

National Institute of Open Schooling

Krishi: Production, Processing and Marketing at Senior Secondary Level (383) Curriculum

Rationale

Agriculture serves as foundation of human civilization and primary source of food production. It is fundamentally linked to the achievement of the sustainable development goals (sdgs), which aim to address global challenges such as poverty, hunger, and environmental sustainability. India is agrarian country where majority of population depend on agriculture for their livelihood generation. Therefore investing in sustainable agricultural practices is essential not only for achieving food security but also for fostering economic growth, promoting gender equality, sustaining water resources and addressing climate change. This course ‘krishi: production, processing and marketing’ has been designed for senior secondary level learners of nios in such a way that learners will be able to acquire the basic understanding of agriculture and its significance in day-to-day life. Special attention has been paid to incorporate eco-friendly farming practices of soil, crop and pest management so that learners become aware about the sustainable ways of food production. Further various case studies, success stories and real-life examples have been presented in order to educate the youths about promising employment opportunities in ‘krishi’. As the learners pursue their career paths in agriculture, this course is expected to provide meaningful and relevant learning experiences to them.

Course objectives

After completing this course, the learner will be able to:

- Recognize the significance of agriculture in indian as well as global society;
- Summarize how the farm products move from field to plate of the consumer;
- Familiarize with agricultural production practices and post-harvest technologies;
- Develop excellence and skills on the aspects of food production, its accessibility, food safety, and

nutrition as well as production economics;

- Outlines the basics of the food value chain viz. How farmers, food processors, exporters, retailers, and end consumers interact in the real world;
- Become aware about the marketing and export strategies for generating revenue through agriculture and its associated activities and
- Appraise entrepreneurship as a path to self-employment and income generation.

Course structure:

Sl. No.	Modules	Study hours	Marks
1.	Scope and importance of agriculture	25	12
2.	Crop production practices	45	25
3.	Post harvest management	20	10
4.	Food processing and value addition	35	15
5.	Agricultural economics, marketing and policy	35	13
6.	Enterprises in agriculture	20	5
7.	Practical	60	20
	Total	240 hrs.	100

Course Description**MODULE 1****(SCOPE AND IMPORTANCE OF AGRICULTURE)****Marks: 12****Study hours: 25****Approach**

This module aims at providing basic understanding of the subject Krishi (agriculture) to learners through the discussion of its evolution from ancient period to modern era, importance of agriculture in Indian economy, unique characteristics of Indian agriculture and modern technologies to hasten agricultural growth and productivity.

Lesson 1:**Evolution and development of agriculture****Topics:**

The lesson covers:

- Origin and evolution of agriculture
- Neolithic revolution (Domestication of plants and animals, technological achievements)
- History of agriculture in India (Pre-Vedic era, Vedic era, ancient dynasties, Mughal and British era)
- British agricultural revolution
- Green revolution (Basic elements and drawbacks, Evergreen revolution)
- Significant achievements of Indian agriculture in post independence era
- History of agricultural education & research in India

Learning Outcomes

The learner:

- recognizes how agriculture was gradually developed from ancient times to modern era;
- explains the reasons for backwardness of Indian agriculture during British period;
- identifies the role of 'Green Revolution' in alleviating hunger from India and
- distinguishes the achievement of India after independence in agriculture sector.

Lesson 2:

Importance of agriculture in Indian economy

Topics:

The lesson covers:

- Sectors of economy (Primary, secondary and tertiary sector)
- Indian agriculture at present scenario
- Role of agriculture in Indian economy
- Source of food, feed and fibre
- Source of income and employment
- Supplying raw material to industries
- Importance of agriculture in international trade
- Share in national income

Learning Outcomes

The learner:

- identifies different sectors of Indian economy;
- explains how agriculture acts as source of food, feed and fibre;

- analyzes role of agriculture in supplying raw material to industries and
- examines how agriculture contributes to employment generation and international trade of our country.

Lesson 3:

Characteristics of Indian agriculture

Topics:

The lesson covers:

- Concept of farm and farm size
- Land use pattern in India
- Challenges of Indian agriculture
- Agro climatic zones of India
- Different soil types of India
- Different farming systems in India
- Classification of crops
- Importance of allied sectors of agriculture
- Sources of irrigation in India

Learning Outcomes

The learner:

- defines the concept of farm and farm size;
- identifies the land use pattern in India;
- recognizes the different agro-ecological zones of India;
- explains the various systems of farming practiced in India and
- analyzes the importance of allied sectors in agriculture.

Lesson 4:**New developments in agriculture**

Topics:

The lesson covers:

- Evolution of agriculture technology (Agriculture 1.0, 2.0, 3.0, 4.0)
- Farm level modernization (Laser Land Leveling, Precision farming, Micro irrigation)
- Farm automation (Modern greenhouse, Artificial Intelligence, Mobile technology, Robotics, Remote sensing, Weather tracking, Drone, Farm management software)
- Modern practices in agriculture (Hydroponics & Aeroponics)
- Agritech startups and FPOs

Learning Outcomes

The learner:

- explains about the recent advancements in Indian agriculture;
- describes the role of emerging technologies and precision agriculture in crop production;
- defines the farm automation;
- discovers modern practices of crop production and
- states the role of Agritech startups and FPOs in agricultural revolution.

