
**Newly Developed Technologies and Innovations
on Urban and Peri-Urban Agriculture in Korea**

JI-HYE MOON

Newly Developed Technologies and Innovations on Urban and Peri-Urban Agriculture in Korea

Ji-Hye Moon

ABSTRACT

Korea has experienced rapid urbanization during the last forty years. Currently, the urban population comprises up to 80% of its total population. This rapid expansion of cities has brought about lots of social and ecological problems, as well. In this regard, urban and peri-urban agriculture has recently attracted lots of attention from rural as well as urban society due to its benefits. This paper introduces the current situation and issues in Korea's urban and peri-urban agriculture, technologies and innovations which are newly developed, and policies to address concerns of urban agriculture and to strengthen the urban –rural links.

Keywords: *urban and peri-urban agriculture, ecology, sustainability, life quality*

INTRODUCTION

We have been witnessing rapid expansion of cities globally, in terms of area and population, since the industrial revolution in the 18th century. In Korea, urban population has been increasing very rapidly. As of 2000, its urban population comprises more than 80% of its total population, (Table 1), which is more than the world's average. The Seoul city is the center of Korea's political, economic, cultural, financial, and social activities. More than 23 million people, about half of the total population of Korea is living in the Seoul metropolitan area. In 2002, approximately 561 city areas exist in Korea. These areas constitute about 14.9% of the total area and the population expands to 40 million, which is about 87.1% of the total population of Korea. Lots of problems have been associated with urbanization in Korea. Among these are soaring up of land prices, traffic congestion, increasing unemployment rate and environmental degradation.

Expansion of urban population has also led to lack of appropriate level of housing units. To address this housing problem, large scale housing construction projects were launched in areas near the cities. As a result, urban and peri-urban agricultural area shrank leading to the weakening of agricultural activities. The number of farmers providing fresh farm products to cities and communities likewise, shrank significantly.

The urban and peri-urban agriculture is therefore expected to play key role to solve various problems brought by urbanization.

Table 1. Trend of urbanization in Korea and around the world (Percentage)

Countries	1950	1960	1970	1980	1990	2000
Korea	21.4	27.7	40.7	56.9	72.1	88.3
Developing	16.9	22.2	24.7	28.8	34.3	40.3
Developed	54.3	60.6	66.6	70.2	72.7	75.8
World's average	29.3	34.2	36.6	39.4	43.1	47.6

Source: United Nations 2002, Ministry of Construction and Transportation 2002

Perspective on agriculture

More than 80% of Koreans are living in the cities. For them, agriculture simply means a traditional industry that provides food. However, Koreans believe that it is high time to look at agriculture in a totally different perspective, by considering its significant role and interplay with the environment and its functions in the context of socio-cultural aspects. Gradually, Koreans have begun to accept the idea of multi-functionality of agriculture. The values we can draw from agricultural activities seem unlimited, but we can establish the desirable relationships and reconcile agricultural activities with our lives in the urban area.

Many countries have already recognized these multi-functional roles of agriculture and they have been implementing relevant policies. In Berlin, Germany, around 50,000 citizens lent some lands for agricultural activities. In Cuba, where more than 80% of its population lives in urban areas, urban agriculture has been successful. This country is now gradually on its way to food security after the collapse of the Cold War.

Table 2. Perspective on agriculture

Stages	Perspectives on agriculture
First stage	<ul style="list-style-type: none"> ○ food security <ul style="list-style-type: none"> - stable and abundant food supply, all year round - nutritional values
Second stage	<ul style="list-style-type: none"> ○ Environmental functions <ul style="list-style-type: none"> - recycling of resources - prevention of noise, heat, and pollution - air refreshing, emission of fragrance (terpene, phytoncide) - flood prevention and water storage
Third stage	<ul style="list-style-type: none"> ○ Quality of life and well-being <ul style="list-style-type: none"> - aesthetic benefits - well-balanced relationship through people-plant interaction - improving people’s health condition

Definition of urban agriculture

Although “urban agriculture” is an unfamiliar word in Korea, we can observe some initial moves toward urban agriculture. Agricultural activities are seen in some unused plots, veranda of apartment complex, or rooftops. Recently, the city government of Seoul revived the once disappeared stream called Chunggaechun. This stream is said to help out in lowering hot temperature in central Seoul. Likewise, the city officials are also taking innovative measures, including awareness campaigns on tree planting and the hazards of air pollution.

