

## Summary of Evaluation Results

<b>1. Outline of the Project</b>		
<b>Country:</b> Kingdom of Bhutan		<b>Project Title:</b> Horticulture Research and Development Project (HRDP)
<b>Issue/Sector:</b> Agriculture and Rural Development		<b>Cooperation Scheme:</b> Technical Cooperation
<b>Division in Charge:</b> Team 3, Agriculture and Rural Development Group 2, Rural Development Department, JICA Headquarters		<b>Total Cost:</b> 337 million yen at the time of the Terminal Evaluation Study
<b>Period of Cooperation</b>	(R/D): March 16, 2010	<b>Partner Country’s Implementing Organization:</b> Renewable Natural Resources Research and Development Center (RNRRDC) Wengkhar, the Department of Agriculture (DoA) of the Ministry of Agriculture and Forests (MoAF)  <b>Cooperating Organization:</b> Dzongkhag (District) Agriculture Office {District Agriculture Officers, Gewog (County) Extension Agents}, National Seed Center (NSC), Regional Agricultural Marketing and Cooperatives Office (RAMCO)
	March 21, 2010 – March 20, 2015 (five years)	
<b>1-1 Background of the Project</b>		
<p>In Bhutan, about 70% of the population lives in rural areas, and most of the rural population is dependent on the agriculture sector accounting for 17% of GDP (2010), which is regarded as the principal source of livelihood in the 10th five-year plan (2008–2013). Because of the nature of subsistence farming with low productivity and small land holding, the food production in Bhutan does not meet the entire food demand of the country and the income of rural farming households remains at a low level. Under those circumstances, promotion of commercial agriculture plays an important role in agricultural development.</p> <p>JICA supported the Renewable Natural Resource Research Center East (subsequently renamed RNRRDC Wengkhar) through the dispatch of an individual expert from 2000 to 2004, focusing on the development of its organizational and technical capacities. Then JICA has carried out the AREP in cooperation with the RNRRC-East to improve the agricultural extension mechanism through strengthening the linkage between research and extension in Mongar <i>Dzongkhag</i> and Lhuntse <i>Dzongkhag</i>. The AREP has brought about the extension of improved varieties of horticulture crops and the improvement of their productivity and quality. In the AREP, farmers in the selected Gewogs of two <i>Dzongkhags</i> have been gradually motivated to take up cultivation of cash crops. However, the commercialization of agriculture has yet to be extended in the whole eastern region. Based on the above, the Royal Government of Bhutan (RGoB) requested the Government of Japan (GoJ) to implement the technical cooperation project for demonstrating outputs of the AREP in other eastern</p>		

Dzongkhags and promoting commercialization of horticulture to alleviate poverty in the eastern region.

## 1-2 Project Overview

The Horticulture Research and Development Project (hereinafter the “Project”) has provided the RNRDC Wengkharr with technical cooperation for identification of suitable crops and appropriate technologies, strengthening the training and extension system, and improving the provision mechanism of seeds and seedlings to enable farmers to practice appropriate technologies for commercialization of horticulture in the eastern region. The support for farmers’ groups for marketing was also added to the Project Design Matrix (PDM) at the time of the Mid-Term Review Study in October 2012.

The expected outcomes of the Project are presented below.

- (1) Overall Goal: Horticulture becomes more popular as a source of income in the target area.
- (2) Project Purpose: The trained and extended farmers practice appropriate technologies for commercialization of horticulture.

### (3) Outputs

Output 1	Horticulture farming practices and crops in the target area are identified according to production and market potential.
Output 2	Technical training system on horticulture is strengthened in RNRDC Wengkharr.
Output 3	The structure for providing seeds and seedlings is established in RNRDC Wengkharr, nursery farmers, seed growers and NSC Yangtse farm.
Output 4	Group for marketing is mobilized and/or formed in collaboration with RAMCO, Mongar.

