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Study on Korean Pine Nut Processors

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In the results of survey on operating state of pine nut processors located in Gapyeong–gun, Gyeonggi–do and Hongcheon–gun, Gangwon–do, representative pine nut producing area, the total purchasing amount of pine nuts with a cone of Gapyeong–gun, Gyeonggi–do was 500~4,000 bags (1 bag is 80 kg), of which average amount per processor was 2000 bags. The price range per bag of pine nuts was 470~620 thousand won and the average price was 550 thousand won. Total purchase price of pine nuts with a cone per processor averaged 1.2 billion won and the mean net income per bag of pine nuts with a cone was 35 thousand won. Total purchasing amount of pine nuts with a cone of Hongcheon–gun, Gangwon–do was 1,000~2,000 bags, averaging 1,500 bags per processor and the price range per bag of pine nuts with a cone was 580~630 thousand won, averaging 610 thousand won. Total purchase price of pine nuts with a cone per processor averaged 0.9 billion won and the mean net income per bag of pine nuts with a cone was 100 thousand won. However, 9 processors among total 16 processors answered to plan to maintain the present state because of difficulty in securing material amount of pine nuts with a cone, low profitability, poor selling, lack of equipment introducing fund, and lack of pine nuts purchasing fund for future business scale. Therefore, it was suggested that in order to activate local economy through maintenance and expansion of pine nut processors, financial supports such as low interest loan for expansion of processing amount were necessary in the short run and expansion of new forestation and crown shape control to facilitate seed exploitation as well as work enforcement such as thinning for increase of yield was required in the long run.

Keywords: Korea, Korean pine nut, processors, production, sales

INTRODUCTION

White pine has been used as wood and its seeds also have been used for foods and drugs widely. It is expected that their demand will be expanded as an eco–friendly agricultural product with increase of national people income. Due to continuous reforestation of *Pinus Koraiensis Sieb. et Zucc*, the yield and production amount of pine nuts were increased dramatically to 1.52 million kg and 13.2 billion won as of 2006 compared with those of past and imported amount and price of pine nuts were also increased largely to 397 tons and 2.41 million dollars in 2007. However, because of the characteristics of *Pinus Koraiensis Sieb. et Zucc*, alternate year bearing, the yield of seeds is irregular. In addition, although gathering and production of pine nuts involve many difficulties such as increase of labor cost for gathering them, reduction of yield from global warming, aging of its gathering labor, risks accompanied with its gathering, and price competition with imported products from increase of import, the pine nuts give a large help to local economy as well as collectors, producers, and processors of pine nuts. Nevertheless, there is few or no concrete domestic study on operation of pine nut processors such other than the study on crown shape control of *Pinus koraiensis S. et Z*, (Jae Seon Yi *et al*., 2002) with direct relation to the yield of pine nuts.

Thus, the purpose of this study is to seek future developmental direction by investigating the operation state of pine nut processors located in Korean representative producing districts of pine nuts such as Gapyeong–gun, Gyeonggi–do and Hongcheon–gun, Gangwon–do.

MATERIALS AND METHODS

As of 2008, there were 16 and 4 pine nut processors in Gapyeong–gun, Gyeonggi–do and Hongcheon–gun, Gangwon–do respectively, but this survey was performed against 14 processors in Gapyeong–gun, Gyeonggi–do and 2 processors in Hongcheon–gun, Gangwon–do, excluding the processors which didn't submit the questionnaire. The survey was performed through personal interview against representatives of the processors from March, 2008 to June, 2008. Contents of the survey included general state of processors such as investment, operation period, and processing facility scale, and purchasing source, processing scale, sales income, and sales system of pine nuts. In order to understand overall state of the target districts including area of Korean white pine forest, pine nut yield and processors, we visited provincial forest administration team of Gyeonggi–do Forestry Environment Research Institute, county office of Gapyeong–gun, Gyeonggi–do, country office of Hongcheon, Gangwon–do, and Hongcheon National Forest Station to listen the opinion of officer and obtain associated data.

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RESULTS AND DISCUSSIONS

Production state of pine nuts in Korea

Areas of white pine forest by regions

Total area of needle forest and broad–leaf forest in Korea, 4,355 thousand ha, consists of 2,695 thousand (62%) of needle forest and 1,660 thousand ha (38%) of broad leaf forest. The White pine forest took 5 of total forest area and 9% of needle forest and by regions, Gangwon–do has 77 thousand ha, followed by Gyeonggi–do with 66 thousand ha and Gyeongsangbuk–do with 28 thousand ha. The district with higher ratio of White pine forest in needle forest was Gyeonggi–do having the highest ratio of White pine forest as 34%, followed by Gangwon–do with 16% and Chungcheongbuk–do with 11% (Korea Forest Service, 2007) (Table 1).

