

THE RATIONALE OF GOVERNMENT'S FINANCIAL SUPPORT FOR ENVIRONMENT-FRIENDLY AGRICULTURE IN KOREA

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I. Introduction

One of the major concerns in agriculture is that food supplies may not be sufficient to meet the increasing requirements of a growing population, even if agricultural practices have been concentrated on the improvement of productivity without considering the environmental problems. The shortage of food, suggesting that we are approaching the finite limits of the earth's resources and available capacity, is reflected both in the global economy and in human populations.

We now have to consider the harmony in agriculture between the preservation of the environment and development of providing food sufficient to meet human needs. When harmonizing of the preservation of the environment and positive development of food production is considered, we find that they are in conflict. Agricultural development, in a sense, has led to environmental problems such as the depletion of both the renewable and non-renewable resources, ozone depletion, the loss of biodiversity and species extinction, deforestation, soil erosion and degradation, and the contamination of lands, air, and water.

Land-based food supplies are becoming limited by the amount of unpolluted water available and from mounting pressures on lands from urbanization, industrialization, and transportation infrastructure. Agriculture seems to be the foundation of national as well as global

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economy. One of the most important tasks in agriculture is to make the agricultural resources sustainable.

Unsustainable development has resulted in the destruction of the ecosystem. Among natural resources which consist of the ecosystem, water and soil are fundamental resources to human lives. Polluted water and degraded soil threaten human welfare. Economic development without considering environmental sustainability has degraded water and soil quality. Degraded water and soil may threaten human health. As the issue of food safety is prominent, multitude of people are now concerned with environmental protection, especially of water and soil. Until recent years, the problem of pollution has focused on point pollution sources such as industrial and livestock wastes. Point pollution sources can be controlled by government's tax and regulatory policies and/or the establishment of pollution control facilities.

On the other hand, because non-point pollution sources are scattered everywhere, it is not easy for the government to control them. The most typical non-point pollution source is agricultural practices using excessive chemical fertilizers and pesticides. By the early 1980s, several incidents of groundwater contamination caused by the field application of pesticides had been confirmed. Until that time, groundwater contamination had been almost entirely unexpected, particularly since the pesticides being found in groundwater included those generally assumed to degrade or volatilize rapidly (Holden 1986, 1).

Agriculture has its own characteristics that serve various public functions beside food production. The role of agriculture includes multiple public functions such as controlling flood, preventing soil erosion, retaining water, preserving local community's culture, and maintaining community. Because these public functions are not compensated in the market, market failure that does not produce goods necessary for a society occurs. Accordingly, government support is necessary to maintain the proper level of agriculture.

Governments in many countries have tried to maintain sustainable environment through policy tools such as compensatory direct payments and regulations.¹ In this viewpoint, the logic of the national development scheme needs to be modified to uphold human dignity. The desirable direction to uphold human dignity is to

maintain good quality of sound environments. The sustainability of environments requires harmony with development and preservation of natural resources. Preventing environment from deterioration requires overall efforts of all economic sectors such as individuals, government, and businesses.

The purpose of this paper is to depict the reason why the government has to support farmers' adoption of environment-friendly agriculture to protect environments and to ensure food safety for the general public.

II. The Philosophical Background of Environment-Friendly Agriculture: Environmental Ethics and Justice²

The ethical issue of environments are "different in the sense that, unlike policy issues in most other arenas, they involve the measurement or the manipulation of complicated ecosystems that are dynamic, interrelated to other systems, dependent upon projections well into the future, and subject to a large degree of scientific uncertainty" (Pops 1997). Environmental ethics may be morally-based (concerned with what is good) or rationally-based (concerned with what is reasonable and practical). On the moral ground, philosophers debate whether we simply owe responsibilities to other human beings, or whether we also do on their own moral claims (DesJardins 1993). The rational basis for the environmental ethic is the recognition of a broadly defined and conceived self-interest, which may be bolstered by but does not depend on moral reasoning. An appeal to reason is at the center of the rational approach: to the

¹ For example, five environmental programs by government supports have been carried out in Switzerland: semi-natural habitats on farmland, integrated production, free range program for livestock, organic farming, and in stalling systems for the well-being of animals. Among these programs, integrated production (low input farming) and organic program are associated with agricultural practice. In the Netherlands, the government is running a strong regulatory policy, the so called "input-output balance system" and also supports organic farming.

