

# The Influence of Ginseng Cultivating Farms' Characteristics on the Attitude and Intention to adopt GAP<sup>1)</sup>

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**ABSTRACT** As the consumers' anxiety for food increases, the interest in food safety also increases. To satisfy the public requirement on food safety, the government is trying to set up a food safety standard by using regulations and certification systems. However, there is still difficulty in building up complex traceability systems for medicinal crops including ginseng due to the low participation of farming industries. The purpose of this empirical research is to draw factors that impede the GAP adoption of ginseng farms. By comparing the average attitude and intention to adopt the ginseng farms' depending on its characteristics through a two-tailed test, it was drawn that continuous farming education can positively influence the GAP adoption of the ginseng farms.

**Keywords** Ginseng, intention to adopt, attitude, GAP certification

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## 1 Introduction

As food related accidents and incidents increase, the consumers' interest in food safety also increases. Furthermore, the distance from the producers to consumers is increasing due to the growing production of processed food, dining-out, and consuming imported food in a dietary life, and consequently the consumers' insecurity about food is continuously soaring (Jaeho Ha, 2005). To satisfy the public requirements for food safety, the government is trying to enforce food safety standard through legislation or certification systems at national and regional levels (Abdelhakim et al., 2009).

In order to secure the citizens' health and the safety of agricultural products, many countries adopt the traceability management systems such as GAP and HACCP certification (Yongman Yu, et al., 2007). The role of the agricultural traceability management system is "to record and manage at every level of agricultural products from the producing stage to the sales stage and to take any actions by tracking those products when any problems such as food safety issue occur." (Agricultural and Marine Products Quality Control Act Article 2 Section 1 Number 7). It also means that for food safety, it is necessary to systematically and consistently manage the hazards from all value chains from food producing, processing, distributing, and consuming in a consistent management principle standard (Table 1, Jihyun Choi & Gyeim Lee, 2005).

It is possible to reduce informational asymmetry between consumers and producers through the traceability management system; this allows the marketers to recover the trust of customers and ultimately maximize their profit (Wangguen Han & Guiju Lee, 1991).

Medicinal crops, such as ginseng, need to be intensively managed for producing and harvesting because the growing period is quite long, and the expense for the raw material of the ginseng costs 60 to 70% of the total expense of the ginseng production. The problem about pesticide residue is particularly serious because

**Table 1** Food Safety Consistent Management System (Jihyun Choi & Gyeim Lee, 2005).

Producing	Treatment after harvesting	Processing	Distributing and Sales	Consuming
GAP				
		HACCP,GMP		
			GHP	
				RECALL
TRACEABILITY				

many farms repeatedly use a herculean amount of pesticide due to the high frequency of diseases and pest occurrences during high temperature summers (Yongman Yu, et al., 2007). Additionally, in the case of ginseng, the producers cannot directly supply them to the customers which require the producers to keep well recorded and managed distribution records (Kwanhoo Kim & Youngdae Kwon, 2010). Therefore, the producing and distributing management through the GAP certification system is vital to overcome this problem. However, the requirement and spreading of the GAP certification system are genuinely slow as only 2% of all ginseng farms perform the GAP certification system accordingly to the standard of 2012 (National Agricultural Products Quality Management Service website). Additionally, there are no empirical studies on the certification system for ginseng. Therefore, this study is trying to provide the framework to build up a ginseng traceability system through objectively researching attitude changes about the GAP certification system depending on the characteristics of the farms with help of participants from actual ginseng farms.

## 2 GAP certification in the ginseng industry

### 2.1 The current situation of the GAP certification

The role of the GAP system is to properly manage the hazards that might occur during the producing, treating,

and harvesting procedures which producers and managers are required to preserve a safe and hygienic agricultural environment for consumers. After deciding to adopt the system in 2002, it has been applied to 42 items under the management of the Ministry for Food, Agriculture, Forestry and Fisheries in 2006, and it has expanded to all items that are produced as food in 2010 (Jihyun Choi, et al., 2012).