Production state of pine nuts with a cone by regions

In the survey on production amount and price of pine–nuts with a cone by years, it was found that the production amount increased from 0.68 million kg in 2002 to 1.52 million kg in 2006 and the average annual production amount for 5 years from 2002 to 2006 was 2.04 mil-

Table 1. Area unit of White pine forest by regions

(Unit: thousand ha)

Classification	Total	Needle–leaf trees						Broad– leaf trees
		Sub–total	Pine	Larch	Rigida	White pine	Others	
Total	4,355	2,695 (100)	1,481	464	411	231 (9)	116	1,660
Gyeonggi–do	381	194 (100)	12	51	64	66 (34)	1	187
Gangwon–do	945	475 (100)	252	140	3	77 (16)	3	470
Chungcheongbuk–do	350	232 (100)	48	111	46	26 (11)	1	118
Chungcheongnam–do	317	201 (100)	81	15	94	9 (5)	2	116
Jeollabuk–do	346	198 (100)	95	21	62	13 (7)	7	148
Jeollanam–do	524	395 (100)	250	–	69	4 (1)	72	129
Gyeongsangbuk–do	806	564 (100)	416	94	22	28 (5)	4	242
Gyeongsangnam–do	459	314 (100)	250	27	25	5 (2)	7	145
Others	228	130 (100)	77	5	26	3 (2)	19	98

Source: Forest Service. 2007 *Statistical Yearbook of Forestry*
Note: The value in ( ) is the component ratio.

Table 2. Production record of pine nuts with a cone by regions

(Unit: 10,000 kg, 100 million won)

Classification	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Total	67.7 (100)	64.5	226.3 (100)	169.5	306.3 (100)	162.1	268.0 (100)	213.7	151.8 (100)	132.3
Gangwon–do	34.1 (50)	32.5	70.1 (31)	38.5	164.9 (54)	82.6	162.7 (61)	120.0	97.2 (64)	73.7
Gyeonggi–do	19.8 (29)	18.8	137.6 (61)	110.2	123.9 (41)	61.9	90.2 (34)	69.5	41.5 (27)	34.7
Gyeongsangnam–do	5.7	5.4	3.9	3.2	5.5	4.7	6.9	5.4	6.9	5.7
Gyeongsangbuk–do	2.6	2.5	2.3	7.4	0.6	1.1	3.3	3.2	0.5	0.8
Jeollabuk –do	3.8	3.6	3.9	3.1	3.4	4.7	3.1	10.4	3.0	13.0
Chungcheongbuk–do	1.1	1.1	0.7	3.7	0.8	4.0	0.8	3.5	0.7	3.1
Others	0.6	0.6	7.8	3.4	7.2	3.1	1.8	1.7	2.0	1.3

Source: Forest Service. 2007 *Statistical Yearbook of Forestry*
Note: The value in ( ) is the longitudinal component ratio.

lion kg. By regions, its production amount in Gangwon–do has increased every year and occupied 64% of total production amount as 0.97 million kg in 2006 and the average annual production for last 5 years was 1.06 million kg. Its production amount of Gyeonggi–do showed large increase every year and occupied 27% of total production amount as 0.42 million kg in 2006. The average annual production for last 5 years was 0.83 million kg. Besides, it was also reported that its production amount increased largely from 6.5 billion won in 2002 to 13.2 billion won in 2006 and the average annual production amount was 14.8 billion won. By regions, its production amount of Gangwon–do has increased every year and occupied 56% of total production amount as 7.4 billion won in 2006. The average annual production for last 5 years was 6.9 billion won. For Gyeonggi–do, it accounted for 26% of total production amount as 3.5 billion won in 2006 and the average annual production amount for last 5 years was 5.9 billion won (Korea Forest Service, 2007) (Table 2).

Export and import of pine nuts by years

For imported pine nuts, frozen pine nuts had accounted for 91% and 86% of the imported quantity and amount respectively for 8 years, from 2000 to 2007, but only frozen pine nuts has been imported since 2006. Import scale of frozen pine nuts increased largely from 64 tons and 0.15 million dollars in 2006 to 397 tons and 2.41 million dollars and is delivered from China. Majority of pine nuts with a cone were imported from USA and shelled pine nuts were imported from China respectively. For exported pine nuts, its scale had been minor as only 18 tons and 0.24 million dollars in total export quantity and amount respectively for 8 years and it was found that there was no export record since 2005 (Korea Forest Service, 2008) (Table 3).

