



APSA Hybrid Rice Seed Production Training Program

Module 1: Hybrid Rice Production in Jiangxi Province and China

Overview

This module briefs about the conditions of agriculture in Jiangxi province and lessons and successful experiences in China's hybrid rice production. It also outlines the history and current status of hybrid rice production in Jiangxi and China.

Objectives

At the end of this module, participants should be able to:

1. Know the importance of hybrid rice in food production and ensuring food security for the growing population and the dwindling arable land area in the world;
2. Discuss how to efficiently commercialize hybrid rice in your county;
3. Know which experiences of China's hybrid rice production are suited in another country.

Exercises

1. Organize a field tour for participants that focuses on Chinese hybrid rice production.
2. Conduct a forum among participants, farmers and technicians.

Module 2: Basic Concepts in the Science of Hybrid Rice Seed Production

Overview

This module describes the basic concepts in the science of hybrid rice seed production such as the three-line system, two-line system, and source of male sterility and classification. There is also a discussion on the research in the science of hybrid rice seed production and its characteristics including out-crossing, adjustable traits, etc. The establishment of hybrid rice seed production system in China is also included in the module.

Objectives

At the end of this module, participants should be able to:

1. Clearly know the basic concepts in the science of hybrid rice seed production;
2. Clarify the types of cytoplasmic male sterility in rice;
3. Know the characteristics in the science of hybrid rice seed production and which

characteristics of hybrid rice are adaptable;

4. Know the system of hybrid rice seed production in China and think of the kind of hybrid rice seed production system most suitable to one's own country.

Objectives

1. Organize a discussion among participants and seed administrators on the system of hybrid rice seed production in China

Module 3. Characteristics of Hybrid Rice Parental Lines

Overview

This module describes some important characteristics of hybrid rice parental lines, such as sensitivity to a day's length, temperature, and nutrition. The importance of knowing these characteristics to hybrid seed production is also discussed.

Objectives

At the end of this module, participants should be able to:

1. Know the characteristics of hybrid rice parental lines in terms of thermo and photo-period sensitivity, and nutrition sensitivity;
2. Know the importance of these characteristics to hybrid seed production.

Exercises

1. Conduct an experiment of nutrition sensitivity with parental lines

Module 4: Effects of Weather Conditions on Flowering of Hybrid Rice Parental Lines

Overview

This module provides knowledge on the flowering habits of hybrid rice parental lines and describes the effect of weather conditions, such as temperature and humidity, on flowering of hybrid rice parental lines. Based on these factors, the determination of seeding interval between the male and female lines by using temperature method and its reliability will be discussed, followed by ways of predicting the flowering synchronization and adjusting the flowering habits (in terms of flowering period and flowering timing).

Objectives

At the end of this module, participants should be able to:

1. Know the effects of temperature and humidity on the flowering habits of hybrid rice parental lines and use of temperature method to determine the seeding interval for hybrid rice seed production;
2. Explain how to predict flowering synchronization using the weather data;
3. Know how to adjust the flowering habits in relation to temperature and humidity.

Exercises

1. Conduct a field observation on the effect of humidity on flowering habits;

2. Conduct an exercise on predicting flowering synchronization using a given data;
3. Conduct an experiment on adjusting flowering date.

Module 5. The Basic Procedure for Seed Production of Hybrids and Parental Lines

Overview

This module outlines the basic procedure of the production of hybrid seeds and parental lines. The five steps—namely the preparation before seeding, management during vegetative growth period, management during panicle initiation period, management during flowering and mature period, and management before and after harvest—is discussed.

Objectives

At the end of this module, participants should be able to:

1. Know the outline of the basic procedure for seed production of hybrids and parental lines;
2. Explain the five steps in the seed production of hybrids and parentals;
3. Know what to do in each steps of the procedure.

Exercises

1. Participate in the determination of seeding intervals for seed production of newly-bred hybrids in small area
2. Participate in the field management of hybrid seed production

Module 6. Technologies for Hybrid Rice Seed Production in Three-line System

Overview

This module describes the detailed technologies in seven aspects—(1) choice of suitable eco-environment, (2) determination of seeding intervals, (3) establishment of the coordinated co-growing relation of the parentals, (4) adjustment of flowering period to assure ideal flowering synchronization, increase of seed setting rate and grain weight, (5) strict rouging for good purity, (6) control of pests and diseases, and (7) technical measures practices for high yield seed production.