### (4) Inputs

#### 【Japanese Side】

- Total cost: 337 million at the time of the Terminal Evaluation Study
- Long-term Expert: One expert for Chief Advisor/Horticulture and two (2) experts for Coordination/Farmers Organizations were dispatched. The total man-months were 107 at the time of the Terminal Evaluation Study.
- Short-term Expert: One expert for Training and Extension, one expert for Pest Control, and two (2) experts for Promotion of Horticulture Cultivation were dispatched. The total man-months were 27 as the time of the Terminal Evaluation Study.
- Cost of the operation in Bhutan: 30.2 million yen including salaries of drivers and seasonal farm laborers in the RNRDC Wengkharr, training costs including training in the third countries, and other expenses.
- Equipment: 46.7 million yen for two (2) vehicles, one excavator, and equipment and materials required for research and development and extension activities.
- Number of trainees received: 53 (14 for Training in Japan and 39 for the Third Country Training in Nepal)

#### 【Bhutanese Side】

- Counterparts (C/Ps): 21 people at the time of the Terminal Evaluation. Eleven (11) C/Ps were transferred or resigned from civil service.
- Cost borne by the Bhutanese Side: Nu. 64.4 million including the salaries of the C/Ps and farm laborers,

allowance and travel expenses of the C/Ps, training costs, equipment and tools for activities.

- Land and facilities: The office building and research farm provided by the RNRDC Wengkhar.

## 2. Evaluation Team

<b>Members of Evaluation Team</b>	Leader	Ms. Ayumu OHSHIMA	Director, South Asian Region, Rural Development Department, JICA
	Horticultural Research and Development	Dr. Azusa FUJIE	Applied Entomologist (Former Director General, Chiba Prefectural Agriculture and Forestry Research Center)
	Cooperation and Planning	Mr. Hiroyuki IKEDA	Deputy Assistant Director, South Asian Region, Rural Development Department, JICA
	Evaluation Analysis	Ms. Toshiko SHIMADA	Consultant, IC Net Limited
<b>Evaluation Period</b>	November 6–27, 2014	Type of Evaluation: Terminal Evaluation Study	

## 3. Results of Evaluation

### 3-1 Confirmation of Results

#### (1) Achievement of Outputs

##### **Output 1 has been on track, and is expected to be achieved by the end of the Project.**

Most of the activities under the Output 1 have made sound progress. The Project has already developed 12 extension and training manuals, and materials for extension agents and farmers, which are necessary for the implementation of activities, although the concrete target value of the Indicator 1-1 had not been set. The final version of the Project working document on crop suitability areas in the Project sites is expected to be published by the end of the Project. Considering the above, the Output 1 has been on track at the time of the Terminal Evaluation, and is expected to be completely achieved by the end of the Project.

The Project conducted on-station and on-farm evaluation of vegetables and fruits for technology development based on the review of the experiences of the AREP and other relevant documents. The major research outputs are as follows: 1) Introduced three fruit varieties and 38 vegetable varieties; 2) Released two varieties of pear and one variety of plum for cultivation in mid-temperate regions; 3) Developed two lines of pummelo by selection from Thai varieties; 4) Identified that pummelo for tolerance to citrus greening disease based on the on-farm evaluation in the affected sites; and 5) Proposed one variety each of local mandarin line and persimmon for release.

Damages to fruits, particularly citrus and pear caused by fruit flies, have been a major problem for farmers in the eastern region. Since the research and study on fruit fly problems had not been undertaken because of the lack of human resources and the technical difficulties in Bhutan, the Project took initiative in undertaking the basic studies on fruit flies with the technical support of the short-term expert on pest control.

##### **Output 2 has been already achieved because all the three indicators have been achieved.**

The activities of the Output 2 have been undertaken as planned. The Project developed the technical training and extension system on horticulture for various types of farmers, namely 1) mixed orchard farmers, 2) focused village farmers for citrus, pear/persimmon and onion, 3) private nursery growers, and 4) vegetable seed growers.

The Project has so far trained 508 farmers. According to the Impact Assessment conducted by the Project, 99% of the trained farmers (158 out of 159 respondents) noted that they applied key training contents in their fields. This exceeded 90% of the target value of the Indicator 2-1. Thus the Indicator 2-1 has been already achieved. The Project has organized the three-day technical training for extension agents in the six target Dzongkhags every year to enhance their technical capacity on horticulture. Sixty (60) extension agents from the eastern region and other regions have so far been trained. Overall, 96.8% (30 out of 31 respondents) of the trained extension agents replied in the Impact Assessment that they applied skills acquired during the training, which exceeded 90% of the target value of the Indicator 2-2. Therefore, the Indicator 2-2 has been already achieved. Regarding the Indicator 2-3, 167 farmers in the Impact Assessment highly assessed the content, practical exercise and overall coordination. As a whole, 99.4% of them described that the training was very good or good. Because this exceeded the target value, i.e., 80% stated in the PDM, the Indicator 2-3 has been achieved. Based on the assessment above, the Output 2 has been already achieved.

