization by developing the exportation selling opportunities and supplying the increasing requirement can be provided by continuous and rapid increase in agricultural production. For this reason, increment of the production provided from unit area is possible by the usage of the new technologies in Turkey. In recent years, Turkey gets ahead a rapid modernization and technological progress in all areas and sustains the agricultural politics with this development in parallel.

Good Agricultural Practices Concept

Nowadays, the greatest requirement of the societies is to provide secure foodstuffs. Rapid increase of the World population, environmental pollution related to

developing technology, economic weakness and lack of education deepen the nourishment problems and obstruct the security food supply.

Good Agricultural Practices are the main factors which are composed and absolutely necessary for the accurate production of the agricultural products and development and generalization of the eco-friendly techniques in the agriculture. By good agricultural practices, agricultural production is executed more environment friendly and takes the human and animal health under protection and at the same time, all of the stages of the production are recorded and the crops are certificated and transmitted to the consumers.

The aim of good agricultural practices is the determination of the successful techniques in terms of yield and quality, protection of the environment, human and animal welfare within the production system and composing of a program aimed at the development and improvement of the current agriculture model. Hence, it is utilized from Hazard Analysis Critical Control Point principles for taking required precautions and providing hygienic conditions in harvesting and storing after production and ISO 9001 Quality Management System, ISO 14001 Environment Management System and OGSAS 18001 Occupational Health and Safety System standards are also used.

Certification of good agricultural practices started with EUREPGAP protocol in Turkey. From 2003, good agricultural practices has been done according to EUREPGAP criteria in fresh fruits and vegetables sector exporting for European countries. The beginning of good agricultural practices within the frame of the laws of the country occurred with the regulations related with good agricultural practices published in 2004. However, the first certification based on these regulations occurred in 2007. "Good Agricultural Practices" regulations which was prepared

by Ministry of Food, Agriculture and Livestock on 8 September 2004, states the rules and conditions of the standards, types of the licensing enterprises and duties and responsibilities of the organizations. “Good Agricultural Practices Regulations” which was published in 2004 with the law no 25577, composed the legal infrastructure of GAP. This regulations changed with the new regulations which was published on 07 December 2010 in the official gazette with the law no 27778 (Ataseven, 2011).

The number of the EUREPGAP certificated producers was 102 in Turkey by 2004. However, a considerable number of increase on the number of producers occurred by years. The number of the provinces, the number of the producers applying good agricultural practices and production area were 18, 657 and 53607 da in Turkey in 2007 and the number of the provinces and the producers and production area reached to 64, 55609 and 4741075 da in 2016, respectively (Table 1).

Table 1. Good agricultural practices indicators in Turkey

Years	Number of provinces	Number of producers	Production area (da)
2007	18	651	53607
2008	19	822	60231
2009	42	6020	1702804
2010	48	4540	781741
2011	49	3042	499632
2012	47	3676	837171
2013	56	8170	985099
2014	53	21332	2147705
2015	61	39740	3465695
2016	64	55609	4741075
% variation (2007-2016)		8442	8744

Good agricultural practices was applied in total of 15 different types of crops (peach, nectarine, cherry, apple, apricot, cabbage, quince, walnut, chestnut, tomato, almond, lettuce, melon, olive and plum) in Çanakkale (Anonymous, 2016).

The number of the producers applying good agricultural practices and the production areas and variation ratios of 2010-2016 years

in Çanakkale province are given in Table 2 (Anonymous, 2017).

The number of the producers applying good agricultural practices and production area were 205 and 8545 da in Turkey in 2010 and the number of the producers and production area reached to 524 and 62670 da in 2016, respectively.

Table 2. Good agricultural practices indicators in Çanakkale province

Years	Number of producers	Production area (da)
2010	205	8545
2011	116	7694
2012	116	12817
2013	113	17160
2014	210	33284
2015	403	46209
2016	524	62670

In this study, socio economic comparison of the agricultural enterprises applying and not applying good agricultural practices in Çanakkale province was done and approaches of the farmers to good agricultural practices was examined. Besides, adoption and application of the agricultural innovations by the farmers were examined, innovativeness index was determined and the comparison of the farmer groups was done.

MATERIALS AND METHODS

The survey studies which were carried out with the farmers applying and not applying good agricultural practices in extremely produces specific crops in Çanakkale and literature studies were the material of the study.

