

## **A Case Study on Management Income and Productivity in Organic Farming\***

Focused on Hong-Dong Myon, Hong-Song County, Chung Nam Province

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### I. Introduction

Many Studies are getting active on organic farming, environmentally conscious agriculture and sustainable agriculture and so on, as people have been concerned about the environmental issues in Korea. And Department of Environmental Agriculture was newly organized in Ministry of Agriculture, Forestry and Fisheries (MAFF). So policies for developing environmentally conscious agriculture are being put into operation from the year 1995. Organic farming which has provided practical examples for those studies and policies was begun spontaneously or without government's support among many farmers from the 1970s in Korea.

Many of studies which have been performed on environmentally conscious agriculture up to now by researchers, are three kinds of types as follows :

The first type is the theoretical clarifications on the relation between farming activity and environmental conservation. The second type is the introductions on the trend of environmentally agricultural policy in foreign countries. The third type is

\* Paper presented at the International Conference on Food, Culture, Trade and the Environment, 19-22 July, 1995.

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the researches on the actual state of organic farming through questionnaire.

But there have been practically few analyses on management income and productivity in organic farming. That is, those in organic farming have been supposed less than those in conventional farming on the ground of feeling or an abstract questionnaire. Accordingly, it has been thought that organic farming method is lack of competitive power against foreign country's agriculture in price side and lower food self-supplying ratio. Now, it is important to grasp the situation exactly, which provides the basic data for deep researches and practical policy directions.

This case study was begun in this critical mind. To begin with, a case region and a farmers' organization were chosen. So the origination and development process of a farmers' organization in it was studied. The farmers' organization(made up of 36 organic farmers) is Pulmoo Farmers' Cooperatives at Hong-Dong Myon, Hong-Song County, Chung Nam Province in Korea. This research analyzed management income rate and production cost for organic products(rice). And then, the results were compared with those for conventional farming method. This research analyzed also the productivity(yield per unit) differences of 11 items (such as rice, lettuce, red pepper, green onion, chinese cabbage, raddish, watermelon, strawberry, grape, carrot and egg) between organic and conventional farming. And the data which were published by Rural Development Administration(RDA) were used as the reference materials for productivity level in conventional farming.

## II. Producers' Organization and Farming Activities

### 1. Introduction of Case Region

A case region of this study is Hong-Dong Myon, Hong-Song County, Chung-Nam Province in Korea(Table 1). Hong-Dong Myon is away 160km from Seoul, and away 10km from Hong-Song Eup. This Myon is composed of 14 Ries and 33villages. The number of farm households is 1,630(September, 1994), and the number of population is 6,326(male 3,200, female 3,126). And area size is 3433.6ha, area cultivated out of which is 1,723.7ha(paddy field is 949.8ha, and upland 773.9ha) and forest size is 1,709.9ha. The former occupies 50.2%, the latter 49.8% in total area. That is to say, this region is called semi-mountains.

The history of organic farming in this region is about 30 years. In particular, Pulmoo agricultural high school(PAHS) opened a school in 1958 has been playing an important role in technical education and spread for organic farming. The major part

of organic farmers in this region was graduated from PAHS.

Table 1. Introduction of case region

farm households	population(person)			area(ha)			
	total	male	female	total	paddy field	upland	forest
1,630	6,326	3,200	3,126	3,433.6	949.8	773.9	1709.9
(-)	(100.0)	(50.6)	(49.4)	(100.0)	(27.7)	(22.5)	(49.8)

Source : Office of Hong-Dong Myon(1994).

## 2. Introduction of Farmers' Organization

### 1) Pulmoo Farmers' Cooperatives

Pulmoo Farmers' Cooperatives(PFC) was organized without government's or National Agricultural Cooperative Federation's help at Hong-Dong Myon in 1980. And PFC became a member of Korea Consumers' Cooperative Federation in 1985. PFC has a building, which is made up of 39 Pyong as a store and 24.3 Pyong as a workroom. In 1994, the number of members was 374 farmers.