**Output 3 has been on track, and already achieved.**

The activities of the Output 3 have been implemented as scheduled. The Project has trained 10 private nursery growers and 14 vegetable seed growers. The RNRDC Wengkhar has produced seeds and seedlings for implementing the research and outreach activities including training and extension with the technical support of the Project. On average, 7,877 fruit plants are produced by the RNRDC Wengkhar and 307 kg of vegetable seeds are produced by the RNRDC Wengkhar and seed growers. Thus the Project has already exceeded the target value of the Indicator 3-1, i.e., 4,500 fruit plants and 200 kg of vegetable seeds. To ensure the quality of these fruit plants and seeds, the seed growers and the private nursery growers were registered with the Bhutan Agriculture and Food Regulatory Authority (BAFRA). The Project provided seeds, seedlings and tools and equipment for trained farmers when the training was completed. The vegetable seed growers were provided with basic seeds, bird nets, watering cans, irrigation pipes, polythene sheets, fertilizers and pesticides and seed packaging materials. The fruit orchard farmers and private nursery growers were provided with secateurs, pruning saws, seeds, seedlings and scions. The Indicator 3-2 of distribution of basic materials has been already achieved. The Project has provided various types of assistance for Regional NSC Yangtse to revive its functions including development of farmland, construction of internal farm road and irrigation facilities, provision of training for its staff members and laborers, and provision of seeds, seedlings and materials. After its revival, the NSC Yangtse produced 362 kg of released varieties of vegetables and 10,000 passion fruit plants by the time of the Terminal Evaluation. Thus the Indicator 3-3 has been achieved. Considering the above, the Output 3 has been already achieved.

**Output 4 has been already achieved because the indicator exceeded its target value.**

The Project encouraged the trained farmers to cultivate various vegetables as intercrops by providing seeds because fruit plants usually take four to five years to start commercial fruiting. The Project has supported farmers' groups in marketing intercropped vegetables to schools in cooperation with the RAMCO. The Impact Assessment shows that 96.3% of the trained farmers who belong to farmers' groups started to engage in group marketing. Because this exceeded 50% of the target value of the Indicator 4-1, the Output 4 has been achieved at the time of the Terminal Evaluation Study. Related to the support for group marketing, the Project has helped construction of a roadside market outlet as One Stop Farmers Shop on the Trashigang-Samdrupjongkhar Highway for the vegetable production group of Orong. At the time of the Terminal Evaluation, the trained farmers have sold their vegetables as a group or an individual to nearby or distant markets, and local and

outside vegetable vendors who come to their villages to buy them.

**(2) Achievement of the Project Purpose: The Project Purpose has been mostly achieved.**

As for the Indicator 1, a total of 2,166 acres was estimated to be under horticulture fruits and vegetables based on the results of the Impact Assessment. Regarding 5,000 acres set as the target value of the Indicator 1, the calculation seemed to be made based on the unfeasible scenario. Because setting the target value of the Indicator 1 was found unrealistic, the Evaluation Team was unable to assess the achievement of the Indicator 1. In general, 86.2% of the trained farmers have extended their knowledge to other farmers. On average, each trained farmer has shared his or her knowledge with 6.4 other farmers. Because this exceeded 75% of the target value of the Indicator 2, the Indicator 2 has been already achieved. According to the results of the Impact Assessment, the overall percentage of the trained and extended farmers who started to sell horticulture produce was 63.9, which exceeded 50% of the target value of the Indicator 3. The overall level of farmers' technical capacity is not very high. However, the training and extension approaches developed by the Project enabled and ensured the farmers to apply the acquired knowledge and skills on horticulture cultivation. The remaining training and extension activities are expected to be completed by the end of the Project. Given the above, the Project Purpose has been mostly achieved.

**3-2 Summary of Evaluation Results**

**(1) Relevance: Very High**

The MoAF has accelerated horticulture development and cash crop production as effective means of contributing to rural development and poverty alleviation in the 10th FYP (2008–2013). In the 11th FYP (2013–2018), the MoAF has focused on transition from subsistence to commercial agriculture, and targeted and commodity focused approach such as “one Gewog, three products” as key strategies for enhancing agricultural productivity and income from agriculture. The Project is consistent with these two FYPs because it has identified and promoted crop suitability areas and appropriate technologies for commercialization of horticulture.