The definition of urban agriculture varies among scholars. There are more than 70 definitions. However, it is difficult to find an appropriate definition for urban agriculture because some definitions are based on usage and the background or origin of the users and its applicability.

The same situation exists in Korea. There are various definitions among scholars and groups engaged in urban agricultural activities. Oh and Choi (2006), for instance, defined urban agriculture as agricultural activities that help enhance the value and quality of life in terms of economic, socio-cultural aspects by growing plants and animals using various spaces in urban areas. Their definition also includes activities of

the urban population like visit to rural areas, experience rural life, and enhance the quality of life of both rural and urban population.

In this case, urban agriculture is not merely growing plants and animals in urban areas but also actively and effectively taking advantage of rural resources. Therefore, their definition is collective of the 1st stage, 2nd stage and 3rd stage of the perspectives on agriculture. Urban agriculture is not confined to activities beneficial only to urban populations. It expands to a higher level to include the whole nation and further, to the global dimension.

Table 3 shows the strengths, opportunities, weaknesses and threats in pursuing urban agricultural policy. In the 21st century, there should be adequate level of awareness and other considerations in urban agriculture.

Table 3. SWOT of urban agriculture

Strengths	<ul style="list-style-type: none"> ○ importance of agriculture as basic industry for food supply ○ manpower shortage in the rural areas ○ increase of surplus manpower in urban areas
Weaknesses	<ul style="list-style-type: none"> ○ recognition of agriculture as decaying industry ○ lack of research and development for urban agriculture program ○ lack of urban spaces for agriculture
Opportunities	<ul style="list-style-type: none"> ○ agricultural experience for those middle age and above ○ growing demand for safe food ○ introduction of 5-day work week
Threats	<ul style="list-style-type: none"> ○ lack of information and opportunity about urban agriculture ○ lack of research data related to urban agriculture ○ agricultural policies, laws, and regulations affecting farmers in the rural areas

Source: Oh and Choi 2006

TYPES OF URBAN AGRICULTURE

Urban agriculture using urban spaces

Different kinds of urban spaces can be tapped for urban agricultural activities. These are schools, parks, rooftops, roadsides, apartment complex, terminals, movie theaters, libraries, and partitions in department stores. We can also include, among

others, activities like growing of animals and fishes and holding or sponsoring events for promoting urban agriculture.

Roof greening

In Korea, we are witnessing the ever-shrinking green areas in cities and ever-expanding areas for buildings. Due to high prices of lands, it is also difficult to get enough green areas for urban agricultural activities. In this case, roof greening can also be a viable option for urban agricultural activities.

In Seoul city, the size of roof area that can be used for greening is about 235 square kilometers (Park 2003). This size comprises about 70% of the total area of Seoul. Recently, the Korean government has actively promoted the use of rooftop for greening activities by enacting a regulation on green roof. Likewise, Seoul city has also been promoting roof greening by providing subsidies and extension of green roof technology.

It is said that the green roof help alleviate heat island effect, minimize noise, purify the air, maintain moisture, and prolong building's life span, among others. Roof greening can be one of the most innovative and quickly adaptable technologies to urban areas (Dunnet and Kingsbury 2004).

In technical terms, various research activities have been unfolded for roof greening. Researches on soil and plants for green roof are underway, considering the climate characteristics of Korea.

In-door agricultural activities

We can see numerous high-rise apartment complexes in Korea and due to the rapid urbanization, this form of expansion is an inevitable housing option for the country.

In 2003, more than 50% of Koreans lived in one of these high-rise apartments and more than 80% of Koreans are indicating their preference for high-rise apartments. Thus, it is assumed that high-rise apartments will be maintained as the main option in Korea.