Aims of this organization are to have cooperative spirit of helping each other, to elevate economic and cultural living level of members and to promote the public good. This organization consists of 3 departments and 4 committees. 3 departments are general affairs department, the first promotion department and the second promotion department. And 4 committees are steering committee, financial committee, agricultural marketing committee and livestock products marketing committee. Agricultural marketing committee includes Organic Farming Producers' Group(Figure 1).

### 2) Organic Farming Producers' Group

The case region is suitable for producing organic farming products geographically. The case region also has the history and tradition for organic farming of more than 30years. Thus the organic farmers of this region have technic level higher than those of other.

Organic Farming Producers' Group(OFPG) was organized within PFC in 1986 by 5 farmers since it was thought that OFPG could settle down inefficiency problems in production and marketing. For instance, inefficiency issues to be solved are to keep the balance of supply and demand, to unify supply price, to make a shipment cooperatively and so on. In 1992, the OFPG was reorganized by 35 organic farmers. At present, PAHS and Jung-Nong Association<sup>1)</sup> are playing a significant part in

education, spread and publicity of organic farming method.

The organization goal of OFPG is to develop organic farming systematically in this region. That is, the objectives are to prevent over and under supply to relatively constant demand through cooperative production and marketing plan and to cut down shipment cost and labor cost by cooperative activities. Also, they are to certificate the quality of their organic products to consumers, to attain consumers' confidence and to enlarge the demand.

A member of OFPG should be a member of PFC and farmer who is producing organic farming products or processing foods from the products. These members are classified as the regular and the associate members. To be an associate member, a farmer must get admission as a member from Organic Farming Products Council within OFPG. And then, if he produces sincerely organic products for 12 months and gets approval at General Meeting, he becomes a regular member. The purposes of this classification is to control the quality of organic products, to do systematically activities of management and marketing through OFPG and etc. These purposes are also found in the secession regulation of members. For example, the member who is absent from a monthly meeting over 3 times successively, the member who is pointed out seriously in the quality aspect by Organic Farming Products Council and the member who voluntarily decides to secede from OFPG are looked upon as seceders from OFPG. And the members of OFPG must sell their products cooperatively through PFC.

Figure 1 shows the structure of OFPG. OFPG consists of General Meeting, Organic Farming Products Council, Auditor, and 6 Crop Units(Jak-Mok Bahn) by item. General Meeting has some functions, which is to elect officers like a chairman, a vice-chairman, a manager, an accounting secretary and an auditor, to make or amend a constitution and to devise a production plan. It aims at diminishing economic risk for management that members devise a production plan cooperatively. A production plan includes production items, yield, new item development, production technology improvement and so on.

And Organic Farming Products Council is made up of 11 farmers such as a chairman, a vice-chairman, a manager, an accounting secretary of OFPG, a managing director of PFC and chiefs of 6 Crop Units(Jak-Mok Bahn). Members of Organic Farming Products Council examine the quality of organic products, the requirements of membership and the selling prices by item.

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1) Jung-Nong Association is a organic farmers' organization which was organized all over the country in 1976 by christian farmers.