The RNRDC Wengkhar has played a key role in research and development of technologies in horticulture, and has had to promote outreach activities for farmers in the eastern region especially after development was included into their mandate in 2009. The Project has responded to such needs of the RNRDC Wengkhar by establishing the effective training and extension system and identifying and extending the appropriate technologies to farmers. Most of the C/Ps and extension agents had had fewer opportunities to gain practical knowledge and skills because the conventional education and training system has focused more on theory than practice. In spite of a number of projects and programs supported by the donor agencies, the number of technical cooperation projects is still limited. In this respect, the Project has met the needs of C/Ps and extension agents by providing adequate opportunities to obtain and upgrade practical knowledge and skills through hands-on training and technical transfer from the Japanese experts. In the eastern region, farmers' demands for introduction of cash crops have been gradually increasing in accordance with improvement of accessibility to markets by farm road construction. The Project meets such needs of farmers by introducing and expanding the appropriate technologies to produce horticulture crops.

According to the Rolling Plan for Bhutan (2011) developed by the Ministry of Foreign Affairs of Japan, agriculture and rural development is one of the five priority areas for assistance. In the agriculture and rural development sector, the plan highlights the necessity of assistance for agricultural technology development and extension programs particularly in the eastern and southern regions to minimize disparities and alleviate

poverty in the country. The Project, therefore, is consistent with these Japanese aid policies. JICA has consistently provided technical support for horticulture development in the eastern region since 2000 with the dispatch of experts on horticulture and the implementation of the AREP. Thus the Project is consistent with the past assistance in this field, and has been fully utilizing various experiences and lessons learned from the past assistance. The training and extension approaches developed by the Project were proper and effective with regard to promoting the adoption of technologies among farmers. It is thus fair to say that the Project as a whole has a very high degree of relevance.

**(2) Effectiveness: High**

The Project has brought about the following notably positive outcomes: 1) the mixed orchard farmers applied the knowledge and skills acquired to establish the orchards and practice fruit and vegetable production through the systematic training and extension package; 2) the focused village approach encouraged the trained farmers to share their knowledge and skills with other farmers, and formed producing villages for group shipping; 3) 14 seed growers and 10 private nursery growers were trained and the NSC Yangtse farm was revived; 4) the farmers' group marketing of vegetables to schools was promoted in coordination with the RAMCO; 5) the technical capacities, and coordination and cooperation among the Project stakeholders were improved through the hands-on training and the Project activities. All the accomplishments above have helped enhance the overall effectiveness of the Project.

At the time of the Terminal Evaluation, three out of the four outputs have been already achieved and the rest has been on track for achievement. Accordingly, the Project Purpose has been mostly achieved. Thus the effectiveness of the Project was assessed as high.

**(3) Efficiency: High**

In spite of the large size of the area covered and the low accessibility because of geographical conditions and scattered households in villages in the eastern region, most of the inputs from the RGoB side and the Japanese side were provided as scheduled, and most of the Project activities were conducted as planned. Although the training and extension approaches were process-oriented and time-consuming, the Project has so far covered 53 out of 70 (76%) Gewog in the eastern region, and trained 508 farmers in total.

The contributing factors for enhancing efficiency included the following: 1) assignment of the main C/Ps who had worked in the AREP; 2) active involvement of many staff members of the RNRRDC Wengkhaz as C/Ps because the Project activities are consistent with its main task; 3) appointment of focal persons in each Dzongkhag; 4) appropriate overall management of the Project by the two long-term experts who have rich working experiences in Bhutan; and 5) good team work between the C/Ps and the Japanese experts and their strong sense of responsibility and ownership. The personnel transfer and study leave among C/Ps in the second year of the Project have slightly affected the smooth implementation of activities. However, these factors have not affected the achievement of the Outputs of the Project. It is thus fair to say that the Project has a high degree of efficiency as a whole.

