



## PROJECT NOTIFICATION

Ref. No.: 22-IP-37-GE-DLN-A-PN2200001-001

<b>Date of Issue</b>	08 April 2022
<b>Project Code</b>	22-IP-37-GE-DLN-A
<b>Title</b>	APO e-Course on Management of Plant Factories
<b>Launch Date</b>	15 July 2022
<b>Hosting Country(ies)</b>	APO Secretariat
<b>Modality</b>	Digital Learning
<b>Implementing Organization(s)</b>	APO Secretariat
<b>Participating Country(ies)</b>	Open
<b>Overseas Participants</b>	Not Applicable
<b>Local Participants</b>	Not Applicable
<b>Qualifications of Participants</b>	Open
<b>Nomination of Participants</b>	Not Applicable
<b>Closing Date for Nominations</b>	Not Applicable

## 1. Objectives

- a. Explain the concepts and mechanisms of plant factories.
- b. Equip participants with knowledge of key technical components in operating plant factories.
- c. Learn about entrepreneurial skills to maximize plant factory management such as data analysis, marketing, and cost control.

## 2. Background

The prices of perishable farm produce such as vegetables and fruit fluctuate depending on their seasonal supply. It is therefore important to ensure a stable supply of perishables to meet consumers' needs while maintaining producers' incomes. Greenhouse farming allows crop cultivation regardless of weather conditions and season, thus extending growing and harvesting periods. Plant factories are modern greenhouses equipped with smart technologies such as sensors and the Internet of Things. Based on monitoring of the environment and crop growth, year-round harvesting in plant factories is possible through advanced environmental control.

There are two basic types of plant factories: those using solar light for tomatoes, peppers, etc.; and those using artificial light for lettuce, other leafy greens, etc. In these plant factories, the crop growth environment such as temperature, air and soil moisture, soil nutrition, and CO<sub>2</sub> levels are monitored and precisely controlled at optimum levels. Data on the environment are automatically stored and analyzed to increase quality and yields. The ideal growth environment is then maintained artificially.

In the Netherlands, the tomato yield per 0.1 ha was drastically increased from 10 tons in the early 1970s to 50 tons in the mid-1990s using plant factories. In addition, 12 labor hours were required to yield 1 ton of tomatoes in 2016 in the Netherlands thanks to plant factories, while in Japan 114 hours were required for the same yield. Therefore, plant factories increase labor productivity, enabling farmers to make profits from small land areas. According to MarketsandMarkets (2021), the global plant factory market was estimated at USD121.8 billion in 2021 and projected to reach USD172.5 billion by 2026.

Plant factory farmers must have entrepreneurial skills. Compared with natural cultivation, plant factories are costly. Sound financial planning taking into account costs and benefits is crucial for success. The production of high-quality produce must therefore be accompanied by the necessary marketing skills. In addition, plant factories can be used for multiple objectives. For example, some small plant factories are used in restaurants and assisted-living facilities.

This course will illustrate practical knowledge and technologies necessary for plant factory management. It is expected to promote smart transformation in the agriculture sector, which is one of the key result areas in the APO Vision 2025. In addition, the promotion of plant factories will contribute to raising the labor productivity of farmers and stabilizing food supplies regardless of climatic conditions, thereby benefiting consumers as well as producers in member countries.

## 3. Modality of Implementation

- a. The course is offered through the APO e-learning platform: <https://www.apo-elearning.org>
- b. Participants should register on this portal and create their own accounts.
- c. Certificates of completion will be provided for those who satisfactorily complete all the modules of the course, including quizzes and a final examination.

## 4. Scope and Methodology

The course will comprise five modules:

Introduction

Module 1:

Overview of plant factories

Module 2:  
Plant physiology: Photosynthesis, respiration, transpiration, and stomata

Module 3:  
Sensors and other equipment

Module 4:  
Data analysis

Module 5:  
Cost-control measures, value-added production, and marketing of produce

Self-assessment quizzes and a final examination

### **Methodology**

Module study, additional study material for participants, quizzes for self-assessment, and a final examination.

### **5. Requirements**

- a. Have necessary devices and software comprising a computer/smartphone, updated browser, microphone, and speaker or headphones.
- b. Access to internet connections.
- c. Completion of all the modules, quizzes, and final examination.
- d. The APO e-certificate will be given to participants who score a minimum of 70% on the final examination.

### **6. Financial Arrangements**

The APO will meet the assignment costs for resource persons to develop the course modules including quizzes and a final examination.

### **7. Actions by Member Countries**

- a. Promote the courses nationwide.
- b. Provide the link to the APO e-learning platform on NPOs' websites and social network services.

### **8. Actions by the APO Secretariat**

- a. Identify and assign the resource person(s) to develop the course.
- b. Announce course commencement on the APO website and social network services.



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Secretary-General