Moreover, in-door agriculture is another important form of urban agricultural activities. The first consideration here is the environmental characteristics of indoors,

in particular, of high-rise apartments, such as amount of light, and degree of heat and humidity. Table 4 below showed the categories for indoor ornamental plants.

Table 4. Categories of ornamental plants for in-door cultivation

Categories	Plants
Good indoor growth	<i>Anthricum andraeanum</i> , <i>Euphorbia milli</i> var. <i>splendens</i> , <i>Epipremnum aureum</i> , <i>Pachira aquarica</i> , <i>Rhapis excelsa</i> , <i>Ficus benjamina</i> , <i>Spathiphyllum</i> spp., <i>Sansevieria trifasciata</i> , <i>Cymbidium</i> spp., <i>Phalaenopsis</i> spp., <i>Neofinetia falcata</i> , <i>Aerides japonicum</i> , <i>Clivia miniata</i> , <i>Polygonatum odoratum</i> , <i>Schlumbergera truncata</i> , <i>Dracaena</i> spp., <i>Monstera deliciosa</i> , <i>Araucaria heterophylla</i> , <i>Asparagus setaceus</i> , <i>Aglaonema</i> spp., <i>Chamaedorea elegans</i> , <i>Hedera helix</i> , <i>Syngonium podophyllum</i> cv. <i>Pixie</i> , <i>Zebrina pendula</i> , <i>Philodendron</i> cv. <i>Xanadu</i> , <i>Saxifraga stolonifera</i> , <i>Ligularia fischeri</i> , <i>Ceropegia woodii</i> , <i>Syneilsis palmata</i>
Easily attacked by scale	<i>Brunfelsia australis</i> , <i>Fuchsia</i> × <i>hybrida</i> , <i>Adenium obesum</i> , <i>Chrysalidocarpus lutescens</i> , <i>Euphorbia pulcherrima</i> , <i>Aphelandra squarrosa</i> , <i>Camellia japonica</i>
Easily attacked by mite	<i>Crassula argentea</i> , <i>Ficus benjamina</i> , <i>Rhododendron</i> spp.
Easily attacked by aphid	<i>Capsicum annuum</i> , <i>Capsicum annuum</i> var. <i>abbreviatum</i> , <i>Bougainvillea glabra</i> , <i>Rosa rugosa</i> , <i>Prunus mume</i> , <i>Prusus tomentosa</i>
Off balanced	<i>Mirabilis jalapa</i> , <i>Begonia</i> × <i>hiemalis</i> , <i>Cycas revoluta</i>
Need managing techniques	<i>Ardisia pusilla</i> , <i>Ardisia japonica</i> , <i>Nanadina domestica</i> , <i>Adiantum raddianum</i> , <i>Scefflera arboricola</i> cv. <i>Hong Kong</i>

Source: Oh 2005

There are families growing vegetables indoors to educate children and to have fresh and safe vegetables. Technically, growing vegetables requires sufficient light, nutrition, and water than other indoor plants. Therefore, it is necessary to select vegetables for better indoor cultivation. Table 5 shows the categories of vegetables suitable for various light conditions. Also, it is important to develop adequate methods for growing plants indoors. Wick irrigation method was tested and proved to be good

for vegetable growing. Also, it proved to be manageable when combined with slow release fertilizer or nutrient solution (Moon 2005).

Table 5. Categories of vegetables suitable for various light conditions.

Shading (%)	Plants
70	Chinese chive, endive, garland chrysanthemum, lettuce, pak-choi, water dropwort
90	Chinese chive, endive, water dropwort

Source: Moon 2006

Some municipal governments in Korea are now promoting cultivation method using earthworms for indoor agricultural activities. Each household stores organic waste into a pot, where earthworms dissolve the waste to make the soil fertile for indoor cultivation. In addition, the Rural Development Administration (RDA) have conducted researches on air-purifying functions of various plants and shared them for better results.

Weekend farming

Weekend farming program is to experience being a farmer. In this program, urban citizens are assigned some plots, and they cultivate various vegetables and fruits for themselves. This program has become very popular in Korea.