MODULE 2**(CROP PRODUCTION PRACTICES)****Marks: 25****Study hours: 45****Approach**

This module is designed to impart the technical knowledge about commonly cultivated crops, their specific climatic and soil requirement and the series of operations from land preparation, sowing, various intercultural practices to harvesting of crops. Additionally, it also discusses about different dimension of horticulture like Pomology, Olericulture, and Floriculture.

Lesson 5:**Soil health and plant nutrition**

Topics:

The lesson covers:

- Soil as a natural body for plant growth
- Components of soil (mineral matter, organic matter, air, water)
- Soil horizons and profile
- Weathering and soil formation
- Properties of soil (Physical, Chemical, Biological)
- Soil fertility and plant nutrition
- Sustainable soil management

Learning Outcomes

The learner:

- summarizes the importance of soil in agriculture and human life;

- explains how a soil is originated from parent rocks;
- supports the farmers to manage the soil sustainably for crop production and
- discusses the techniques for protection of soil from erosion and degradation.

Lesson 6:

Crops, cropping system and crop establishment

Topics:

The lesson covers:

- Concept of crop production practices
- Classification of crops (based on growing season and use)
- Cropping system
- Farming system
- Soil and climatic requirement of important field crops
- Field preparation (Conventional and conservation tillage)
- Seeds and varieties
- Sowing and transplanting

Learning Outcomes

The learner:

- classifies the crops growing in their surroundings according to their growing season and usage;
- develops integrated farming system plan for better farm productivity;

- recommends the crops for cultivation as per their specific soil and climatic requirement and
- prepares the field scientifically for sowing and transplanting of crops.

Lesson 7:

Nutrient, water and weed management

Topics:

The lesson covers:

- Type of plant nutrients, their function in plant body and characteristic deficiency symptoms
- Sources of plant nutrients: fertilizers and manures
- Fertilizer management in crops
- Water movement in soil
- Water requirement of various crops
- Scheduling and methods of irrigation
- Weeds, their classification and crop weed competition
- Weed control techniques

Learning Outcomes

The learner:

- defines the essential and beneficial plant nutrients;
- explains the role of proper nutrition in the plant's growth and development;
- identifies water requirement of various crops and the significance of supplying irrigation;
- discusses the different irrigation techniques; and
- describes the preventive and curative strategies of weed control.

Lesson 8:**Plant protection and harvesting**

Topics:

The lesson covers:

- Insect-pest; their life cycle and feeding habit
- Integrated pest management: physical, cultural, chemical, biological and behavioral control
- Disease pests: fungi, bacteria and virus
- Disease management
- Harvesting of crops (criteria and methods)

Learning Outcomes

The learner:

- defines the insects, pests, diseases and their life cycle;
- explains the importance of integrated pest management in managing ecological imbalance;
- distinguishes common disease symptoms of plants; and
- identifies the appropriate method and suitable time for harvesting of plant produces.

Lesson 9:**Fundamentals of horticulture and fruit production**

Topics:

The lesson covers:

- Concept & origin of horticulture
- Division of horticulture

- Importance of horticultural crop and factors affecting horticultural production
- Climatic zones for horticultural production in India
- Propagation of horticultural crops (asexual and sexual propagation)
- Types of fruits
- Orchard management
- Training and pruning
- Causes and remedies of fruit drop and barrenness in plants

Learning Outcomes

The learner:

- defines the concept and origin of horticulture;
- identifies the different horticultural zones of India;
- describes various plant propagation techniques;
- discusses about orchard for large scale production of fruits and
- explains the causes and remedies of fruit barrenness.

Lesson 10:**Vegetable crops**

Topics:

The lesson covers:

- Difference between vegetable and fruit crops
- Importance and scope of vegetable cultivation in India
- Classification of vegetables

- Types of vegetable gardens
- Nursery raising of vegetables
- Cultivation practices of important vegetable crops

Learning Outcomes

The learner:

- differentiates between vegetable and fruit crops;
- summarizes the scope of vegetable cultivation in India;
- explains various types of vegetable gardens;
- describes the method to develop a vegetable nursery and
- tabulates the cultivation techniques of common vegetables grown in India.

Lesson 11:

Flower crops

Topics:

The lesson covers:

- Importance of floriculture and Prospects of floriculture in India
- Cut and loose flowers
- Shrub & shrubbery border
- Climber plants and Cut greens (fresh leaves and stems)
- Potted plants & annuals
- Flower seed production and bulbous ornamentals
- Nursery, lawn and arboriculture
- Perfumes, colouring pigments, dried flowers

- Bonsai and terrarium

Learning Outcomes

The learner:

- defines floriculture and its prospects of in India;
- describes the popular flower species cultivated in India;
- recommends suitable shrubs and climbers for specific purposes and
- discusses the different components of commercial floriculture.