Production state of pine nuts in subject areas

Forest areas and White pine forest by ownerships

First, for the forest areas of Gapyeong–gun, Gyeonggi–do and Hongcheon–gun, Gangwon–do, where the subject processors were located by ownerships, it was found that Gapyeong–gun, Gyeonggi–do consisted of 54% of private forest, 32% of provincial forest, 13% of national forest, and 1% of military forest in 69 thousand ha of total forest area, where White pine forest accounted for 30% of total forest area. The area ratio of White pine forest by ownerships consisted of 38% of private forest, 24% of provincial forest, and 13% of national forest. It

Table 3. Export and import record of pine nuts by years

(Unit: tons, thousand dollars)

	Import								Export					
	Total		Frozen pine nuts		Shelled pine nuts		pine nuts with a cone		Total		Shelled pine nuts		pine nuts with a cone	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Total	1,223 (100)	6,457 (100)	1,117 (91)	5,580 (86)	103	614	3	263	18	25	12	24	6	1
2000	1	20	–	–	1	20	–	–	–	–	–	–	–	–
2001	13	93	–	–	13	93	–	–	–	–	–	–	–	–
2002	129	337	64	146	55	191	–	–	10	19	10	19	–	–
2003	60	420	44	126	14	168	2	126	–	–	–	–	–	–
2004	128	402	120	402	–	–	–	–	8	6	2	5	6	1
2005	259	1,189	238	910	20	142	1	137	–	–	–	–	–	–
2006	254	1,586	254	1,586	–	–	–	–	–	–	–	–	–	–
2007	397	2,410	397	2,410	–	–	–	–	–	–	–	–	–	–

Source: Korea Forest Service. 2008 *Export and Import Statistics on Forest Products*

Note: Less than 1 ton of export and import quantity was excluded from the statistics.

Table 4. Forest area in the subject regions by ownerships

(Unit: ha)

Classification	Total	National forest	Provincial forest	Military forest	Private forest
Gapyeong–gun	69,193 (20,651)	8,718 (1,173)	22,419 (5,385)	834 (unclear)	37,222 (14,093)
Hongcheon–gun	149,582 (27,782)	84,658 (6,696)	5,114 (–)	5,123 (292)	54,687 (20,794)

Source: 1. Forest Service. 2007 *Statistical Yearbook of Forestry*

2. Gapyeong–gun. 2008 *Planted area of White pine*

3. Hongcheon–gun. 2008 *Planted area of White pine*

4. Gyeonggi–do Forestry Environment Research Institute 2008. *Report of pine nut fruiting amount.*

Note: The value in ( ) is area of *Pinus Koraiensis Sieb. et Zucc.*

was found also that Hongcheon–gun, Gangwon–do had 150 thousand ha of total forest area, which consisted of 57% of national forest, 37% of private forest, 3% of military forest, and 3% of provincial forest and White pine forest accounted for 19% of total forest area. The area ratio of White pine forest by ownerships consisted of 38% of private forest, 8% of national forest, and 6% of military forest (Gapyeong–gun, 2008a; Hongcheon–gun, 2008a; Gyonggi–do Forest Environment Research Station, 2008a) (Table 4).

Harvest status of pine nuts with a cone by ownerships

First, Gapyeong–gun, Gyeonggi–do had 3,705 thousand kg of total pine nuts with a cone harvest for 6 years from 2002 to 2007, of which annual mean was 618 thousand kg. Each harvest by ownerships for total harvest quantity consisted of 93% of private forest and 7% of provincial forest. The average annual yielding quantity was 574 thousand kg of the private forest, 41 thousand kg of the provincial forest and 2 thousand kg of the national forest. The national forest located in Gapyeong–gun concluded a profit sharing agreement to divide the yield in 2007 into 70% and 30% with 40 persons in 5 villages and each share of national forest and collector earned 6.5 million won and 15.18 million won of income respectively. On the other hand, Gapyeong–gun had concluded a profit sharing agreement to divide profit into 7:3 between collectors and Gapyeong–gun for 25 ha of White pine forest (yield of pine nuts with a cone 560 kg) in 2007 for the first time. In addition, it is promoting the geographical indication system of Gapyeong pine nuts for preventing inflow of pine nuts from other regions and making a brand of pine nuts produced in Gapyeong as of 2008. Hongcheon–gun, Gangwon–do had 5,248 thousand kg of total harvest for 6 years from 2002 to 2007, of which annual mean was 875 thousand kg. The harvest amount by ownerships for the total harvest were 99% of private and public forest and 1% of national forest, and each annual mean harvest was 865 thousand kg of private and public forest and 10 thousand kg of national forest (Gapyeong–gun, 2008b; Hongcheon–gun, 2008b; Chuncheon National Forest Office, 2008; Hongcheon National Forest Office, 2008b) (Table 5). In the other hand, Hongcheon–gun also had a plan to complete the geographical indication system of Hongcheon pine nuts by 2008 in order to make the pine nuts produced in Hongcheon a brand and to prevent outflow of them in unprocessed state such as bunches and cones of pine nuts. Hongcheon–gun is expanding support on pine nut processing facilities to raise the value–added of pine nuts by processing the whole amount of pine nuts bunches and pine nuts with a cone which are being drained to other regions with low price.