Looking at the system, hosted by the agricultural food department, the major roles are covered each by the National Agricultural Products Quality Management Service, GAP certification institute, and farms (Kwanhoo Kim & Yongdae Kwon, 2010). National Agricultural Products Quality Management Service performs the inspections that question the certification institute/facility designation and management as well as goods on the market, the GAP certification institute conducts the affairs related to the certification, and the farms produce the agricultural products certified by the GAP and record as well as maintain the production information (Korea GAP research association, 2008).

Table 2 shows that most crops, with the exceptions of food crops, fruits, and vegetables, hold certification adoption rates that are as low as less than 4%. Jihyun Choi and Gyeim Lee (2005) pointed out the main limited factors of the traceability related to GAP and HACCP are due to the small capacity of the work field,

**Table 2** The current situation depending on the items of the GAP certification (in the standard of 2011)

Classification	The Number of Certification	The Number of Farms		Certified area (ha)	Planned Quantity of Production	
		The number	Ratio (%)		Production	Ratio (%)
(ton)						
Food crops	340	20,584	55.41	33,058.70	235,419.46	36.66
Fruit trees	500	9,553	25.72	11,011.10	233,493.55	36.36
Vegetables	284	3,861	10.39	2,743.88	107,229.04	16.7
Medicinal crops	537	1,227	3.3	852.21	8,020.27	1.25
Special crops	59	1,779	4.76	1,772.80	32,277.72	5.03
Mushrooms	36	142	0.38	109.08	25,725.72	4.01

Data: GAP activation countermeasure. Ministry for Food, Agriculture, Forestry and Fisheries. 2011 (recitation)

lack of incentives, lack of educated professionals, insufficiency of a hygienic management field, and the complexity of the distribution systems.

## 2.2 GAP certification in ginseng industry

Table 3 shows the current situation of the ginseng cultivation over the last seven years. The cultivating area increased from 16,405ha in 2006 to 19,702ha in 2009 but has decreased until 2011. However, the number of cultivating farms increased from 15,856 in 2006 to 23,795 in 2012. The output also increased by 56.9% from 706.9 billion KRW in 2006 to 1,108.8 billion KRW.

more for the GAP certified ginseng products. Moreover, the government actively encourages the farms to adopt the GAP certification by supporting the whole or half of the certification expense. The investigation for the fundamental causes is necessary because only few farms adopt the GAP certification in spite of these benefits.

## 3 Results

### 3.1 Data collection and analysis

This research is related to the attitude and intention of

**Table 3** The current situation of ginseng cultivation between 2006 to 2012 and GAP certification ratio

Classification	2006	2007	2008	2009	2010	2011	2012
Ginseng cultivating area (ha)	16,405	17,831	19,408	19,702	19,010	17,601	16,174
The number of ginseng farms (numbers)	15,856	19,850	24,298	23,285	23,857	23,578	23,795
Quantity of ginseng production (M/T)	19,850	21,818	24,613	27,460	26,944	26,737	26,057
Ginseng output (billion KRW)	706.9	735.5	753.3	827.8	834.1	951	1,108.80
The number of ginseng GAP certified farms (number) and ratio	1	10	253	346	411	434	477
	0.01%	0.05%	1.00%	1.50%	1.70%	1.80%	2.00%
Ginseng GAP certified cultivating area and ratio	13.3	40.9	141.9	162.2	217.6	344.6	500.7
	0.08%	0.23%	0.73%	0.82%	1.10%	2.00%	3.10%

Data: Ministry for Food, Agriculture, Forestry and Fisheries (2007~2013). Ginseng statistical data National Agricultural Products Quality Management Service, GAP information service website Certified farms statistical data

After adopting the GAP certification system in 2006, the GAP certified ginseng cultivating farms are gradually increasing (Table 4). However, only 2% of the total farms in 2012 use this system, and the use of the GAP certification system in most areas, except for Chungnam, is still very low. According to Doohee Lee, Hyundong Jang, Soohyun Hwang, and Kwangwon Lee (2009), consumers are willing to pay about 7,477 KRW

adopting the GAP certification of the ginseng cultivating farms and is conducted from targeting the farms cultivating ginseng in Korea. The research period was about two months between June, 2013 and July, 2013. A total of 185 survey data were collected, and 161 of them were analyzed, excluding the 24 insincere answers.