² Environmental ethics are a set of norms concerning how humans should behave toward the natural world (Pops 1997).

point, the argument that sound ecosystems will continue to serve mankind in perpetuity and are a necessity for serving all of the various values any of us might have-material, aesthetic and spiritual. Both moral and rational formulations of environmental ethics depend upon extending our thinking to take into account the needs of things that are beyond ourselves: mankind, the diversity of animal or plant lives, natural ecosystems, the land, and biotic mass.

Environmental justice is a key concept in discussing environmental ethics. It concerns the harmful effects of environmental hazards and especially attempts to address disparities in the distribution of these harmful effects and benefits. Environmental justice is more focused upon the realities of injustice and concerned with groups and individuals gaining a just share of scarce resources and burdens. As Pops states, "seeking justice leads us to consider four types of equity: (1) equity across nations (inter-nation equity), (2) equity across groups and individuals within a nation (intra-societal equity), (3) equity across generations (intergenerational equity), and (4) equity across species (inter-species equity)" (Pops 1997).

The difficulty in dealing with environmental problems lies in the fact that, even though everyone recognizes the importance of environmental problems, they are deeply associated with individual interests. In such a situation, the starting point of tackling environmental problems is to derive harmony between resource development and conservation. One way of approach to obtain harmony would be to pull out a necessary concession from both development and conservation or for governments to set regulations. Concession and regulation should have legitimacy which should be based on philosophical and/or ethical reasoning.

Environmental policies have the characteristic of socio-political arrangements between the absolute individual freedom of property rights and the limitation of individual property rights for the society as a whole. There are three philosophical thoughts related to this issue: utilitarianism, libertarianism, and liberalism. In the utilitarian viewpoint, the environmental policy that regulates or limits individual property rights cannot be accepted. Most attacks on utilitarianism as a standard of policy choice have been based on both its ethical and methodological grounds. It is incompatible with the idea of justice, that is, it ignores the procedure and is only concerned with the consequences

(Lee 1994, 23). Because of its aggregative character, utilitarianism is insensitive to the fate of the individuals and the next generations and has no use for the Lockean proviso³ (Cohen 1986, 133). Also, in the libertarian perspective, the notion of social production of social entitlement was not taken into account. Because the libertarian perspective views that individual rights are first priority and does not take into account the limitation of individual property rights for the future generations, it does not accept government intervention for any reason.

In the liberal point of view, we have to see the regulatory policy for environments as one of the welfare policies. The environment policy is to accomplish Rousseau's "general will."⁴ General will is a transposition of the most essential individual moral faculties to the realm of public experience (Shklar 1969, 184). According to Rousseau, human nature includes potentiality both for moral good and for moral evil (Lemos 1977, 30). The concept of general will is inserted as a constant criterion in environmental policies. General will is the will against political inequality. It pursues the interests of men in general against that particular will which leads men to seek privileges, especially by forming groups that aim at inequality. The reason why inequality occurs is not that people do not see a common interest, but that it is no match for those who want to deceive and mislead it (Rousseau 1968, 69-74).

Environmental ethics refer to a series of norms that are related with human being's action, especially human being's action to the nature. The feeling of environmental ethics starts with human being's responsibility for the nature. The ultimate goal of environmental ethics in agriculture is to let farmers become stewards of the nature.

Agriculture needs ethics of the environment because agriculture cannot continue indefinitely without environmental ethics, or at least it cannot continue happily. Even if agricultural ecosystems do not fail in the lifetime of our current generation of farmers, the political controversy created by conflict between agriculture and environment

³ Locke's proviso means "enough and as good left in common for others (Locke 1988, 288).