Pine nut production of provincial forest in Gyeonggi–do and Hongcheon National Forest Office

The provincial forest in Gyeonggi–do concludes a profit sharing agreement based on fruiting survey result on pine nut fruiting forest land with trees older than 15 years in its provincial forest every year. The profit sharing ratio between collectors and provincial forest was set as 70% : 30% and in 2007, 70 households participated in gathering of pine nuts with a cone from Sep 6 to Oct 31. From 2002 to 2007, total sale amount of pine nuts with a cone from national forests was 420 million won and its annual mean reached 70 million won (Gyonggi–do Forest Environment Research Station, 2008a; Gyonggi–do Forest Environment Research Station, 2008b) (Table 6).

The national forests in Gangwon–do under the Gangwon–do Hongcheon National Forest Office concludes profit sharing agreements with residents of the corresponding region on the basis of fruiting survey results on pine nut fruiting forest land with trees older than 30 years in the national forest every year. The profit sharing ratio between collectors and national forest was set as 70% : 30% In 2007, 36 representatives of collectors (collecting personnel per representative was 6~12 persons in average) concluded the profit sharing agree-

Table 5. Gathering state of pine nuts with a cone by ownerships

(Unit: thousand kg)

Classification	Gapyeong–gun				Hongcheon–gun		
	Total	National forest	Provincial forest	Private forest	Total	National forest	Public forest Private forest
Total	3,705	12	247	3,446	5,248	60	5,188
Annual mean	618	2	41	574	875	10	865
2002	18	–	3	15	107	–	107
2003	868	–	110	758	429	5	424
2004	703	7	60	636	952	6	946
2005	550	–	3	547	1,015	1	1,014
2006	114	–	10	104	288	3	285
2007	1,452	5	61	1,386	2,457	45	2,412

Source: 1. Gapyeong–gun. 2008 *Annual state of pine nuts gathering*
2. Hongcheon–gun 2008 *The yield of Hongcheon pine nuts*
3. Chuncheon National Forest Office. 2008 *Internal data*
4. Hongcheon National Forest Office. 2008 *Internal data*

Note: 1. The provincial forest of Gapyeong–gun is sum of pine nut production amount of provincial forests located in 3 cities and provinces such as Gapyeong–gun, Pocheon–si, and Namyangju–si.
2. In 2007, the pine nut production of provincial forest located in Gapyeong–gun accounted for 90% of total.

Table 6. Gathering state of pine nuts with a cone in Gyeonggi–do provincial forest

Classification	Gathering amount (thousand kg)			Sales amount of pine nuts with a cone from provincial forest (thousand won)
	Total	Regional residents	Provincial forest	
Total	247	173	74	421,135
Annual mean	41	29	12	70,189
2002	3	2	1	7,544
2003	110	77	33	172,545
2004	60	42	18	68,457
2005	3	2	1	8,772
2006	10	7	3	20,445
2007	61	43	18	143,572

Source: 1. Gyeonggi-do Forestry Environment Research Institute. 2008 *2007 Pine Nuts Gathering Completion Report of Provincial Forest*
2. Gyeonggi-do Forestry Environment Research Institute. 2008 *2007 Report of pine nut fruiting amount*

Table 7. Details of pine nuts with a cone gathering of Gangwon–do Hongcheon National Forest Office

Classification	Gathering amount (thousand kg)			Sales amount of pine nuts with a cone from national forest (thousand won)
	Total	Regional residents	National forest	
Total	85.7	60.0	25.7	147,520
Annual mean	14.3	10.0	4.3	24,587
2002	–	–	–	–
2003	16.4	11.5	4.9	18,787
2004	20.4	14.3	6.1	21,806
2005	1.4	1.0	0.4	3,350
2006	2.6	1.8	0.8	5,900
2007	44.9	31.4	13.5	97,677

Source: Hongcheon National Forest Office. 2008 *Details of Pine Nuts Gathering by Sites (2002~2007).*

ment and participated in gathering of pine nuts with a cone from Aug. 23 to Oct. 31. From 2002 to 2007, total sale amount of pine nuts with a cone from provincial forests was 150 million won and its annual mean reached 25 million won (Hongcheon National Forest Office, 2008b) (Table 7). However, the profit sharing ratio between collectors and national forest was changed to 90% : 10% and Hongcheon National Forest Office made it obligation in concluding the agreement that total personnel participating in gathering works of pine nuts should subscribe in Workmen's Accident Compensation Insurance in order to prepare themselves against accidents that might occur during the collecting works. Gyeonggi–do provincial forests and National Forest Office located in Gapyeong gun also made it obligation to subscribe in insurances against accidents.