In 1993, the National Agricultural Cooperative Federation (NACF) launched this program as a means of utilizing unused plots in rural areas and helping farming households get additional income. Currently, NACF has more than 500 weekend farms, and membership of more than 70,000. The local governments, agricultural technology and extension centers, and farms run this weekend farming. They rent small lots to the public annually and provide management services and education on growing vegetables and fruits. In some cases, seeds and fertilizers are provided free. The members sometimes hold bazaars to trade their crops. In between work, families also enjoy traditional farmers' music and folk games with other families. For several years now, weekend farms have been a new cultural trend, helping people become more aware of the importance of the earth, nature, the environment, life and health and the value of working together (Choi, 2001).

Urban agriculture using rural spaces

Green tourism in Korea was introduced in 1984 to increase farm income. With sustainable development as a global trend and the introduction of the 5-day work week in Korea, green tourism has recently drawn significant attention based on affluent rural resources. Green tourism continues to see market expansion despite the fact that they are still in their initial stages.

Moreover, the Ministry of Environment (ME), Ministry of Agriculture and Forestry (MAF), and the Ministry of Maritime Affairs and Fisheries (MOMAF), Korea Forest Service (KFS), and Rural Development Administration (RDA) have actively joined efforts in framing/tracking related policies and systems for these developments. Particularly, the MAF plans to increase the farm villages involved in farm-stay programs from 200 villages in 2005 to 687 villages by 2009. Also the 154 natural recreation forests are developed until 2009 from 94 in 2005 (MAF 2005).

Green tourism makes urban living enjoyable with wise use of their leisure time and unique experiences in the rural areas, forests, and seaside villages. It has effects on increased farm incomes, conservation of rural environment, and making intensive use of rural resources. Therefore, rural tourism brings effects in improving the welfare of both urban and rural people.

The promotion of rural tourism in Korea is carried out using different strategies such as education of green tour professionals (village leaders and field experts), establishment of institutional linkages between corporations in the cities and rural villages, and marketing promotion through exhibits, media broadcasts, and portal sites for green tourism. The site provides up to date information on rural tourism, weekend farms, and tourist lodging in rural areas.

Concerted efforts coupled with implementing regulations are aimed to revitalize the interchange between urban and rural community and to increase the capital investment to rural areas such as retirement farms, training facilities, “one company-one rural community” movement.

However, this development approach still needs enhancement due to scattered rural resources and the receptive capacity of rural villages is not sufficient to meet the urban dwellers’ demand. The use of resources should also be kept within a sustainable level allowed by the environment.

CONCLUSION

Korea's agriculture is facing stern challenges including aging farm population, decreasing farm land, and competition in the open markets brought about by globalization and urbanization. Otherwise, the life quality of urban area is not improving due to pollution, ecological degradation, and congestion. In this situation, urban agriculture can be a sound countermeasure and can address some of Korea's pressing urban problems. Therefore, urban agriculture is expected to benefit both urban and rural communities as a man-oriented, environment-friendly, sustainable and more focused on human well being.

Comment: proving

REFERENCES

- Choi. 2001. Weekend farming: The natural way to a healthy mind and body. Korea Now.
- Chung. 2004. Ornamental plants 600. Buminmunhwasa.
- Dunnet and Kingsbury. 2004. Planting green roofs and living walls. Timber Press.
- Kang et al., 2004. Key Issues for Performing Sustainable Tourism
- Ministry of Agriculture and Forestry. 2004. Special law on improving the quality of life for workers involved in agriculture, forestry, and fishery, and promoting regional development.
- Ministry of Construction and Transportation. 2002. Statistics an annual report.
- Moon et al., 2005. Development of vegetable cultivation technology for home gardening. National Horticultural Research Institute Report.
- Oh. 2005. Urban agriculture developed in harmonious relationship of plant, people and environment. Korean society for plants, people, and environment. 2005 Spring: 16-30
- Oh and Choi. 2006. Urban agriculture. Hakjisa.
- Park. 2003. Korea's green roof system. Green roof academy.
- United Nations. 2002. World urbanization prospects: The 2001 revision.