The SPSS 18.0 program was used to analyze the collected survey data. To understand the features of the

**Table 4** The current situation of the ginseng GAP certification in Korea between 2006 and 2012

Classification	2006		2007		2008		2009		2010		2011		2012	
	Farms (N)	Certi.	Farms (N)	Certi.	Farms (N)	Certi.	Farms (N)	Certi.	Farms (N)	Certi.	Farms (N)	Certi.	Farms (N)	Certi.
Total	15,856	1	19,850	10	24,298	253	23,285	346	23,857	411	23,578	434	23,795	477
Certified farm ratio	0.01%		0.05%		1.00%		1.50%		1.70%		1.80%		2.00%	
Incheon, Kyongki	3,577	0	5,083	9	6,071	9	6,004	0	7,279	3	6,268	17	5,788	13
Kangwon	1,048	0	1,251	0	2,416	0	2,125	0	881	5	5,484	8	4,652	6
Daejeon, Chungbuk	4,424	0	3,715	0	3,682	0	5,911	3	3,515	8	3,543	9	4,641	18
Chungnam	3,471	1	4,090	0	6,570	241	4,947	340	5,838	384	3,424	383	4,436	429
Jeonbuk	2,041	0	4,228	0	3,579	0	2,595	0	3,945	0	1,961	0	1,723	0
Kwangju, Jeonnam	393	0	642	0	716	1	487	1	521	6	566	8	452	9
Kyungbuk, Kyungnam	902	0	841	1	1,264	2	1,216	2	1,878	5	2,332	9	2,103	2

data, frequency analysis and descriptive statistics analysis were performed. In order to analyze the different attitudes and intentions of adopting the GAP certification depending on the characteristics of farms, the difference analysis (t-test and ANOVA) was conducted. For post-hoc comparison of variance analysis, the Scheffe test was used.

### 3.2 Demographic characteristics

Table 5 shows the demographic characteristics of the respondents. Most of the respondents were male (88.8%), and people who were more than 50 years old was 59.0%. The highest number of respondents, 68 people (42.2% ), had more than 10 years and less than 20 years of farming experience, and the number of re-

spondents who had less than 10 years was 62 (38.5%). The portion of the respondents who had more than 3,000pyeong<sup>1)</sup> and less than 10,000pyeong was 39.8% (64 persons), and respondents who had more than 10,000pyeong was 31.7% (51 persons). More than half of the respondents (65.8%, 106 people) had a high school diploma or less, and most respondents answered that they participated in farming education with an average of 1~5 times per year (76.4%, 123 people). The portion of the respondents whose annual income was between 50million ~ 100millionKRW was 40.4% (65 people), and more than half of respondents answered that they did not have an existing certification (59.0%, 95 people).

**Table 5** Demographic characteristics of ginseng farms

Variables	Items	Frequency (person)	Ratio (%)	Variables	Items	Frequency (person)	Ratio (%)
Gender	Male	143	88.8	Education	High school or less	106	65.8
	Female	17	10.6		College/University	52	32.3
	No answer	1	0.6		No answer	3	1.9
Age	Less than 40	64	39.8	The number of participation in education	1~5 times	123	76.4
	Above 50	95	59		More than 6 times	37	23
	No answer	2	1.2		No answer	1	0.6
Farming experience	Less than 10 years	62	38.5	Annual income	Less than 50 million KRW	55	34.2
	More than 10 years ~ less than 20 years	68	42.2		More than 50 million ~ less than 100 million KRW	65	40.4
	Exceeding 20 years	28	17.4		More than 100 million KRW	30	18.6
	No answer	3	1.9		No answer	11	6.8
Farming area	Less than 5,000 pyeong	34	21.1	The existing certification situation	Yes (1)	38	23.6
	More than 5,000 pyeong ~ less than 10,000 pyeong	64	39.8		Yes (more than 2)	9	5.6
	Exceeding 10,000 pyeong	51	31.7		No	95	59
	No answer	12	7.5		No answer	19	11.8