Case Study

General state and processing state of pine nut processors

General state of pine nut processors

For the subjects, 14 pine nut processors in Gapyeong–gun, Gyeonggi–do and 2 pine nut processors in Hongcheon–gun, Gangwon–do, it was found that 12 and 2 processors were being operated as private and corporate form respectively. Their operation periods were 5~35 years averaging 17 years and the age of representative were 36~72 years old, averaging 53 years old. Investment amount was 0.3 billion won per processor on the average, average area per processor was 370, and average number of their employees was 10, of which temporary employment accounted the majority as 7.2 processors located in Hongcheon–gun, Gangwon–do were being operated by individuals and their operation periods were 3 and 23 years respectively. Average age of their representatives was 51 years old, their average investment amount was 0.7 billion won, and average area of their processing facilities was 440. Average number of their employees was 9, but temporary employment accounted for the majority as 7 persons. For the reason that the majority of their employment were temporary, the processors of Gapyeong–gun and Hongcheon–gun answered to control the processing quantity considering purchase quantity, sales demand and price of pine nuts with a cone and the periods of their employment were diverse as 4~10 months. Moreover, although 2 of 3 corporations in Gapyeong–gun received partial support, other processors received no support. 2 processors in Hongcheon–gun constructed a new building and introduced automated processing equipments with 0.2 billion won of support from Hongcheon–gun and their own share respectively in 2006.

Processing and income state of pine nuts with a cone

First, total purchasing amount of pine nuts with a cone of Gapyeong–gun, Gyeonggi–do was 500~4,000 bags (1 bag is 80 kg) of which average amount per proc-

essor was 2000 bags. Price range per bag of pine nuts was 470~620 thousand won and the average price was 550 thousand won. Total purchase price of pine nuts with a cone per processor averaged 1.2 billion won and the mean net income per bag of pine nuts with a cone was 35 thousand won.

Total purchasing amount of pine nuts with a cone of Hongcheon–gun, Gangwon–do to process them into shelled pine nuts was 1,000~2,000 bags, averaging 1,500 bags per processor and the price range per bag of pine nuts with a cone was 580~630 thousand won, averaging 610 thousand won. Total purchase price of pine nuts with a cone per processor was 0.9 billion won on the average and the mean net income per bag of pine nuts with a cone was 100 thousand won. On the other hand, most of processors in Gapyeong–gun and Hongcheon–gun answered that they hoped to expand their income by increasing the processing quantity, but it was not easy because of difficulties in expansion of markets and funding money for purchasing pine nuts with a cone.

Purchase method of pine nuts with a cone and sales method of shelled pine nuts

Purchase and producing district of pine nuts with a cone

In purchase of pine nuts Gapyeong–gun, Gyeonggi–do, individual collectors and collecting merchants accounted for 90% and direct gathering of processors was only 10%. In the producing districts, Gyeonggi districts accounted for 74% and the rest was produced in Gangwon–do including Hongcheon–gun. In case of Hongcheon–gun, total quantity of pine nuts with a cone was purchased from individual collectors and collecting merchants and the producing district of whole quantity was Hongcheon different from Gapyeong–gun. Like this, it was considered that the reason that processors in Gapyeong–gun purchased pine nuts from Gangwon–do was that the quantity of pine nuts with a cone produced in Gapyeong–gun was insufficient compared with their processing capacity and the reason that pine nuts from Hongcheon–gun were flown into Gapyeong–gun, their production was greater than their processing capacity.

Sales method of shelled pine nuts

Sales method of shelled pine nuts of Gapyeong–gun, Gyeonggi–do consisted of 37% of wholesale market, 30% of retail and individual delivery, and 17% of internet and e–post shopping. Besides, the sales manner of Hongcheon–gun, Gangwon–do consisted of 33% of company, 30% of wholesale market, and 17% of internet and e–post shopping.