Figure 1. The structure of Pulmoo Farmers' Cooperatives

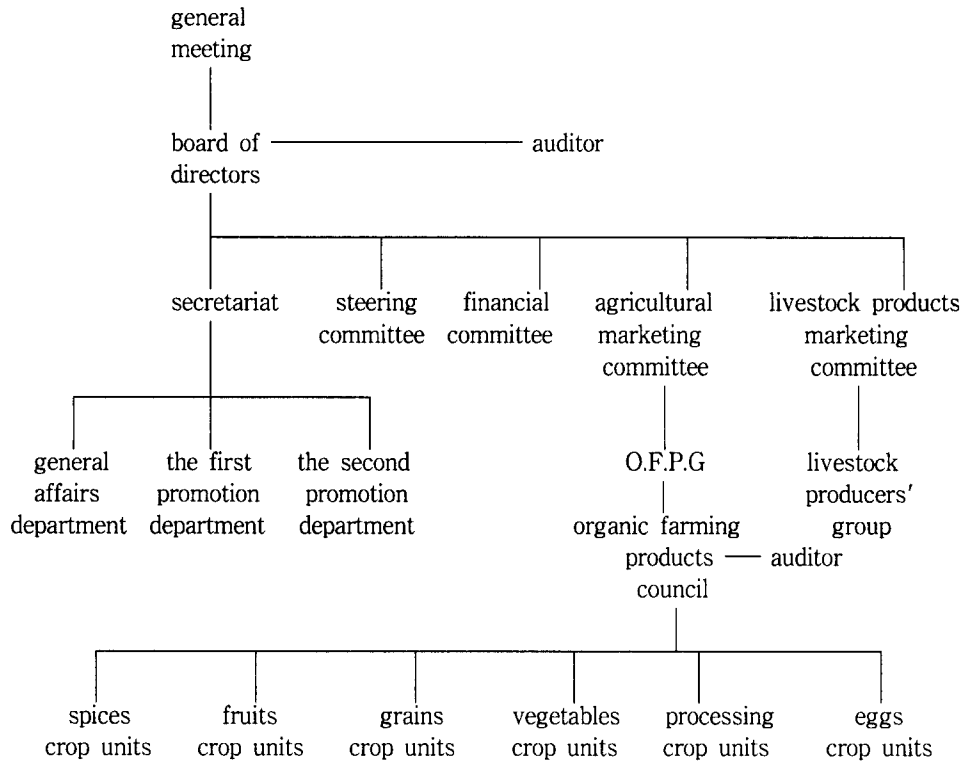


Table 2. Age distribution of members of OFPG

ages	20~29	30~39	40~49	50~59	total
farmers	3	20	8	5	36
%	8.3	55.6	22.2	13.9	100.0

Source : field survey(1994).

The number of OFPG's members was 45 farmers(regular members were 36 farmers and associate members 9) in 1994. Table 2 shows the age distribution of members. Members in thirties(55.6%) are the most in the OFPG and members in forties(22.2%) are the next. This distribution is very different from age one of overall farm households in Korea. So to speak, most of Korean farmers are the old age of 50~60. That the ages of members in case region are relatively young were originated from some grounds, as follows :

First, the sincere and earnest farming activities of organic farmers in this region have had an influence on young farmers. Second, PAHS has taught organic farming

method and basically agricultural philosophy since opened a school in 1958. That members graduated from PAHS are a large majority in OFPG proves this fact. Third, this region has the tradition of organic farming more than 30 years and farmers have actively exchanged technical and economic information each other. Accordingly, it is comparatively easy for young farmers to introduce organic farming method. Fourth, many members of Jung-Nong Association, who have a religious conviction for organic farming, lives in this region. A religious conviction has been helpful to overcome the difficulties by which organic farmers would be often confronted in producing and marketing.

### 3. Farming Contents of Organic Farmers in Case Region

The following table 3 shows farming contents of 32 members of OFPG surveyed. Their farming career averages 15.9 years and their organic farming one averages 5.2 years. These results are closely related to age distribution of members and development process of OFPG. As above, members' ages are mainly the age of 30~40 and OFPG was organized in 1986 by 5 farmers.

And area cultivated per farm household surveyed is 1.69ha(paddy field 0.80ha, upland 0.89ha). This is wider than the average area of cultivated land per household (paddy field 0.82ha, upland 0.47ha, total 1.29ha) of the whole farm households by 0.40ha. And size of raising livestock per farm household surveyed is cattle 6.5 heads, hog 54.0 heads, chicken 585.2 heads. Except hog, this size is larger than that<sup>2)</sup> of raising livestock in Korean whole farm households. It is thought that this result was caused that government had encouraged farmers to produce livestock and poultry by assigning Hong-Song County as an area raising livestock. Organic farmers are being supplied with raw materials for compost heap from livestock farmers in this area. And the expenditures of employment farm wages per farm household are 4.2 times as much as those(408 thousand won) per household in Korean whole farmers.