The number of the peach and cherry farmers who applied good agricultural practices was 147 in Çanakkale. The sample size was calculated according to simple random sampling method using the following equation (Çiçek and Erkan, 1996).

$$n = \frac{NxS^2}{(N-1)D^2+S^2}$$

n = Sample size

N = Number of total enterprises

S = Standard deviation

$$D^2 = (d/Z)^2$$

d = acceptable error (permissible error 10%)

Z = reliability coefficient (1.645, which represents the 90% reliability).

Thus, the calculated sample size was determined to be 55 and these farmers were selected randomly. Furthermore, 55 farmers, who did not apply good agricultural practices, were interviewed for the comparison of the farms in the same region.

During the analyses of the data, average and percentage calculations, crosstabs, frequency distributions were used. Besides, normally distributed continuous data obtained for the groups applying and not applying good agricultural practices were subjected to t-test, discrete data were subjected to chi-square test and the differences between the groups were observed.

First of all, the innovations were determined in order to introduce the adoption of the innovations and points were given to each farmer toward the innovations (Table 3). The scoring was turned into index form and then the farmers were divided in two subgroups as “high level innovators” and “low level innovators” (Özkaya, 1996). The innovativeness index was calculated by using the following formula.

Innovativeness index

$$= \left(\frac{\text{Total point of the producer}}{\text{Maximum point}} \right) * 100$$

The farmers who had more and less than 50% innovativeness index were accepted as high level innovators and low level innovators, respectively.

Table 3. Innovativeness index indicators

Drip irrigation	Yes: 5 point	No: 0 point
Agriculture insurance	Yes: 5 point	No: 0 point
High system viticulture	Yes: 5 point	No: 0 point
Soil analysis	Yes: 5 point	No: 0 point
Hybrid vegetable seed/seedling growing	Yes: 5 point	No: 0 point
Greenhouse production	Yes: 5 point	No: 0 point
Certified seed use	Yes: 5 point	No: 0 point
Good agriculture practices	Yes: 5 point	No: 0 point
Information from the agricultural organizations about irrigation methods and amounts and implementation	Yes: 5 point	No: 0 point
Information from the agricultural organizations about fertilizing and spraying and implementation	Yes: 5 point	No: 0 point

RESULTS AND DISCUSSION

Socio Economic Structure of the Enterprises

The data regarding the ages, education periods, household sizes, agricultural experiences, number of agricultural organizations and total land sizes of the farmers applying and not applying good agricultural practices are given in Table 4.

The average of the ages of the farmers applying and not applying good agricultural practices were determined as 49.51 and 48.44, respectively. The education periods

were found as 6.65 and 5.89 years and the household sizes were determined as 4.91 and 4.27 respectively for the farmers applying and not applying good agricultural practices. The agricultural experience of the farmers applying good agricultural practices was determined as 30.36 years whereas it was determined as 29.24 years for the farmers not applying good agricultural practices. The number of the agricultural organizations which the farmers joined were determined as 2.33 and 1.95, respectively. The total land sizes of the farmers was determined as 51.45 da and 52.15 da, respectively.

Table 4. Socio-economic characteristics of the farmers

		GAP	Non GAP
Age	Average p	49.51	48.44
			0.607
Education period	Average p	6.65	5.89
			0.102
Household size	Average p	4.91	4.27
			0.019**
Agricultural experience	Average p	30.36	29.24
			0.603
Number of agricultural organizations	Average p	2.33	1.95
			0.049**
Total land size (ha)	Average p	51.45	52.15
			0.958

** p<%5

The difference between the household sizes and number of agricultural organizations of the farmers applying and not applying good agricultural practices was determined to be statistically significant in 5% difference level whereas the difference between the ages, education periods, agricultural experiences and land sizes was not statistically significant.

36.36% of the farmers applying good agricultural practices and 43.64% of the farmers not applying good agricultural practices stated that they dealt with non-agricultural activities. The ratios of the farmers in two groups who had social insurance were found as 92.73% and

96.36%, respectively. 20% of the farmers applying good agricultural practices and 9.09% of the farmers not applying good agricultural practices stated that they participated in the village management. The ratios of the farmers applying and not applying good agricultural practices who resided in the village were determined as 54.55% and 89.09%, respectively. Almost all of the farmers applying good agricultural practices (98.18%) were affiliated to agricultural organizations and this ratio was 80% for the farmers not applying good agricultural practices (Table 5).