⁴ The concept of general will provided by Rousseau ties moral psychology and political theory together.

is gradually taking much of the joy out of farming.

Environmental ethics is broadly classified into anthropocentric and ecocentric ethics. As mentioned earlier, environmental ethics in agriculture belong to our choice. The view of anthropocentric ethics suggests that we have to develop all possible agricultural lands in order to solve mankind's food problem. On the other hand, the view of ecocentric ethics indicates that environment in itself has the utmost value. Therefore, we have to keep the nature as a natural status (grasslands and forests in the marginal agricultural lands) not to be developed.

One of the alternative of ecocentric and anthropocentric ethics theories is the concept of sustainability which can be applied to both the whole environmental system and individual interests (Thompson 1995). Agricultural sustainability stresses the necessity of the development of environment-friendly agriculture which satisfies both the necessity of farming and environment protection enabling the future generations to use the agricultural resources. Sustainability in agriculture restores the spirit of soils. Because the deterioration of water and soil quality deprives the means of lives of the next generations, environment-friendly agriculture is necessary in order to keep fairness between the present generation and next generations. The concept of sustainability in agriculture guarantees the next generations' farming activities. It is satisfied with the consumers' necessity for safe foods which are organically produced. It also includes preservation of the communities. The environment-friendly farming method is more difficult than the conventional one because it needs more inputs, especially labor force for making organic fertilizers and conducting pest control.

The government can adopt either regulatory policies limiting farmers to utilize their property rights or support farmers to introduce environmental-friendly farming methods. In terms of political feasibility and philosophical reasoning, government support like direct payment is more desirable than regulations because government support is a tool of inducement that farmers can practice environmental-friendly farming voluntarily without political burdens on the government.

III. Practical Reason for Government Support: Necessities of Environment-Friendly Agriculture in Korea

Although environmental issues cannot be free from international characteristics, this paper concentrates on the discussions regarding intra-societal equity because governmental response to the environmental issues is related to the distribution of benefits and burdens for protecting the environment. Water and soil pollution belong to the first generation environmental problems.⁵ Because the Korean government just recently started to be concerned with environmental consequences in the agricultural sector, its policy responses to the environmental problems began with policy decisions driven by the issue network claimed by ecologists, and the value of environmental preservation recognized by the general public. Also, it has been driven by a recognition that the competitiveness in the agricultural sector can be accomplished by introduction of the organic and/or low input farming methods. Under the World Trade Organization system, governments are limited in product-specific domestic support. Excluded from the domestic support reduction commitments are product neutral income subsidies, disaster payment, early retirement support, less favored area support, and environmental conservation support (Seoh 1996, 12). According to the UR agreement Annex 2 article 12, "eligibility for such payments shall be determined as part of a clearly-defined government environmental or conservation programme and be dependent on the fulfillment of specific conditions under the government programme, including conditions related to production methods or inputs" (Korea Rural Economic Institute 1994), each government can support farmers for environmental protection without violating the agreement. Governments should play policy steering roles, in compliance with the international agreements such as UR and the WTO.

⁵ The first generation environmental problem includes pollution of water, air, and soil by industrial activities associated with poverty and underdevelopment. The second generation environmental problems include more global issues such as acid rain, depletion of stratospheric ozone, global warming, deforestation and desertification, preservation of biodiversity, international traffic in toxic and dangerous products and wastes.

The legitimacy of practicing environment-friendly agriculture has to be based on the consumers' needs and the preferences of the general public.

1. Increase in the Preference for Food Safety

The preferences for food safety have domestically and internationally increased. One of the international movement about food safety is to establish the standard of foods ordained by the Codex Alimentarius Commission. According to the provisions of the Codex, only foods organically produced may be the objects of international trades. In regard to food safety, organic farming method is not the only one fulfilling food safety. Here, more broad environmental-friendly farming methods are included such as low input farming and natural farming.