Area cultivated for organic farming averages 0.87ha(paddy field 0.39ha, upland 0.48ha). This fact shows that members of OFPG are managing organic and conventional farming at the same time.

That is to say, size of area cultivated for organic farming (0.87ha) covers 51.4% in overall size(1.69ha). This means that they intend to minimize physical and economic risk for organic farming at present situation of organic production technology in Korea.

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2) The size of raising livestock per farm household is cattle 4.0 heads, hog 84.7 heads, chicken 379.9 heads(MAFF, 1994).

Table 3. Farming contents of organic farmers in case region

units : ha, a thousand won

farming career	organic farming career	area of cultivated land		size of raising livestock (heads)			expenses of farm wages	area cultivated for organic farming		rate (%)	
		paddy field(A)	upland (B)	cattle	hog	chicken		paddy field(C)	upland (D)	C/A	D/B
15.9 years	5.2years	0.80	0.89	6.5	54.0	585.2	1,715	0.39	0.48	48.8	53.9

Source : field survey(1994).

And kinds of organic farming products in case region are 11 grains(rice, barley, wheat, soybean, potato and etc), 52 vegetables(lettuce, chinese cabbage, radish, pumpkin, red pepper, carrot, watermelon, strawberry, tomato, cucumber, garlic, green onion, eggplant, crown daisy and etc), 4 fruits(apple, grape, pear and peach), egg and so forth. Thus it can be said that many kinds of organic products have been produced a little amount each. In case of wheat, 3 farmers and 1 factory are cultivating and processing wheat in case region as a campaign to save Woo-Ri Mil(Korean native wheat).

However, there are not livestock products(chicken, pork and beef) which are produced by organic method. This fact shows that organic farmers raise livestock by conventional farming method. Presently, producing fruits such as apple and pear, they sprinkle pesticides a little since it is very hard to produce them by organic farming method. Except fruits, all kinds of agricultural products are being produced without synthetic chemical pesticides and fertilizers.

### III. Analysis on Management Income of Organic Farming

- In Case of Rice -

#### 1. Comparison of Production Cost between Organic and Conventional Farming

Table 4 shows comparison of production cost per 10a in rice between organic and conventional farming. Production cost of rice in organic farming method was 859,764wons in 1992 and 860,990 wons in 1993. And Production cost of rice in conventional one was 397,296 wons in 1992 and 397,534 wons in 1993. So the formers were respectively 2.16 and 2.17 times as much as the latters in 1992 and 1993.

Particularly, in case of rice production cost in organic farming method in 1993,

costs of labor, other materials, fertilizer, electric power & fuels and agricultural facilities were paid 3.49, 8.41, 3.69 and 4.45 times as much as those of conventional farming.

It is thought that these results were mostly caused by cost of labor which was needed in prevention damage by insects and diseases, weeding works and making compost heap and buying facilities and materials of compost heap. To settle down these problems, it is necessary to develop technology for farming using a natural enemy and microorganism, to develop weeders of a small or a middle size and to build the facilities which can manufacture compost heap cheaply and in large quantity. How will we meet experts and capital needed for these projects? Since these technologies and facilities are a public goods, the development of those should be supported by government.