As a result of the chi square test which was done in order to determine the difference between the farmers applying and not

applying good agricultural practices according to the place of residence and membership to agricultural organizations statistically, it was determined that the

difference between the farmers was statistically significant in 1% significance level.

Table 5. Descriptive information of the farmers, social participation and environmental relationship level

		GAP		Non GAP		Total		p
		Number	%	Number	%	Number	%	
Nonagricultural activity	Yes	20	36.36	24	43.64	44	40.00	0.436
	No	35	63.64	31	56.36	66	60.00	
Social insurance	Yes	51	92.73	53	96.36	104	94.55	0.401
	No	4	7.27	2	3.64	6	5.45	
Participation in village management	Yes	11	20.00	5	9.09	16	14.55	0.105
	No	44	80.00	50	90.91	94	85.45	
Place of residence	Village	30	54.55	49	89.09	79	71.82	0.000 ***
	District	5	9.09	4	7.27	9	8.18	
	Province	20	36.36	2	3.64	22	20.00	
Membership to agricultural organizations	Yes	54	98.18	44	80.00	98	89.09	0.002 ***
	No	1	1.82	11	20.00	12	10.91	
Assignment in the organization	Yes	11	20.37	10	22.73	21	21.43	0.777
	No	43	79.63	34	77.27	77	78.57	

*** p<0.01

Adoption and Application Level of Agricultural Innovations

The attitudes of the farmers to agricultural innovations are given in Table 6. According to the results, it was determined that 76.36% and 80% of the farmers applying and not applying good agricultural practices applied drip irrigation, respectively. 54.55% of the farmers applying good agricultural practices stated that they had agricultural insurance and this ratio was found as 36.36% for the farmers not applying good agricultural practices. High system viticulture was not intensive in two groups but it was much more adopted by the farmers applying good agricultural practices. All of the farmers applying good agricultural practices stated that they had soil analysis and this ratio was determined as 67.27% for the farmers not applying good agricultural practices.

41.82% and 25.45% of the farmers in two groups stated that they cultivated hybrid vegetable seed/seedling, respectively. 21.82% of the farmers applying good agricultural practices and 9.09% of the farmers not applying good agricultural practices stated they applied greenhouse production. Besides, it was determined that 43.64% and 30.91% of the farmers applying and not applying good agricultural practices used certified seed.

The ratios of the farmers who stated that they obtained and applied information from the agricultural organizations about irrigation methods and amounts were found as 45.45% and 60%, respectively. Besides, 80% and 65.45% of the farmers applying and not applying good agricultural practices stated that they obtained and applied the information from the agricultural organizations about fertilizing and spraying, respectively.

As a result of the chi square test which was done in order to determine the difference between the farmers applying and not applying good agricultural practices according to agricultural insurance, hybrid vegetable seed/seedling growing, greenhouse farming and information from the agricultural organizations about

fertilizing and spraying and implementation statistically, it was determined that the difference between the farmers was statistically significant in 10% significance level whereas the difference between the soil analysis was statistically significant in 1% significance level.

Table 6. Farmers' approaches to agricultural innovations

		GAP		Non GAP		Total		p
		Number	%	Number	%	Number	%	
Drip irrigation	Yes	42	76.36	44	80.00	86	78.18	0.644
	No	13	23.64	11	20.00	24	21.18	
Agriculture insurance	Yes	30	54.55	20	36.36	50	45.45	0.056*
	No	25	45.45	35	63.64	60	54.55	
High system viticulture	Yes	6	10.91	2	3.64	8	7.27	0.142
	No	49	89.09	53	96.36	102	92.73	
Soil analysis	Yes	55	100.00	37	67.27	92	83.64	0.000
	No	0	0.00	18	32.73	18	16.36	
Hybrid vegetable seed/ seedling growing	Yes	23	41.82	14	25.45	37	33.64	0.069*
	No	32	58.18	41	74.55	73	66.36	
Greenhouse production	Yes	12	21.82	5	9.09	17	15.45	0.065*
	No	43	78.18	50	90.91	93	84.55	
Certified seed use	Yes	24	43.64	17	30.91	41	37.27	0.167
	No	31	56.36	38	69.09	69	62.73	
Information about irrigation methods and amounts and implementation	Yes	25	45.45	33	60.00	58	52.73	0.127
	No	30	54.55	22	40.00	52	47.27	
Information about fertilizing and spraying and implementation	Yes	44	80.00	36	65.45	80	72.73	0.087*
	No	11	20.00	19	34.55	30	27.27	