**(4) Impact: Many positive impacts have been already confirmed.**

The Impact Assessment indicated that the overall average income of trained farmers stood at Nu. 16,671, which has already surpassed the target of Nu. 15,120 (80% increase from the Baseline Survey of Nu. 8,400) of the target value of the Indicator 1 at the time of the Terminal Evaluation Study. The farmers produced and consumed a variety of vegetables at the household level. Therefore, positive impacts toward the achievement

of the Overall Goal have been observed. The following ripple effects of the Project have also been observed: 1) the MoAF has included persimmon and pear as focused crops in the eastern region in 11th FYP (2013–2018), which have been promoted by the AREP and the Project; 2) other RNRDCs such as Bajo and Bhur have begun to adopt the training and extension approaches developed and promoted by the Project; 3) the Market Access and Growth Intensification Project (MAGIP) financed by the IFAD has also adopted some of the training and extension approaches; 4) His Majesty the 5th King awarded the National Order of Merit (Gold) to the Chief Advisor of the Project and the Program Director of the RNRDC Wengkhar for the Project's contribution to improving the lives of farmers in the eastern region; and 5) the Project has received considerable publicity through much media coverage and various visitors.

**(5) Sustainability: If the financial sustainability is secured, the Project's overall sustainability is rated relatively high.**

Policy aspect: In the 11th FYP (2013–2018), the MoAF has focused on transition from subsistence to commercial agriculture, promotion of import substitution, and targeted and commodity focused approach as key strategies for enhancing agricultural productivity and income from agriculture, following the 10th FYP (2008–2013) which emphasized the acceleration of horticulture development for rural development and poverty reduction. The current policy of horticulture development and extension will likely to remain unchanged even after the completion of the Project. Thus it is fair to say that the sustainability from the policy aspect is high.

Financial aspect: The RNRDC Wengkhar has made a proposal for the five-year follow-up project with the estimated cost of nearly Nu. 12 million per year to ensure the sustainability of the Project. At the time of the Terminal Evaluation, such resources were not assured except for the regular annual budget allocated to the RNRDC Wengkhar, NSCs and Dzongkhags. According to the C/Ps, they will propose the estimated budget at the time of annual budget planning exercise of the RGoB. In addition, they will strive to secure the budget resources by coordinating with other donor-assisted programs in the eastern region and by sharing resources among the relevant agencies such as Dzongkhags, the RAMCO and the NSC. If the financial resources are confirmed, then the sustainability of the Project from the financial aspect can be evaluated as high.

Institutional aspect: The training and extension approaches have been institutionalized in the RNRDC Wengkhar, and adopted by other RNRDCs and the MAGIP. The group marketing system of vegetables to schools and the mechanism in which Dzongkhag Agriculture Offices purchase seeds from the seed growers trained by the Project are expected to be sustained although follow-up activities need to be undertaken. The sustainability in the institutional aspect is thus relatively high.

Organizational aspect: The RNRDC Wengkhar has played a leading role in conducting research and development of technologies as well as providing technical support to farmers and other related agencies after its change of mandate in 2009. It is expected to keep taking overall responsibility in implementing the follow-up project and other regular work. The Chief Advisor has been fully involved in overall management of farms of the RNRDC Wengkhar. Regarding the personnel transfer, four researchers are likely to be transferred or take study leave in the near future. Because more staff members who have less experience will be in charge of farm management, the RNRDC Wengkhar needs to ensure the division of responsibilities to maintain the quality of farm after the completion of the Project. Given the above, the sustainability from the organizational

aspect is relatively high.

Technical aspect: The trained farmers have adopted new knowledge and skills steadily. They are likely to keep doing what they learned and experienced from the Project in the short- and mid-terms if extension agents and the RNRRDC Wengkhār keep conducting monitoring and follow-up activities. However, when commercialization is promoted and consumers are more conscious about the quality and costs of vegetables and fruits, the technical capacities of farmers will be tested. In the long term, it is necessary to upgrade their capacities. The C/Ps and the extension agents are expected to apply their knowledge and skills at work because they were fully involved in the Project activities and had enough confidence to do so. Fruit flies and other pests and diseases have become serious problems for citrus and pear in the mid to low elevation. The MoAF should take concrete measures to address the problems from the policy to farmer levels. Thus the sustainability from the technical aspect is assessed as relatively high.

### **3-3 Contributing Factors for Generating Effects**

#### **(1) Factors Concerning Planning**

The following aspects of the Inputs of the Project have contributed to generating positive outcomes: 1) the Chief Advisor has 14 years of extensive work experiences in the RNRRDC Wengkhār and sub-centers in the east region, substantial knowledge of horticulture, and abundant acquaintances; 2) the current expert on Coordination/Farmers Organization has long work experiences as coordinator of various projects and offices in developing countries including Bhutan; 3) the major C/Ps have had worked in the AREP, and played a leading role in implementing the Project activities with a strong sense of ownership; and 4) most of the horticulture sector members of the RNRRDC Wengkhār have been assigned as the C/Ps and actively taken part in the Project. Furthermore, various outputs of the AREP are contributing to generating the Project's effects. They include identification of the crop suitability areas, production of adequate seedlings and seeds, improvement of quality, and organization and institutional strengthening of the RNRRDC Wengkhār and sub-centers in the east region.