Table 4. Comparison of production cost between organic and conventional farming (rice, per 10a)

units : won, %

items	organic farming				conventional farming				A/C	B/D
	1992(A)	ratio	1993(B)	ratio	1992(C)	ratio	1993(D)	ratio		
seed & seeding	8,568	1.0	9,210	1.1	6,055	1.5	6,337	1.6	1.42	1.45
fertilizer*	68,665	8.0	61,093	7.1	15,602	3.9	16,563	4.2	4.40	3.69
pesticides	0	0.0	0	0.0	12,459	3.1	15,828	4.0	0.0	0.0
other materials	14,318	1.7	13,449	1.6	1,871	0.5	1,599	0.4	7.65	8.41
electric power & fuels	6,498	0.7	4,608	0.5	1,169	0.3	1,269	0.3	5.56	3.63
irrigation	7,475	0.9	7,234	0.8	2,820	0.7	2,977	0.7	2.65	2.43
agr. implement	91,195	10.6	67,079	7.8	53,035	13.3	56,432	14.2	1.72	1.19
agr. facilities	6,095	0.7	5,522	0.6	1,139	0.3	1,241	0.3	5.35	4.45
animals	0	0.0	0	0.0	631	0.2	532	0.1	0.0	0.0
labor	356,960	41.5	398,087	46.2	110,837	27.9	114,196	28.7	3.22	3.49
others	0	0.0	0	0.0	1,058	0.3	1,385	0.4	0.0	0.0
subtotal	559,774	65.1	566,282	65.7	206,676	52.0	218,359	54.9	2.71	2.60
land service	266,398	31.0	248,523	28.9	171,396	43.1	156,508	39.4	1.55	1.59
capital service	33,592	3.9	46,185	5.4	19,224	4.9	22,667	5.7	1.75	2.04
subtotal	299,990	34.9	294,708	34.3	190,620	48.0	179,175	45.1	1.57	1.64
total	859,764	100.0	860,990	100.0	397,296	100.0	397,534	100.0	2.16	2.17

notes : Cost of by-products was excluded from both cases.

In case of organic farming, costs of refining, packing and shipping were excluded.

\* Cost of fertilizer in organic farming is that of farm manure and in conventional farming included both chemical fertilizer and farm manure.

Source : Organic farming is from field survey(1993 and 1994) and conventional farming is from MAFF(1994), 'Major Statistics of Agriculture, Forestry and Fisheries.'



And the component ratio of rice production cost in organic farming is labor cost 46.2%, cost of land service 28.9%, cost of agricultural implement 7.8%, cost of farm manure 7.1% and so on in 1993. But that in conventional(1993) is cost of land service 39.4%, labor cost 28.7%, agricultural implement 14.2%, cost of capital service 5.7% and et cetera.

## 2. Comparison of Management Income between Organic and Conventional Farming

Table 6 compares management income of organic farming with that of conventional farming in rice. Management income and the rate of income per 10a in the one were 367,362 wons(61.6%) and those in the other were 396,327 wons(70.0%) in 1990(Suh, C., H., et al, 1992). These differences were caused by yield decrease and too much management expenditures in organic farming, though price per unit was higher. For instance, yield is 307kg/10a, price is 1,896 wons/kg and management expenditures 212,282 wons/10a in the former. But in the latter, yield is 451kg/10a, price is 1,256 wons/kg and management expenditures 170,170 wons/10a.

Table 5. Comparison of management income between organic and conventional farming (rice, per 10a)

units : won, %

items	1990		1993	
	organic farming	conventional farming	organic farming	conventional farming
yield(kg)	307	451	469	418
price(won/kg)	1,896	1,256	2,125	1,439
gross-receipts	579,643	566,497	996,625	601,481
management expenditures	212,282	170,170	228,607	182,177
income	367,362	396,327	768,018	419,304
the rate of income	61.6	70.0	77.1	69.7

Note : By-products were excluded from gross-receipts.

Sources : Cases of organic farming are from Suh, C, H., et al(1992) and field survey(1993).

Cases of conventional farming are from RDA(1991 and 1994), 『Standard income of agricultural and livestock products.』

In 1993, however, Management income and the rate of income per 10a in organic farming were 768,018 wons(77.1%) and those in conventional farming were 419,304 wons(69.7%). These results were caused by yield increase, on the contrary in 1990, and higher price in organic agriculture products. For example, yield is 469kg/10a,

price is 2,125 won/kg and gross-receipts 996,625 won/10a in the one. But in the other, yield is 418kg/10a, price is 1,439 won/kg and gross-receipts 601,481 won/10a. Consequently, management income of the one was more than that of the other by 348,714 won. A cause of these differences is in cost of land service, too. So to speak, organic farmer is mainly using self cultivated-land, not leased cultivated-land.