1) 1pyeong  $\approx$  3.3m<sup>2</sup>

3.3 Difference of the attitude and intention to adopt depending on the demographic characteristics of ginseng farms

consumers' trust, if the income of the farms will increase, and if interactions with the consumers will be more active through the GAP certification adoption

**Table 6** Difference of the attitude and intention of adopting the GAP certification depending on the gender

Items (7 points measure)	Male	Female	t
I understand about the GAP certification well.	4.04	3.18	1.881*
I think the GAP certification adoption cost is appropriate.	3.73	2.94	2.350**
I will adopt the GAP certification because the systematic evaluation is good.	4.07	4.94	-2.206**
I will adopt the GAP certification not to get left behind from other farms.	4.25	5.12	-2.067**

Note: \*p<0.1, \*\*p<0.05, two-tailed test

Table 6 explains how the gender of the respondents influences the attitude and intention of adopting the GAP certification. The male respondents seemed to be more familiar about GAP certification than the female respondents, and said that the GAP certification adoption cost was proper (p<0.05). More females than males answered that they would adopt the certification because the systematic evaluation is beneficial, and they do not want to fall behind from other farms.

(Table 7). In other words, it is shown that the age group of more than 50 years old has higher expectations of the GAP certification.

Respondents with more than a 100millionKRW annual income had higher numbers than the respondents with annual income between 50millionKRW and 100millionKRW when they were questioned if they would adopt the GAP certification because the systematic evaluation is good, or if they would adopt the GAP cer-

**Table 7** Difference in the attitude and intention of adopting the GAP certification depending on age

Items (7 points measures)	Less than 40 years old	More than 50 years old	t
The sales of ginseng will increase because of the consumers' trust for ginseng.	4.59	5.01	-1.820*
The income of the farms adopting the GAP certification will increase.	4.3	4.82	-1.988**
The interaction with the consumers will be more active through the GAP certification.	4.63	5.14	-2.165**

Note: \*p<0.1, \*\*p<0.05, two-tailed test

Respondents whose ages were more than 50 years old had higher numbers than respondents whose ages were less than 40 years old when they were questioned if the ginseng sales will increase with the increase of the

tification to not fall behind from other farms (Table 8). 3.4 Difference of the attitude and intention of adopting the GAP certification depending on the number of participation in the farming education

**Table 8** Difference of the attitude and intention of adopting the GAP certification depending on the annual income

Items	Annual incomes	Mean	S.D	F	Sig	Scheffe		
						1	2	3
I will adopt the GAP certification because the systematic evaluation is good.	1 Less than 50 million KRW	4.22	1.487	4.302	0.015			
	2 More than 50 million ~ less than 100 million KRW	3.83	1.602					**
	3 More than 100 million KRW	4.83	1.577					
I will adopt the GAP certification not to fall behind from other farms.	1 Less than 50 million	4.36	1.556	3.554	0.031			
	2 More than 50 million ~ less than 100 million KRW	4.06	1.735					**
	3 More than 100 million KRW	5.03	1.608					

Note: \*\*p<0.05

**Table 9** Profiles of the low-attendance group and the high-attendance group of farming education

Variables	Items	1~5 times	More than 6 times	$\chi^2$	t
Gender	Male	109(88.6%)	33(91.7%)	0.271	-
	Female	14(11.4%)	3(8.3%)		
Age	Less than 40 years old	52(42.6%)	11(30.6%)	4.807	-
	More than 50 years old	70(57.4%)	24(69.4%)		
Farming experience		14.85	15.72	-	-0.552
Farming area		10,254.00	13,541.70	-	-1.813*
Education	High school or less	84(68.9%)	22(62.9%)	0.446	-
	College/University degree	38(31.1%)	13(37.1%)		
Annual income	Less than 50 million KRW	45(38.5%)	10(30.3%)	1.594	-
	Less than 50 million KRW ~ more than 100 million KRW	51(43.6%)	14(42.4%)		
	More than 100 million	21(17.9%)	9(27.3%)		
Innovativeness	Try new things earlier than others	4.15	4.7	-	-1.948*
	Preference of trying the new method	4.41	4.92	-	-1.901*
	Preference of trying the new system despite the expectation of loss	3.82	4.44	-	-2.074**
	Adopting the new system before thinking about the loss	3.77	4.42	-	-2.121**