From the international point of view, the competitiveness in agricultural crops can be accomplished by the production with the adoption of environment-friendly farming methods. Especially, the government cannot use visible tools to protect domestic agriculture such as the tariff system and price supports. Domestically, many consumers want safe food produced organically, even if they are to pay some premium. The result of the survey showed the evidence in that 69.4 percent of 314 interviewees were willing to pay higher price on the unpolluted food products (Seoh 1996, 154).

The government should support the farmers to cope with the international circumstances and domestic customers' needs. The reason why government supports is necessary is because farmers who introduce environment-friendly farming are faced with the loss of products. Without government's compensation, many farmers do not adopt environment-friendly farming methods.

2. General Public's Desire for Living Environment Protection

The quality of the resource of tap water and underground water have been deteriorated. Until now, sewage, industrial wastes, and livestock wastes have been considered as the major sources of pollution. According to a research outcome, the pollution in Paldang tap water zone which is designated as a source of tap water for metropolitan residents is resulted from 40 percent of industrial wastes, 35 percent

of livestock wastes, and 24 percent of sewage (Hwang et al. 1997, 13). The pollution having resulted from the agricultural practices have been neglected. As the general public is concerned with pollution, they are interested in agricultural practices. According to the results of the survey,⁶ fifty six percent of the total interviewees are willing to pay more water charge and entrance fee for supporting farmers who reduce the use of chemical fertilizers and pesticides.

In order to reduce pollution problem, the government should take some actions for reducing pollution resulting from agricultural practices. One of the ways is for the government to lead farmers to practice environment-friendly farming via direct payment.

3. Overuse of Chemical Fertilizers and Pesticides

As the agricultural product practices have been more intensified and production has increased the overuse of chemical fertilizers and pesticides harms the food safety and pollutes water and soil. In order to meet consumers' needs, farmers should apply for low input farming or organic farming methods. Farmers have to change their farming practice from conventional one to low input one. The beginning stage of the introduction of low input farming methods inevitably results in the decrease of productivity and, even, although not always, low income. The government has to set up the support policy for compensating farmers' income. The actual use of chemicals in Korea is much more than in other countries. As Table 1 shows, the use of chemical fertilizers in Korea is very high as 400 kg/10a, compared to 94 kg/10a for the U.S.A, 223 kg/10a for Israel, and 99 kg/10a of the average of the world. However, it is lower than Japan and New Zealand.⁷

In order to reduce the use of chemical fertilizers, the recommended amount of fertilizers by the type of crops, which is the amount necessary for crop growth, should be determined. The input-output balance system that uses just the right quantity of fertilizers

⁶ The survey was conducted in 1997 by 218 interviewees including beneficiary farmers, general public, and local public officials related to the agricultural policies (Lee 1998, 176-177).

⁷ Recent aggregate data is not available. However, the use of chemical fertilizers of major countries have not been changed so much (Tables A1-A5 in appendix).

necessary for crops' growth is applied in the Netherlands and Switzerland. This system is a policy device to reduce the use of fertilizers. Especially, phosphate clings to the soil and runs through the river with soils and deeply influences the quality of water.

Table 2 shows the actual quantity of fertilizers used in conventional farming and the optimum quantity of fertilizers for use in Korea. In general crops, only nitrate is overused by 38 percent. On the other hand, for vegetables, nitrogen, phosphorus, and potassium are very much used by 40 percent, 138 percent, and 53 percent, respectively. Once we reduce the quantity of fertilizers by the standard, the reduction of pollution will decrease by 33.9 percent for nitrate, 10.3 percent for phosphate, and 12.5 percent for potassium (Tables 3, 4, and 5).

TABLE 1 The Use of Chemical Fertilizers in Major Countries

Unit: kg/10a

	World Average	U.S.A	Israel	Korea	Japan	New Zealand
Quantity of use	99	94	223	400	415	732

Source: *Annual Report of Fertilizers, 1993*.