*** p<0.01 * p<0.10

The innovativeness indexes of the farmers were determined (Table 7). 12.73% of the farmers applying good agricultural practices and 65.45% of the farmers not applying good agricultural practices were determined to be low level innovators. A great majority of the farmers applying good agricultural practices (87.27%) were determined to be high level innovators and this ratio was found as 34.55% for the farmers not applying good agricultural practices. In the study conducted by Öztürk (2010), 92% and 8% of the enterprises were in high level innovator and low level innovator groups, respectively. In

the other study conducted by Karabat et al. (2013), 80% and 20% of the viticulture producers were in high level innovator and low level innovator groups, respectively.

As a result of the chi square test which was done in order to determine the difference between the farmers applying and not applying good agricultural practices according to the innovativeness level statistically, it was determined that the difference between the farmers was statistically significant in 1% significance level.

Table 7. Distribution of the farmers according to innovativeness level

Innovativeness level	GAP		Non GAP		Total	
	Number	%	Number	%	Number	%
Low	7	12.73	36	65.45	43	39.09
High	48	87.27	19	34.55	67	60.91
Total	55	100.00	55	100.00	110	100.00

p= 0.000

Farmers' Opinion about Good Agricultural Practices

The reasons of applying good agricultural practices are given in Table 8.

According to the results, 47.27% of the farmers stated that they applied the good agricultural practices in terms of the security of the workers. Besides, 40%, 34.55%, 32.73%, 25.45% and 10.91% of the farmers

stated that they applied the good agricultural practices in terms of obtaining qualified crop, supporting, less harm to the environment, obtaining more crops and control in each phase.

In the study conducted by Sayın et al. (2015), the reasons of applying good agricultural practices in Antalya were less harm to the environment, obtaining qualified crop, control in each phase and supporting.

Table 8. Reasons of applying good agricultural practices

Reasons of applying good agricultural practices	Number	%*
Security of the workers	26	47.27
Qualified crop	22	40.00
Supporting	19	34.55
Less harm to the environment	18	32.73
More crop	14	25.45
Control in each phase	6	10.91

*: More than one choice

The reasons of not applying good agricultural practices are given in Table 9. According to the results, 72.73% of the farmers found applying good agricultural practices unnecessary. Besides, 23.64% of

the farmers stated that the costs of good agricultural practices were high and 20% of the farmers stated that they did not have information about good agricultural practices. Furthermore, 16.36% of the farmers indicated that they obtained more crops by conventional methods and 10.91% of the farmers stated they did not apply good agricultural practices as the marketing

opportunity of good agricultural practices was restricted.

In the study carried out by Sayın et al. (2015), "unnecessary" choice came first among the reasons of not applying good agricultural practices choices. In the study conducted by Özkan and Engin (2014), a great majority of the farmers (93.8%) in Kumluca district stated that they did not apply good agricultural practices due to lack of knowledge and 69.2% of the farmers stated that they found applying good agricultural practices unnecessary.

Table 9. Reasons of not applying good agricultural practices

Reasons of not applying good agricultural practices	Number	%*
Unnecessary	40	72.73
Cost overrun	13	23.64
Lack of knowledge	11	20.00
More crops by conventional methods	9	16.36
Restricted marketing opportunity	6	10.91

*: More than one choice

The opinions of the farmers' about the necessity of good agricultural practices were examined (Table 10). According to the results, it was determined that 81.82% and 41.82% of the farmers applying and not applying good agricultural practices stated that good agricultural practices were necessary.

As a result of the chi square test which was done in order to determine the difference between the farmers applying and not applying good agricultural practices according to the necessity of good agricultural practices statistically, it was determined that the difference between the farmers was statistically significant in 1% significance level.