#### **(2) Factors Concerning the Implementation Process**

After the commencement of the Project, the focal persons for each six Dzongkhags were assigned from the C/Ps, which has contributed to effective coordination and cooperation with one another. The training and extension approaches in which the C/Ps and the extension agents worked together for monitoring and follow-up activities have brought about stronger coordination with one another and the promotion of horticulture among the selected farmers. This helped enhance the effectiveness and a part of the sustainability of the Project. The new mandate of RNRRDC in 2009 has enabled the RNRRDC Wengkhār to take the lead in conducting training and extension activities. The Working Group Meeting, which was held annually by the Project in each Dzongkhag, has worked well as a forum for the stakeholders to share the progress of the Project's activities and discuss issues. It has also promoted effective coordination among the RNRRDC Wengkhār, Dzongkhag Agriculture Offices, extension agents, and the RAMCO, and has resulted in enhancing the effectiveness, efficiency, and the sustainability in the organizational and institutional aspects of the Project.

### **3-4 Inhibiting Factors**

#### **(1) Factors Concerning Planning**

No factors were identified.

## **(2) Factors Concerning the Implementation Process**

The personnel transfer and study leave among C/Ps in the second year of the Project have slightly affected the smooth implementation of activities. However, these factors have not affected the achievement of the Outputs of the Project because the number of staff members in charge of horticulture has been increased.

### **3-5 Conclusion**

Most of the Outputs have been already achieved. The Project has a very high degree of relevance, and a high degree of effectiveness and efficiency. At the time of the Terminal Evaluation, many positive impacts have emerged. The results of the Terminal Evaluation confirmed that the Project Purpose was mostly achieved. Thus the Project is going to be terminated in March 2015 as scheduled.

To make the Project sustainable, it is recommended that the Bhutanese side duly take into account the recommendations as listed below.

### **3-6 Recommendations**

#### **(1) Recommendations to be implemented during the Project period**

##### **1. Disseminating the training and extension approaches**

The Evaluation Team confirmed that the training and extension approaches developed by the Project were highly effective in having farmers apply practical knowledge and skills to implement fruit and vegetable cultivation in orchards or produce vegetable seeds and fruit plants at farms. Based on the experiences, it is recommended that the Project keep disseminating such approaches by emphasizing the effectiveness of these approaches in contrast with the conventional ones.

##### **2. Securing the financial resources for the post-Project activities**

The RNRRDC Wengkhar has already planned the post-Project activities and estimated its costs to expand the Project's effects. It is strongly recommended that the RNRRDC Wengkhar immediately discuss how it can secure such budget with the DoA, the MoAF, the Ministry of Finance, donor agencies and other relevant stakeholders.

##### **3. Taking over the overall management of farm from the Japanese expert**

The RNRRDC Wengkhar has been supported by JICA since 2000, in which the Chief Advisor of the Project has been fully involved in overall management of its farm. For the RNRRDC Wengkhar to take over such overall management of the research farm, it needs to assign an overall farm manager and enhance researchers' active commitment to daily field management.

#### **(2) Recommendations to be implemented after the termination of the Project**

##### **1. Implementing the post-Project follow-up activities**

It is recommended that the RNRRDC Wengkhar carry out the post-Project follow-up activities as per the plan in coordination with the Dzongkhag Agriculture Offices, extension agents and the relevant organizations in the eastern region. To encourage such initiative, strong support from the central government, especially the MoAF, is desired, in relation to developing strategies for promoting horticulture at the national and regional level, as well as securing budget as mentioned above.

## **2. Supporting enhancement of the linkage between the trained farmers and markets**

The majority of the farmers trained in the Project have started selling their produce. With group sales of vegetables to schools initiated and facilitated by the RAMCO, schools are currently the major consumers of the vegetables produced by the beneficiary farmers of the Project. However, the farmers might need some more external support to ensure the sustainability of their linkage with markets in such cases as negotiations for contract extension. Thus the concerned agencies such as the Dzongkhag Agriculture Offices, the Dzongkhag Education Offices, the RNRDC Wengkhaz and the RAMCO should keep coordinating with one another whenever necessary.