TABLE 2 The Quantity of Fertilizer Used in Conventional Farming and the Optimum Quantity of Fertilizers for Use in Korea

Unit: kg/ha

	General Crops (8 crops)			Vegetables (15 items)		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Chemical fertilizers	105	86	86	296	179	222
Animal manure fertilizers	3	3	2	58	78	42
Total	108	89	88	354	257	264
Standard of fertilizer use	78	84	89	253	108	172
Ratio of actual use to the optimum quantity	1.38	1.06	0.99	1.40	2.38	1.53

Note: The survey data of 13,000 farmers, 1993.
Source: RDA (1993).

TABLE 3 Nitrogen Used by Crops* and Environmental Effect
Unit: kg/10a

	Quantity used	Quantity ratio of nitrogen absorbed by crop (%)	Quantity of environmental pollution
Quantity used by farmers	15.9	4.1 (26.0)	11.8
Optimum quantity	11.0	3.2 (29.0)	7.8

* eight crops and fifteen vegetables are averaged.
Source: RDA (1997).

TABLE 4 Phosphorus Used by Crops and Environmental Effect
Unit: kg/10a

	Quantity used	Quantity ratio of phosphate absorbed by crop (%)	Quantity of environmental pollution
Quantity used by farmers	7.8	1.0 (13.4)	6.8
Optimum quantity	7.0	0.9 (13.4)	6.1

Source: RDA (1997).

TABLE 5 Potassium Used by Crops and Environmental Effect
Unit: kg/10a, %

	Quantity used	Quantity ratio of potassium absorbed by crop (%)	Quantity of environmental pollution
Quantity used by farmers	9.2	2.8 (30.5)	6.4
Optimum quantity	8.0	2.4 (30.5)	5.6

Source: RDA (1997).

In general, there are differences between the chemical fertilizers and organic fertilizers. As Table 6 shows, the average ratio of crop's absorption is different from the types of nutrients and the types of fertilizers.

The quantity of pesticides used in Korea is shown in Table 7. The quantity of pesticides actually used had gradually increased from 3.8 kg/ha in 1975 to 14.0 kg/ha in 1992 and after 1992 the quantity of pesticides have gradually decreased by the range from 11.5 kg/ha to 11.8 kg/ha. It is generally inferred that some portion of pesticides, from 30 percent to 60 percent, is flowed into the environment.

TABLE 6 The Ratio of Crop's Absorption by the Types and Ingredients of Fertilizers

	Unit: %		
	Nitrogen	Phosphorus	Potassium
Chemical fertilizers	30-60	5-25	40-60
Organic fertilizers	13-55	18-20	50

Source: Lee (1998, 23) recited from the data calculated by the RDA (1997).

TABLE 7 Changes of the Quantity in the Use of Pesticides

	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997
Total quantity (1,000 tons)	8.6	16.1	18.2	26.6	28.0	28.9	26.8	25.7	26.7	24.6	24.8
Quantity of use (kg/ha)	3.8	7.3	8.5	12.6	13.7	14.0	13.1	12.6	13.4	11.5	11.8

Note: The Quantity of use = Total quantity/Total lands.

Source: Ministry of Agriculture and Forestry, *Annual Statistics of Agriculture and Fishery*.

4. Lack in the Popularization of Environment-Friendly Agriculture and Government Support System

Environment-friendly agriculture was not started by government's comprehensive plans in the beginning, but by individuals and organizations carrying out organic and natural farming. Because various individuals or organizations practice environment-friendly agriculture, any integrated farming method, especially technology, does not exist. Unlike European countries, the Korean government does not support farmers practicing environment-friendly agriculture through a direct payment policy. However, organic farming and low-input farming have increased. Nine thousand farm households and about 7.3 thousand hectares are cultivated by environment-friendly agriculture (see Table 8). Because the government did not provide the concrete goal of the environmental-agricultural policy, various policies or programs have been implemented. As a result of this, a systematic relation among those policies lacks relatedness (Seoh 1998).