Table 10. Distribution of the farmers according to the opinions for the necessity of good agricultural practices

Are good agricultural practices necessary?	GAP		Non GAP		Total	
	Total	%	Total	%	Total	%
Yes	45	81.82	23	41.82	68	61.82
No	10	18.18	32	58.18	42	38.18
Total	55	100.00	55	100.00	110	100.00

p= 0.000

The opinions of the farmers about the reasons of the necessities of good agricultural practices are given in Table 11. Accordingly, 46.67% of the farmers applying good agricultural practices and 34.78% of the farmers in the other group stated that good agricultural practices were

necessary for obtaining nutritious crops. Besides, the farmers in two groups stated that good agricultural practices were necessary in terms of less harm to the environment, controlled production type and supporting, respectively.

Table 11. The reasons of the necessities of good agricultural practices

The reasons of the necessities of good agricultural practices	GAP		Non GAP		Total	
	Number	%	Number	%	Number	%
Nutritious crop	21	46.67	8	34.78	29	42.65
Harmless to the environment	11	24.44	6	26.09	17	25.00
Controlled production	6	13.33	5	21.74	11	16.18
Support	7	15.56	4	17.39	11	16.18
Total	45	100.00	23	100.00	68	100.00

The opinions of the farmers about the reasons of the unnecessities of good agricultural practices are given in Table 12.

Accordingly, 30%, 30% and 40% of the farmers applying good agricultural practices

stated that good agricultural practices were not economic, did not have marketing advantage and the support amount was low, respectively. Besides, 62.5%, 12.5% and 25% of the farmers not applying good

agricultural practices stated that good agricultural practices were not economic, did not have marketing advantage and the support amount was low, respectively.

Table 12. The reasons of the unnecessities of good agricultural practices

The reasons of the unnecessities of good agricultural practices	GAP		Non GAP		Total	
	Number	%	Number	%	Number	%
Not economic	3	30.00	20	62.50	23	54.76
Low support	3	30.00	4	12.50	7	16.67
Non marketing advantage	4	40.00	8	25.00	12	28.57
Total	10	100.00	32	100.00	42	100.00

The opinions of the farmers about good agricultural practices were inquired and the distribution of the farmers according to the answers are given in Table 13.

The farmers applying good agricultural practices stated that marketing guarantee should be given to the crops and the

supporting amount should be increased. Besides, they stated that training studies to the farmers should be done. Furthermore, they indicated that the marketing price of the good agriculture products should be high, the controls should be increased and good agricultural practices should be obligated.

Table 13. Distribution of the farmers according to the opinions about good agricultural practices

Opinions about good agricultural practices	GAP*	
	Number	%
Marketing guarantee to the crops should be given	28	50.91
Support amount should be increased	24	43.64
Farmers should be informed	17	30.91
Marketing prices of the crops should be higher	10	18.18
Controls should be increased	9	16.36
Application should be obligatory	8	14.55

*: More than one choice

CONCLUSION

In the study, the comparison of the farmers applying and not applying good agricultural practices in terms of the adoption of the agricultural innovations was done and the attitude of the farmers applying good agricultural practices to the agricultural innovations was determined more favorable. The farmers applying good agricultural practices in Çanakkale province substantially applied the criteria which were determined as innovations. The conveniences for supplying the inputs used in good agricultural practices should be

provided and the costs of good agricultural practices should be decreased. The economic advantage of the farmers applying good agricultural practices should be provided, in other words, the good agricultural products should be marketed with higher prices. The marketing advantage should be provided for these crops.

The amounts of the activities such as demonstration, seminar and farmer meetings should be increased and the participation of the farmers to these activities should be provided. Awareness raising of the farmers about agricultural subjects and adoption of the innovations by the farmers can be

possible by increasing the number of visits of the cooperatives and public establishments. The farmers should be informed about the positive contribution of good agricultural practices in terms of especially environment protection and human health and conscious occurrence on this subject should be provided.

According to the statements of farmers, the suggestions such as the marketing guarantee, support amount and education studies come to the forefront. Accordingly, the good agriculture supports should be increased, farmer trainings should be increased and marketing benefit should be provided to the good agriculture crops.

As a result of the evaluations, it was determined that approaches of the farmers to good agricultural practices was more favorable. Besides, it was observed that this case was important for food security and sustainable food production.

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