Likewise, the trained seed growers are still in the initial stage in producing and marketing vegetable seeds. To encourage them to keep producing and marketing high-quality seeds, the RNRDC Wengkhaz, in collaboration with the Dzongkhag Agriculture Offices and the RAMCO, needs to help strengthen the link between the trained seed growers and buyers such as the NSC and private seed growers so that the latter will purchase the seeds in a stable manner.

## **3. Taking necessary measures to study and control pests and disease, especially fruit flies**

Damages caused by pests and disease, especially fruit flies, are a major concern among farmers, the RNRDC Wengkhaz and the Dzongkhag Agriculture Offices during the implementation of the Project. Thus it is recommended that the RNRDC Wengkhaz continue to study and monitor the issue, as well as raise awareness among farmers on it. At the same time, the MoAF is recommended to consider practical measures for pest and disease control that suit the organic agriculture policy of Bhutan.

## **4. Exploring ways to disseminate horticulture to more marginalized farmers**

The Project has selected and trained motivated farmers in relatively accessible villages through the training and extension approaches. These approaches were found to be effective in enabling such selected farmers to start engaging in vegetable and fruit production. As horticulture becomes more popular in the eastern region, the RNRDC Wengkhaz needs to examine how it can be effectively disseminated to more marginalized farmers in remote areas.

### **3-7 Lessons Learned**

#### **(1) Long-term cooperation can generate synergy effects.**

JICA has supported horticulture research, development, and promotion continuously since 2000 in the eastern region and achieved various outcomes. The staff members of the RNRDC Wengkhaz who had been trained in the previous project were assigned as the main C/Ps and actively participated in the Project's activities. The organizational and institutional capacities of the RNRDC Wengkhaz had improved remarkably through the previous cooperation. This has served as a solid foundation for horticulture research and development of technologies, and extension in the Project. The Chief Advisor of the Project has provided technical support for all the activities since 2000 and built up good relationships with the Bhutanese C/Ps. This mutual trust has contributed to implementing the overall activities smoothly and generating various effects and positive impacts of the Project. Such long-term cooperation can produce synergy effects because the established resources can be effectively utilized in a project.

#### **(2) Coordination and cooperation with relevant organizations can produce synergy effects.**

The Project has supported the capacity improvement of Dzongkhag Agriculture Offices and extension agents,

and involved them in extension, monitoring and follow-up activities in villages. This has helped farmers adopt the technology for production of horticulture crops.

The Project has also worked with the RAMCO that supported group marketing in the Vegetable Value Chain Programme under the MAGIP supported by the IFAD and Schweizerische Normen-Vereinigung (SNV: Swiss Association for Standardization). The Project trained the farmers to produce fruit and intercropping vegetables while the RAMCO helped these farmers start group marketing of vegetables to schools. This has created a win-win situation in which farmers earned stable income and schools purchased various fresh vegetables. The Project's extension approaches have also been adopted by the MAGIP, involving the farmers and extension agents who were trained by the Project.

These experiences of the Project indicate that effective coordination and cooperation with relevant organizations can produce synergy effects.

**(3) Intensive training and outreach can be a key to ensure application of skills.**

A conventional horticulture extension approach, i.e., distributing seeds/seedlings with simple training, has been done in many countries, under which most farmers are unable to apply what they have learned to horticulture production. To address this issue, the Project has developed more intensive training and extension approaches. Among these approaches, the systematic training and orchard development program including the hands-on practice was proven highly effective in imparting the practical knowledge and skills to farmers, which have boasted the high application rate over 90%. In extension of horticulture techniques which requires more careful attention by growers, such an approach can be a key to successful extension of horticulture in similar projects.

**(4) The cropping area which is easily affected by external factors is not always a relevant indicator for the horticulture extension.**

The Indicator of the cropping area was set to measure the achievement of the Project Purpose based on the recommendations from the MoAF during the Mid-Term Review Study. However, it is hard to increase and measure the cropping areas precisely in the steep topography of the eastern region of Bhutan. At the time of the Terminal Evaluation, it was confirmed that the target value of such an indicator was not realistic. The DoA suggested that the cropping area affected by other external factors such as land use development is not appropriate to measure the extent of horticulture extension.