Government support policies are focused on agricultural materials and facilities, and technological development policy, one of the most important policies for environment-friendly agriculture, have been lacked. One of the most serious problems in the popularization of environment-friendly agriculture lies in the insecurity of farmer's income. There is no policy tool to compensate the income losses of farmers like compensations of the income direct payment scheme. When farmers adopt environment-friendly farming methods, their

TABLE 8 The Status of Environment-friendly Agriculture by Farming Methods

Unit: farms, ha

Organic Farming		Farming without Pesticide		Low-input Farming		Total	
No. of households	Acreage	No. of households	Acreage	No. of households	Acreage	No. of households	Acreage
1,313	1,080	1,558	1,268	6,231	4,967	9,132	7,314

Source: Survey data conducted by Rural Development Administration & National Agricultural Cooperative Federation. 1997.

income is, in aggregate, decreased by 9 percent in case of rice until they are settled in the organic farming (see Table 9). After adapting to organic farming there is no income loss. Therefore, the government should support for the farmers' income losses during a transitional period from conventional to organic farming.

There are several policies propelled by government's efforts in order to induce adoption of environment-friendly agriculture: a support project to lead farmers to high quality agricultural products for mid and small-scaled farmers; the project of making fertilizers with livestock manure; and the establishment project for the area of environment-friendly agriculture. Various programs may decrease their effectiveness due to an overlap and redundancy among related programs. Therefore, a systematic and aggregate policy like direct payment to effectively for achieving environment-friendly agriculture is needed.

TABLE 9 Comparison of Income and Costs in Farming Methods (Rice)

Unit: 1,000 won/10a

	Farming Methods		
	Organic farming	Low-input farming	Conventional farming
Total revenue (A)	764.1	720.1	710.6
Production (kg/10a)	315.0	350.0	442.7
Price (won/kg)	2,430	2,060	1,605
Expenses (B)	359.6	360.5	256.9
Seed	11.5	11.4	8.6
Chemical fertilizers	0	6.2	10.9
Organic fertilizers	82.3	73.6	3.6
Pesticides	6.9	12.7	18.9
Heating, materials, repairs	8.9	8.9	8.9
Self-labor	127.3	158.6	104.5
Wages + Machines	122.7	89.1	101.5
Management costs (C)	190.1	193.3	131.4
Net Income (A-B)	404.5	359.6	453.8
Income (A-C)	574.0	526.8	579.2

Data: Lee et al. (1998).

IV. Pros and Cons for Supporting Environment-friendly Agriculture

Agriculture has dual effects on the environment: positive and negative effects. The several effects such as flood control, soil conservation, ground water retention, ground subsidence prevention, air purification, purification of wastes, ecological conservation, education of the nature, the provision of natural landscape and recreation spaces are considered as positive effects of agriculture. Table 10 shows the results of studies about the multiple public functions of agriculture. The results of studies conducted in Korea are different, ranging from 2,580 thousand won per hectare to 9,990 thousand won. On the other hand, the multiple public function of agriculture in Japan was estimated as 17,200 thousand won per hectare. Even though the results are different according to studies, we cannot ignore the public functions of agriculture. Agriculture cannot be merely explained by economic aspects, but by societal aspects.

In order to keep these public functions of agriculture, sustainable agriculture should be prevailed and the government has to

TABLE 10 Comparison of Agriculture's Multiple Public Functions

Unit: 10 thousand won/ha

Multiple Functions of Agriculture	KREI (1995) ¹⁾		Eom et al. (1993) ²⁾		Japan (1997) ³⁾
	Minimum	Maximum	Minimum	Maximum	
Controlling flood	10	79	118	118	1,247
Keeping water	45	76	-	-	364
Preventing soil erosion	4	8	5	15	23
Purifying soil	3	3	-	-	2
Purifying water	38	95	443	443	-
Purifying air	15	41	30	30	84
Producing oxygen	143	315	393	393	-
Total	258	617	774	999	1,720

1) Oh et al. (1995).

2) Eom (1993).

3) Ministry of Agriculture, Forestry, and Fishery (1997).