However, whereas Gapyeong–gun sold most of their shelled pine nuts with a mark of Gapyeong pine nuts but sold a part of them with indication of “Made in Korea”. The reason was that all of them were not produced in Gapyeong–gun but produced in other districts of Gyeonggi–do and Gangwon–do. Besides, it was found that a part of pine nuts labeled with Produced in Gapyeong were processed in mixture of pine nuts with a cone produced in Gapyeong and other districts. On the other hand, 6 processors of 14 processors in Gapyeong–gun had their shops on the roadside with large traffic to facilitate sale of pine nuts. However, in case of Hongcheon–gun, all the 4 processors performing processing of pine nuts currently were located in places with little traffic, so it was difficult to appeal to drivers and visi-

Table 8. Operation form and scale of processing facility

Classification		Operation form	Operation period (year)	Age of representative (years old)	Investor (person)	Investment amount (10 million won)	Area of processing facility (m^2)	Employee (person)			
								Total	House	Employment	
										Regular	Temporary
Gapyeong–gun	Total	–	–	–	53	383.9	5,170	139	41	5	93
	Average	–	17	53	–	29.5	369	9.9	2.9	0.4	6.6
	1	Corporation	8	48	27	64.0	746	10	1	3	6
	2	Corporation	7	45	6	94.0	419	15	6	–	9
	3	Corporation	8	61	1	113	990	10		2	8
	4	Individual	6	60	1	15.0	149	8	4	–	4
	5	Individual	35	64	1	6.0	198	15	4	–	11
	6	Individual	10	51	1	21.0	413	9	3	–	6
	7	Individual	28	36	1	15.0	165	11	4	–	7
	8	Individual	13	45	1	16.4	185	7	3	–	4
	9	Individual	20	53	1	1.0	215	6	3	–	3
	10	Individual	25	72	1	7.0	541	14	5	–	9
	11	Individual	10	59	1	5.0	139	6	1	–	5
	12	Individual	18	48	1	20.0	238	9	3	–	6
	13	Cropunit	5	48	9	6.5	343	8	2	–	6
	14	Individual	25	55	1	–	429	11	2	–	9
Hongcheon–gun	Total	–	–	–	2	145.0	878	18	3	1	14
	Average	–	13	51	1	72.5	439	9.0	1.5	0.5	7
	1	Individual	23	47	1	75.0	406	8	1	–	7
	2	Individual	3	55	1	70.0	472	10	2	1	7

Note: 1. No answer was excluded from the average.
2. The area of processing facility involves buildings for processing equipments, low temperature storehouses, and offices.

Table 9. Purchasing and processing income of pine nuts with a cone

Classification		Purchase quantity (bag)	Average purchase price per bag of pine nuts with a cone (10 thousand won)	Total purchasing price of pine nuts with a cone (100 million won)	Processing quantity of shelled pine nuts per bag of pine nuts with a cone (kg)	Net income per bag of pine nuts with a cone (10 thousand won)	Total net income (100 million won)
Gapyeong –gun	Total	27,100	–	117.7	–	–	7.9
	Average	1,936	55	11.8	18	3.5	0.9
	1	2,000	55	11.0	18	5.0	1.0
	2	1,800	50	9.0	17	2.5	0.5
	3	3,600	56	20.2	19	2.8	1.0
	4	400	58	5.8	17	4.0	0.2
	5	2,000	59	11.8	20	–	–
	6	2,500	62	15.5	19	3.0	0.8
	7	3,000	–	–	19	5.0	1.5
	8	800	55	4.4	19	–	–
	9	500	–	–	–	–	–
	10	4,000	57	22.8	19	5.5	2.2
	11	1,000	47	4.7	17	2.0	0.2
	12	2,500	50	12.5	–	2.0	0.5
	13	1,000	–	–	–	–	–
	14	2,000	–	–	16	–	–
Hongcheon –gun	Total	3,000	–	18.4	–	–	1.0
	Average	1,500	61	9.2	18	10.0	1.0
	1	1,000	58	5.0	18	10.0	1.0
	2	2,000	63	12.6	18	–	–

Note: 1. No answer was excluded from the average.
2. 1 bag is 80 kg.