#### IV. Analysis on Productivity of Staple Items

Productivity per unit of some items in an organic field is usually lower than in a conventional one within 5 years. However, it is said that yield per unit has been increased to the level of a conventional field or more than that if about 5 years go on (Chung, J., Y, 1987, p.295, p.321 ; Suh, C., H, et al, 1991, p.58 ; Kwon, W., D, 1992, p.199 ; Kim, H, 1993, p.66). But there has not been any definite comparison with numbers as yet. Therefore yield per 10a of 11 items (rice, autumn chinese cabbage, autumn radish, carrot, green onion, lettuce, red pepper, strawberry, watermelon, grape and egg) was studied in case region and compared with that of conventional farming method. The data of the former were got from field survey and those of the latter were what had been published by RDA. Farmers surveyed average 5.2 years in organic farming career.

##### 1. Productivity Comparison of Rice, Autumn Chinese Cabbage, Autumn Radish, Carrot and Green Onion

Table 6 shows the productivity of rice, autumn chinese cabbage, autumn radish, carrot and green onion in organic and conventional farming. A case of rice was classified into within and over 5 years because rice is an important food for Korean and paddy field covers about 50% of area cultivated. Also, it is difficult to produce rice in organic method comparatively, so rice yield has not been leveled up as that of conventional method for short-run.

Rice yield of organic farmers within 5 years was less than that of conventional ones by 23.7% but organic farmers over 5 years produced rice more than conventional ones by 1.0%. And in an autumn chinese cabbage, organic agricultural products were yielded more by 10.6% and in an autumn radish, organic farmers produced 1.2% more when compared with conventional ones, too. But yields of carrot and green onion in organic farming method were less than that in conventional one by 22.6%

and 23.4% each. Since the carrot is a root vegetable and its sweetness level is high, it is preferred by harmful insects (in particular, soil nematode). And in case of green onion, it is hard for the harmful insects inside its leaves to be exterminated. These characteristics of carrot and green onion work as causes of yield decrease.

Especially, a farmer is doing Duck Farming Method (Oh-Ri Nong Beop) which raise rice and ducks in paddy field at the same time. The farmer has been farming in organic method for 13 years and produced 480kg per 10a by Duck Farming Method in 1994. The output is more than that of conventional method by 3.2%. Area of cultivated land doing Duck Farming Method was 3.3ha and 400 ducks were raised there. The farmer bought 1,000 ducklings for 1,000 won per head and put them in paddy field in 20 days after rice transplantation, and then sold them at 4,000 won per head about the middle of August. The effects of Duck Farming Method are as follows :

Table 6. Comparison of productivity between organic and conventional farming in case region (rice, autumn chinese cabbage, autumn radish, carrot and green onion)

unit : kg/10a, %

items	rice		chinese cabbage	radish	carrot	green onion
	within 5years	over 5years				
organic farming(A)	355	479	9,680	4,948	2,000	2,340
conventional farming(B)	465		8,753	4,887	2,724 <sup>1)</sup>	3,137
comparison(A/B)	76.3	106.9	110.6	101.2	73.4	74.6

Note : carrot yield per unit in conventional farming is average value of the whole country and those of the rest is average values of Chung-Nam Province.

Source : The data of organic farming were got from field survey(1994) and those of conventional farming were got from RDA(1994), "Standard income of agricultural & livestock products".

First, that contributes to saving down labor force for weeding works because ducks remove weeds or check their germination. Second, that is useful for prevention damage by insects and diseases because ducks swallow up harmful insects and help to be well ventilated in paddy field as they eliminate yellow leaves from the bottom of paddy. Third, that is effective in applying manure due to duck's feces and urine. Fourth, that makes paddy straws strong since ducks stimulate them. Fifth, that increases farm household income since cost of raising duck costs little except some expenditures of feed cost in the early days.