4) Exchange rate: 100yen=1,368.84.

Source: Oh et al. (1998, 14).

support agriculture to be sustainable.

There are pros and cons on the issue of government's aids to organic and low input farming's environmental effects. Many discussions about the pros have been mentioned previously. The rationale opposing government's aids to environment-friendly agriculture is based on two facts. One is that organic farming also pollutes environments in terms of nitrate problem. Second reasoning is that since agricultural products produced by organic farming is fully compensated in the market, there is no reason for the government to support farmers practicing organic farming. In order to be environment-friendly agriculture, some conditions should be met such as the introduction of rotation system, legume cultivation in cropping system, cultivation of green manure, resistant varieties, appropriate application of organic fertilizers, and closed recycling system (Lee et al. 1998, 18).

The first reason for opposition is centered on the problem of nitrate. The optimum quantity of fertilizers (organic or chemical) and pesticides contributes to the reduction of pollution caused by farming.

V. Conclusions

As the environmental pollution issues are prevalent, policy-makers and scholars have been concerned with non-point pollution sources. The most typical non-point pollution source is an agricultural practice through the extreme use of chemical fertilizers and pesticides. The agricultural effects on the environment have been surfaced and many people have paid attention to the agricultural effects on the environment. Water and soil are vital resources to human lives. Polluted water and soil threatens human welfare. Therefore, agriculture needs ethics of the environment. Agriculture cannot be sustained without environmental ethics. Environmental ethic is classified into two aspects: one is ecocentric and the other is anthropocentric. But in agriculture we cannot choose one exclusively. We need an alternative. One of the alternative of ecocentric and anthropocentric ethics theories is the concept of sustainability. Governments try to maintain sustainable environment through the policy tools of aids for environment-friendly agriculture and

regulation for environmental protection

In regard to the fact that handling environmental problems are closely associated with individual interests, philosophical concepts backing up the government support for environmental protection is fundamental. Utilitarian and libertarian thoughts cannot be a background of government support for environmental protection because utilitarianism has aggregate characteristics and because libertarianism asks the government not to limit individual rights. Only liberalism leaves room for government's positive actions, including the regulations of individual rights and the unequal distribution of government support, in order to achieve social justice.

The rationale of government's support for the development of environment-friendly agriculture in Korea is to meet the general public's desire for food safety and the protection of living environment, to reduce the use of agricultural chemicals to protect water quality and farming soils, and to rearrange government policies supporting environment-friendly agriculture to be sustainable.

APPENDIX

Table A1 The Changes in the Use of Fertilizers in the U.S.

Unit: 1,000 tons

Fertilizers	1994	1995	1996
Nitrogen	11,469	10,631	11,110
Phosphorus	4,102	4,014	4,088
Potassium	4,779	4,652	4,915

Source: *Annual Report of Fertilizers, 1998.*

Table A2 The Changes in the Use of Fertilizers in Israel

Unit: 1,000 tons

Fertilizers	1994	1995	1996
Nitrogen	50	50	50
Phosphorus	22	22	22
Potassium	32	32	32

Source: *Annual Report of Fertilizers, 1998.*

Table A3 The Changes in the Use of Fertilizers in Korea

Unit: 1,000 tons

Fertilizers	1994	1995	1996
Nitrogen	477	475	478
Phosphorus	227	222	227
Potassium	270	263	274

Source: *Annual Report of Fertilizers, 1998.*

Table A4 The Changes in the Use of Fertilizers in Japan

Unit: 1,000 tons

Fertilizers	1994	1995	1996
Nitrogen	477	475	478
Phosphorus	227	222	227
Potassium	270	263	274

Source: *Annual Report of Fertilizers, 1998.*

Table A5 The Changes in the Use of Fertilizers in New Zealand

Unit: 1,000 tons

Fertilizers	1994	1995	1996
Nitrogen	103	130	140
Phosphorus	379	386	381
Potassium	134	135	139

Source: *Annual Report of Fertilizers, 1998.*

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