Table 10. Purchase method and producing district of pine nuts with a cone

Classification		Purchase method of pine nuts with a cone (bag)			Producing district of pine nuts with a cone (bag)		
		Total	Individual collector. Collecting merchants	Direct gathering	Total	Gyeonggi	Gangwon
Gapyeong –gun	Total	27,100 (100.0)	24,350 (89.9)	2,750 (10.1)	27,100 (100.0)	20,000 (73.8)	7,100 (26.2)
	1	2,000	2,000	–	2,000	2,000	–
	2	1,800	1,800	–	1,800	1,800	–
	3	3,600	3,600	–	3,600	3,600	–
	4	400	400	–	400	400	–
	5	2,000	1,000	1,000	2,000	700	1,300
	6	2,500	2,500	–	2,500	1,700	800
	7	3,000	2,250	750	3,000	3,000	–
	8	800	800	–	800	800	–
	9	500	500	–	500	500	–
	10	4,000	4,000	–	4,000	1,200	2,800
	11	1,000	1,400	–	1,000	600	400
	12	2,500	3,500	–	2,500	1,500	1,000
	13	1,000	–	1,000	1,000	1,000	–
	14	2,000	2,000	–	2,000	1,200	800
Hongcheon –gun	Total	3,000	3,000	–	3,000	–	3,000
	1	1,000	1,000	–	1,000	–	1,000
	2	2,000	2,000	–	2,000	–	2,000

Note: 1. 1 bag is 80kg.
2. The value in ( ) is the component ratio.

Table 11. Sales method of shelled pine nuts

(Unit: thousand kg)

Classification		Total	Wholesale market	Retail and individual delivery	Internet and e–post shopping	Individual store	Company
Gapyeong –gun	Total	498.7 (100)	185.1 (37)	147.6 (30)	86.7 (17)	45.5 (9)	33.8 (7)
	1	36.0	12.6	–	23.4	–	–
	2	30.6	29.1	1.5	–	–	–
	3	68.4	–	68.4	–	–	–
	4	6.8	4.1	–	–	2.7	–
	5	40.0	32.0	8.0	–	–	–
	6	47,6	9.5	23.8	–	14.3	–
	7	57.1	11.4	–	14.3	20.0	11.4
	8	15.2	9.1	1.5	4.6	–	–
	9	9.0	6.3	2.7	–	–	–
	10	76.0	22.8	15.2	38.0	–	–
	11	17.0	–	8.5	–	8.5	–
	12	45.0	36.0	9.0	–	–	–
	13	18.0	9.0	9.0	–	–	–
	14	32.0	3.2	–	6.4	–	22.4
Hongcheon –gun	Total	54.0	16.2 (30)	7.2 (13)	12.6 (23)	–	18.0 (33)
	1	18.0	5.4	–	12.6	–	–
	2	36.0	10.8	7.2	–	–	18.0

Note: The value in ( ) is the component ratio.

tors as indigenous products of Hongcheon–gun. Therefore, it was considered that a method to move the processors to places with great public relation effect or collectivize them would be required in future.

Future management plan of pine nut processors

First, 14 processors of Gapyeong–gun and 2 processors of Hongcheon–gun answered that their average management goal achievement level was 67% and it was suggested that their satisfaction level was not so high. For trends of purchase price of pine nuts with a cone, 8 processors among total 16 processors answered that the purchase price was rising and the others answered that they were maintained in current level. For rising factors of the purchase price of pine nuts with a cone, they answered that there were increase of pine nut processors, influx decrease of pine nuts with a cone produced in Gangwon–do, reduction of pine nut production in Gapyeong–gun from temperature rising.

However, for future business scale 6 processors planned expansion, 9 processors planned to maintain the present status, and 1 processor planned reduction. The processors planning expansion expected increase of processing quantity and save of labor cost through introduction and expansion of automated equipments, and the processors planning to maintain the present status answered that there were difficulties in securing of pine nuts with a cone, low profitability, and lack of money for introducing equipments, and lack of money for purchasing pine nuts with a cone, but they would maintain their business for securing income source using family labors in the agricultural off–season. For details of hope on management, the processors of Gapyeong–gun answered to want long term–low interest loan, development of pine nut processing equipment for automation, preparation of measures able to prevent price collusion of pine nuts with a cone by brokers including collecting merchants, enhancement of public relation, packing material support, low temperature storehouse support, and preparing clear criteria of supports for corporations and individuals. The processors of Hongcheon–gun hoped development of automatic equipment such as selection and drying, price control of pine nuts with a cone in alternate year bearing, improvement of sales and distribution structure, and increase of new processors.

CONCLUSION

1. In Gapyeong–gun, Gyeonggi–do, where subject pine nut processors were located, White pine forest accounted for 30% of total forest area, 69 thousand ha and in Hongcheon–gun, Gangwon–do, it accounted for 19% of of total forest area, 150 thousand ha.
2. It was found that Gapyeong–gun, Gyeonggi–do had 3,705 thousand kg of total harvest for 6 years from 2002 to 2007, of which annual mean was 618 thousand kg. Hongcheon–gun, Gangwon–do had 5,248 thousand kg of total harvest for 6 years from 2002 to 2007, of which annual mean was 875 thousand kg.
3. In Gapyeong gun, 12 processors and 2 processors among total 14 subject processors were operated in the forms of individual and corporation. Their operation periods were 5~35 years, averaging 17 years and the age of representative were 36~72 years old, averaging 53 years old. Investment amount was 0.3 billion won per processor on average, average area

per processor was 370, and average number of their employees was 10, of which temporary employment accounted the majority as 7.