## 2. Productivity Comparison of Lettuce, Red Pepper, Strawberry, Watermelon and Egg

Table 7 shows the productivity of lettuce, red pepper, strawberry, watermelon and egg. In organic farmers surveyed, yields per unit of lettuce and strawberry were more than those in conventional ones by 7.1% and 14.5%. But yields per unit of red pepper and watermelon in the former were less than those in the latter by 24.7% and 17.9%. Organic farmers also produced grape 19.5% less than conventional ones. And the gap of egg productivity between organic and conventional method was the most (32.0%) of any other item. This is due to the difference in production method. In organic farming, that is, chickens are raised not only at a henhouse on the ground but at a proper male/female ratio. In conventional farming, however, chickens are raised densely at a layered henhouse.

We can find that the items of which productivity per unit in organic method is higher than that in conventional one are short in cultivated period or absorb a little nutritious substance from soil. For example, those are chinese cabbage, lettuce and radish.

Table 7. Comparison of productivity between organic and conventional farming in case region (lettuce, red pepper, strawberry, watermelon, grape and egg)

unit : kg/10a, %

items	lettuce	red pepper	strawberry	watermelon	grape	egg
organic farming(A)	2,000	165	1,680	2,111	1,800	18,000
conventional farming(B)	1,868 <sup>1)</sup>	219 <sup>1)</sup>	1,467	2,570	2,237	26,455
comparison(A/B)	107.1	75.3	114.5	82.1	80.5	68.0

Note : Yields per unit of lettuce and red pepper in conventional farming are average value of the whole farm households in Korea and those of the rest are average values in Chung-Nam County.

Egg Yield per unit is the number of eggs per 100 heads a year.

Source : Ibid.

In case of items of which productivity is low relatively, we considering that government has little tried to develop technologies and varieties for organic farming up to now, the productivity gap analyzed above may be small. It should also be considered that organic farmers have acquired technologies for organic farming from neighboring farmers and have relied on a store of knowledge accumulated by trial and error. So to speak, government has tried to develop continuously varieties and technologies for conventional farming so as to increase yield per unit. On the contrary, organic farmers has tried to learn organic method for themselves without

government's support. Without established technology, in addition, they sometimes had to play a part in testing the organic farming method which had been spreaded by non-government organizations.

## V. Conclusions

As above, farming situation, management income of rice farming and productivity (yield per unit) of OFPG in case region(Hong-Dong Myon, Hong-Song County, Chung Nam Province in Korea) have been studied. In order to raise the rate of management income, productivity and food self-supplying ratio by developing organic farming method, the issues that should be settled down are as follows :

First, the technologies of saving down labor force in weeding works and in making compost heap should be developed actively. So farm wages which have covered the most of production costs should be cut down.

Second, it is necessary to be developed for the varieties suitable for organic farming, for natural pesticides, and for prevention method against damages by blight and harmful insects using microorganism and plant. Thus that yield was reduced by blight and harmful insects is to be prevented. It is essential for government to systemize and consolidate a policy for technology development so as to attain these objects. Also, various technologies developed by farmers should be arranged scientifically.

Third, There should be legislation measures which could support technology development sustainably. I think that since the technologies and establishments of agriculture are a public goods, development of those should be supported by government. As a result, organic farming that is being usually managed in small or middle farm scale at present may become larger scale, and the productivity of that may be raised much more.

Finally, limits of this study are as follows :

First of all, the results of this study are not able to be generalized for the whole organic farmers all over the country. Therefore, there should be continuously many case studies on other regions. Nextly, this analysis on management income was restricted within case of rice. Namely, there was lacking in analyzing on other economic crops that were of importance on farmer's income. Lastly, these analyses on productivity by item were also restricted within some items(11 items). These issues left will be studied from now on.

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