Note: \*p<0.1, \*\*p<0.05, cross-tab analysis, two-tailed test

The groups were segregated according to the number of the participation in ginseng farming education (1~5 times vs. more than 6 times), and each group's profiles were analyzed (Table 9). Each item was analyzed except for the missing values. There were no significant differences between two groups in most of the demographic variables. Most of the two groups were male, and participants who were more than 50 years old took most of the portion. The portion of participants who had a high school diploma or less was more than half, and the annual income range of most of the participants was between 50million and 100millionKRW and less than 50millionKRW. There was no significant difference in farming experience, but the group that participated in the

farming education more than 6 times had larger farming areas (13,541pyeong). This group showed a significantly higher eagerness for innovation. This group preferred trying new techniques and methods in advance from the other people. In addition, although loss would be expected, they preferred to adopt the new system before thinking about the compensations.

Table 10 shows the difference of the attitude and intention of adopting the GAP certification between groups that are divided by the number of the participation in the farming education. The group which participated in the farming education more than 6 times had more knowledge about the GAP certification than the group that participated 1~5 times. They answered that

**Table 10** Difference of the attitude and intention of adopting the GAP certification in low-attendance group and high-attendance group of farming education

Items (7 points measure)	1~5 times	More than 6 times	t
I can understand the function of the GAP certification.	4.08	4.68	-2.184**
I think that I can utilize the GAP certification well.	4.03	4.7	-2.417**
I am confident of using the GAP certification.	3.93	4.57	-2.271**
I know much of the GAP certification.	3.73	4.73	-3.043**
The income of the farms adopting the GAP certification will increase.	4.47	5.11	-2.135**
The interaction with the consumers will be more active through the GAP certification.	4.79	5.41	-2.262**
Although I do not have the GAP certification, I am satisfied with the current certification system.	3.75	3.19	1.947*
It is highly likely that I will adopt the GAP certification.	4.21	4.89	-2.408**
I am thinking about adopting the GAP certification.	4.12	4.97	-2.874**
I will adopt the GAP certification sooner or later.	3.98	4.81	-2.822**

Note: \*p<0.1, \*\*p<0.05, two-tailed test

they understood the function of the GAP certification, thought they could utilize it well, and are confident of using it ( $p < 0.05$ ) and knowing much of it ( $p < 0.01$ ).

The expectation when adopting the GAP certification was significantly high in the groups that participated more than 6 times. They answered that the income of the farms adopting the GAP certification will increase, and the interaction with the consumers will be more active ( $p < 0.05$ ). Their intentions to adopt the GAP certification was also significantly high ( $p < 0.05$ ,  $p < 0.01$ ). On the other hand, the group participating 1~5 times showed more satisfaction with the current certification system without the GAP certification. It can be speculated that the level of understanding about the GAP certification was low. Although there was no significant difference of most demographic characteristics between those two groups, there was a significant difference in the attitude and intention of adopting the GAP certification. As a result, it means that the importance and necessity of continuous GAP education should be emphasized.

### 3.5 Difference of the attitude and intention to adopt the GAP certification depending on whether or not they have the existing certification

The group using the existing certification and the group not using it were compared (Table 11). However, only 144 respondents who participated in this study except

for the respondents ( $n=17$ ) who already adopted the GAP certification in the group, used the certification. Additionally, because the missing values that depended on each item were so different, they were excluded and each item was analyzed once more.

For both groups which either used or not used the existing certification system such as organic, etc., the portion of male was higher which showed respectively 88.4% and 89.7%. In the age distribution column, the portion of respondents who were more than 50 years old and without the certification was 67.0%; the 58.6% of the respondents with the certification was less than the 40 years old group ( $p < 0.05$ ). The farming experience was respectively 15.92 years and 12.66 years, and the group without the certification had more years of experience ( $p < 0.1$ ). There were no significant differences of farming area, education, and income distribution between the two groups. The respondents who participated in farming education 1~5 times in two groups were respectively 83.0% and 70.0%.

On the other hand, the group using the existing certification showed more preferences to try new things ( $p < 0.01$ ) and new methods in advance of others compared to the group not using the existing certification.