4. 2 processors located in Hongcheon–gun, Gangwon–do were being operated by individuals and their operation periods were 3 and 23 years respectively. Average age of their representatives was 51 years old, their average investment amount was 0.7 billion won, and average area of their processing facilities was 440. Average number of their employees was 9, but temporary employment accounted for the majority as 7 persons.
5. Total purchasing amount of pine nuts with a cone of Gapyeong–gun, Gyeonggi–do was 500~4,000 bags (1 bag is 80 kg), of which average amount per processor was 2000 bags. Price range per bag of pine nuts was 470~620 thousand won and the average price was 550 thousand won. Total purchase price of pine nuts with a cone per processor averaged 1.2 billion won and the mean net income per bag of pine nuts with a cone was 35 thousand won.
6. Total purchasing amount of pine nuts with a cone of Hongcheon–gun, Gangwon–do to process them into shelled pine nuts was 1,000~2,000 bags, averaging 1,500 bags per processor and the price range per bag of pine nuts with a cone was 580~630 thousand won, averaging 610 thousand won. Total purchase price of pine nuts with a cone per processor was 0.9 billion won on the average and the mean net income per bag of pine nuts with a cone was 100 thousand won.
7. In purchase of pine nuts Gapyeong–gun, Gyeonggi–do, individual collectors and collecting merchants accounted for 90% and direct gathering of processors was only 10%. In the producing districts of pine nuts with a cone, Gyeonggi districts accounted for 74% and the rest was produced in Gangwon–do including Hongcheon–gun. In case of Hongcheon–gun, total quantity of pine nuts with a cone was purchased from individual collectors and collecting merchants and the producing district of whole quantity was Hongcheon different from Gapyeong–gun.
8. Sales method of shelled pine nuts of Gapyeong–gun, Gyeonggi–do consisted of 37% of wholesale market, 30% of retail and individual delivery, and 17% of internet and e–post shopping. Besides, the sales manner of Hongcheon–gun, Gangwon–do consisted of 33% of company, 30% of wholesale market, and 17% of internet and e–post shopping.
9. For future business scale 6 processors planned expansion, 9 processors planned maintaining quo status, and 1 processor planned reduction. The processors planning expansion expected increase of processing quantity and save of labor cost through introduction and expansion of automated equipments, and the processors planning to maintain the present status answered that there were difficulties in securing of pine nuts with a cone, low profitability, and lack of money for introducing equipments, and lack of money for purchasing pine nuts with a cone, but they would maintain their business for securing income source using family labors in the agricultural off–season.

From the above discussions, following challenges were drawn.

1. Although the processors of Gapyeong–gun planned to make Gapyeong pine nuts a brand through geographical indication system, the production of pine nuts with a cone in Gapyeong–gun did not reach their processing capacity. Therefore, it seemed that Gapyeong–gun would need forest practices such as thinning in the short term and crown shape control to facilitate harvesting fruits as well as new forestation in the long term.
2. In case of Hongcheon–gun, it seemed that it is required to grow pine nuts as indigenous products through promotion of geographical indication system for its own pine nuts and fostering and expansion of sales market to raise their value–added by processing total quantity of pine nuts produced in the district.
3. The largest difficulty of processors in both districts was supply of money for purchasing pine nuts with a cone for processing and selling. Therefore, it was considered that when financial support measures such as low interest loan for expansion of processing quantity were prepared to activate the processors, it would be possible to induce positive participation of mountain owners in their management for White pine forest as well as income increase of pine nut collecting and producing agricultural farms.
4. As hoarding and price collusion of brokers including collecting merchants gave great effect on the purchasing price of pine nuts with a cone, it seemed that measures for local governments to purchase pine nuts and supply them to the processors in stable price were needed.
5. In order to overcome the poor sales, it seemed that development of various products using pine nuts and holding events were needed and positive public relation of pine nuts as local indigenous products in places with great advertisement effect was required also.
6. Finally, there were some differences in production and processing capacity of pine nuts with a cone between both regions. In case of Gapyeong–gun, some products didn't have clear indication on their production district and in case of Hongcheon–gun, their pine nuts were discharged to outside because of low price, so changed to products produced in other regions or could not raise their value added. Therefore, both districts should give efforts to differentiate their pine nuts from those produced in other regions and to make them a brand by operating faithfully the systems such as geographical indication system faithfully.

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