Objectives

At the end of this module, participants should be able to:

1. Know the principles of high yield seed production technologies;
2. Explain how to select the suitable eco-environment for hybrid seed production;
3. Know the principles of methodologies for determining seeding interval and how to integrate them in the determination of seeding interval;
4. Describe the definition of the co-growing relation of parentals and importance of coordinating the well-established co-growing relation of the parentals;
5. Explain the standards of ideal flowering synchronization and the importance of adjusting flowering period;
6. Know the methodologies of predicting flowering synchronization;
7. Know the methodologies of adjusting flowering period;

8. Know the role and techniques of application of GA3 in seed production;
9. Know how to take some other supplementary measures to increase the seed setting rate and grain weight in seed production;
10. Explain the techniques of rouging
11. Know the techniques in the control of pests and diseases in seed production.

Exercises

1. Conduct seed sowing experiment;
2. Conduct an exercise on determining seeding interval;
3. Conduct an exercise on predicting flowering synchronization using different methods;
4. Conduct an exercise on applying GA3

Module 7: Technical Systems for Purification and Core Seed Production of Parental Lines in Three-line System

Overview

This module introduces the results and causes for the degeneration of the parental lines. Three kinds of technical systems of the purification and core seed production of parental lines are described.

Objectives

At the end of this module, participants should be able to:

1. Explain the causes of the degeneration of parental lines;
2. Know the advantages and disadvantages of each system of purification and core seed production of parental lines;
3. Explain how to purify the parental lines and produce the core seeds by means of the system.

Exercises

1. Conduct a field tour on purification and core seed production;

Module 8 Technologies for Seed Quality Test of Hybrid Rice

Overview

This module describes the technologies for seed quality test of hybrid rice in two aspects, including indoor testing and field testing.

Objectives

At the end of this module, participants should be able to:

1. Explain the technologies for seed quality indoor-test of hybrid rice;
2. Explain the technologies for seed quality field-test of hybrid rice.

Exercises

1. Conduct indoor seed quality test
2. Conduct seed quality field test

Module 9: Introduction of China's New Cultivation Technologies in Hybrid Rice Production

Overview

This module introduces some of China's new cultivation technologies in hybrid rice production, including high yield cultivation technology of aerobically raising seedling with a special soft plastic tray, zero-tillage high yield cultivation technology, high yield seedling-throwing technology, and zero-tillage and seedling-throwing technology, etc.

Objectives

At the end of this module, participants should be able to:

1. Explain the principles of each new technology;
2. Explain the reasons for the increase of yield in each technology;
3. Know the methods of each technology;
4. Determine which one is most suited to one's country.

Exercises

1. View the videos on seedling-throwing cultivation technology;
2. View the videos on high yield cultivation technology of aerobically raising seedling with a special soft plastic tray;
3. View the videos on zero-tillage and seedling-throwing technology;
4. Conduct a field tour on the related new cultivation technologies.

Module 10: Technologies of Hybrid Rice Seed Production in Tropical Areas

Overview

This module presents the desirable characteristics of hybrid rice seed production sites, hybrid rice parentals developed and used in various tropical countries, differential seeding, and crop establishment procedures.

It also discusses the major bacterial and fungal diseases and their management, nutrient management practices for parental combinations of different growth durations, methods for estimating flowering dates, and corrective measures to adjust asynchronous flowering.

Objectives

At the end of this module, the participants will be able to:

1. Describe the soil and climatic characteristics of ideal seed production sites;
2. Enumerate the parentals developed and used in the Asian tropics;
3. Know differential seeding and crop establishment procedures;
4. Identify the major bacterial and fungal diseases of rice and their management;
5. Determine fertilizer management practices for parental combinations of different maturities;

6. Explain the methods for estimating and adjusting flowering dates of parental lines

Exercises

1. Determining/computing seeding and transplanting dates at different seeding intervals of A and R lines and seeding frequencies of R line
2. Field visit to identify bacterial and fungal diseases
3. Field practicum: Sampling and estimating flowering dates of A and R lines and recommending corrective measures to promote synchronization of flowering

Module 11: Technology Extension System of Hybrid Rice Production in Jiangxi Province and China

Overview

This module introduces hybrid rice technology extension system in Jiangxi and China. Mechanism of hybrid rice technology extension is discussed in details.

Objectives

At the end of this module, participants should be able to:

1. Know the hybrid rice technology extension system in Jiangxi and China;
2. Know how hybrid rice technologies are transferred from researchers to farmers;
3. Know what policies and regulations the Chinese government is adopting for efficient technology transfer.

Exercises

1. Visit some agricultural technology extension stations in Jiangxi province
2. Organize a discussion about technology extension system among participants and technicians or officials.