There were more respondents of the group using the existing certification answered that they understood the GAP certification and were confident of using it compared to the group not using the certification ( $p < 0.1$ ,  $p < 0.05$ ). In addition, they answered that they needed the

**Table 11** Profiles of the groups with and without the existing certification

Variables	Items	Without certification	With certification	$\chi^2$	t
Gender	Male	84(88.4%)	26(89.7%)	0.034	-
	Female	11(11.6%)	3(10.3%)		
Age	Less than 40 years old	31(33.0%)	17(58.6%)	6.124**	-
	More than 50 years old	63(67.0%)	12(41.4%)		
Farming experience		15.92 years	12.66 years	-	1.856*
Farming area		11160.7 pyeong	12656.0 pyeong	-	-0.68
Education	High school diploma or less	70(74.5%)	18(60.0%)	2.311	-
	College/University degree	24(25.5%)	12(40.0%)		
Income	Less than 50 million KRW	35(39.8%)	9(31.0%)	1.078	-
	More than 50 million KRW ~ Less than 100 million KRW	36(40.9%)	15(51.7%)		
	More than 101 million KRW	17(19.3%)	5(17.2%)		
The number of participation in education	1~5 times	78(83.0%)	21(70.0%)	2.38	
	More than 6 times	16(17.0%)	9(30.0%)		
Innovation	Try new things in advance of others	4.01	4.97	-	-2.603**
	Preference trying a new method	4.29	5.07	-	-2.293**

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , two-tailed test

GAP certification, showed higher intentions of participation, and they answered that they will adopt the GAP certification sooner or later (Table 12).

Rodger (1995) discussed compatibility as a major variable that influences on the technology adoption rate based on experiences of using a similar functioned technology. Although the contents of each certification system are different, it can be thought that a group experiencing an existing certification related to the agricultural products is more likely to adopt the GAP certification compared to a group that has not.

and a higher intention to adopt the certification than the group that did not use existing certifications. In the aspect of the compatibility between technologies, the well use of an existing certification helped in adopting the GAP certification system. While it is important to expand groups using an existing certification system in the policy to activate the GAP certification, it is also necessary to emphasize the differences to prevent duplications of the contents from the certification and consider an option to combine and expand it in the future.

This study has great significance because it draws

**Table 12** Difference of the attitude and intention of adopting the GAP certification between the groups with and without the existing certification

Item (7 point measure)	Without certification	With certification	t
I understand the function of the GAP certification.	3.61	4.5	-2.391**
I am confident of using the GAP certification.	3.82	4.4	-1.793*
I think that the GAP certification is necessary.	4.39	5.32	-2.347**
I will participate in the GAP certification.	4.16	5.44	-3.022**
I will adopt the GAP certification sooner or later.	3.88	4.6	-2.070**

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , two-tailed test

#### 4 Conclusion

The purpose of this study is to draw implications related to the GAP adoption and activating a traceability system by drawing characteristics of ginseng cultivating farms that influence the attitude and intention of adopting the GAP certification.

The following results are shown: First, the number of the participation in the farming education significantly influenced on the attitude and intention of adopting the GAP certification. Although there were no significant differences of demographic characteristics between the two groups, the group that participated more in the farming education (more than 6 times) had more knowledge about the GAP certification, had higher expectations in the aspect of income after adopting the certification and interaction of the customers, and higher intentions to adopt it. In other words, education acted as a major variable. Therefore, it is necessary to provide a stable education related to the GAP certification led by the local and national agricultural cooperative federation, agricultural technology center, etc. and encourage the cultivating farms to participate.

Second, the use of the existing certifications influenced the attitude and intention to adopt the GAP certification. Groups using an existing certification showed more knowledge about the GAP certification

the practical implications on educational policies related to the GAP certification by drawing the characteristics of ginseng cultivating farms that influence on the attitude and intention of adopting the GAP certification. However, the study shows its limits when it could not analyze detailed contexts that are required to establish an educational policy. A further study is recommended to include concrete educational contexts to expand the GAP certification system in ginseng farming and analyzing the existing certifications for a broader and more concrete policy establishment.

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