MODULE 3

(POST HARVEST MANAGEMENT)

Marks: 10

Study hours: 20

Approach

This module aims at developing awareness about post-harvest losses occurring after harvesting and before consumption and proper post-harvest management techniques to minimize these losses. It also discusses about various traditional and modern practices by which learners can ensure quality, nutritional value, and safety of food products.

Lesson 12:

Need and importance of post harvest management

Topics:

The lesson covers:

- Causes and effects of post harvest loss
- Benefits of effective management of post-harvest systems

- Types of post-harvest loss (PHL)
- Important sites of post harvest losses
- Advanced technologies to minimize the losses

Learning Outcomes

The learner:

- explains the importance of post harvest management;
- identifies the reasons for post harvest loss;
- classifies the different types of post harvest loss; and
- indicates the advanced technologies to manage post harvest loss.

Lesson 13:

Processes in post-harvest management system

Topics:

The lesson covers:

- Steps involved in post harvest management system
- Processing of fruits and vegetables
- Processing of cereals

Learning Outcomes

The learner:

- identifies various processes of post-harvest management system;
- describes the methods of fruits and vegetables processing; and
- explains the cereal processing techniques.

Lesson 14:

Storage and warehousing

Topics:

The lesson covers:

- Importance of storage
- Factors of storage
- Precautions of fruit and vegetable storage
- Changes in the food during storage
- Storage techniques
- Warehouse

Learning Outcomes

The learner:

- defines the storage and its importance;
- explains the important factors of food storage;
- indicates several precautions for prolonged storage of foods;
- identifies the difference between traditional and modern storage structures and
- describes the warehousing system of food storage.

MODULE 4

(FOOD PROCESSING AND VALUE ADDITION)

Marks: 15

Study hours: 35

Approach

Food processing extends the shelf life of perishable products. This is crucial in reducing post-harvest

losses and improving farmer's income and resource utilization. As demand for easy to prepare and ready-to-eat food is growing, this module is designed to impart the knowledge of different food groups, their processing techniques and methods of value addition among learners for tapping employment opportunities in this sector. Apart from that, the learner will also understand the importance of maintaining food safety and quality during processing.

Lesson 15:

Food processing sector: opportunities and challenges

Topics:

The lesson covers:

- Importance of food
- Present status of Indian food processing industry
- Scope of food processing sector
- Challenges in food processing sectors
- Opportunities in food processing sector

Learning Outcomes

The learner:

- defines food processing and explains its importance;
- describes the current status of the food processing sector in our country;
- lists the various sub-sectors of the food processing industry;
- discusses the scope and opportunities available in the food processing sector;

- highlights the challenges and constraints faced by the food processing sector and
- outlines the various schemes and initiatives by the government to support the food processing industry.

Lesson 16:

Food groups and nutritional importance

Topics:

The lesson covers:

- Sources of food (plants and animals)
- Basic food groups and their classification
- Balanced diet
- Nutrients present in food

Learning Outcomes

The learner:

- states the different sources of food;
- classifies food into various food groups;
- explains the importance of a balanced diet;
- lists the nutrients present in food;
- describes the importance of nutrients in our food and
- identifies important food sources for these nutrients.

Lesson 17:

Types and methods of food processing

Topics:

The lesson covers:

- Types of food processing (primary and secondary)
- Principles of food preservation
- Methods of food processing (blanching, pasteurization, dehydration, freezing and fermentation)
- Emerging non-thermal technologies

Learning Outcomes

The learner:

- recognizes the common food spoilage factors;
- explains the principle of food preservation;
- describes different levels and important methods of food processing;
- lists the advantages and disadvantages of different techniques and
- enlists the emerging techniques in food processing.

Lesson 18:

Value added food products

Topics:

The lesson covers:

- Importance of value addition and range of value added food products
- Techniques opted for value addition of food products
- Value added products of fruits and vegetables
- Value added products from cereals
- Value added products from milk

Learning Outcomes

The learner:

- defines the value addition;
- lists the different methods used for value addition of foods;
- explains the value addition of fruits and vegetables and different value added products;
- describes the process of value addition of cereals and
- outlines the value addition of milk and different value added milk products.

Lesson 19:

Food safety and quality control

Topics:

The lesson covers:

- Attributes of food quality
- Methods of food quality control
- Food quality inspection and food quality control
- Quality control (QC) and quality assurance (QA)
- Food safety
- Food Safety Management Practices (FSMP)
- Food product certifying bodies

Learning Outcomes

The learner:

- identifies the characteristics of food quality;
- interprets the concept of food safety;

- differentiates between quality control and quality assurance;
- evaluates various Food Safety Management Practices like GMP, GHP, HACCP and
- discovers the features and functions of national and international food quality certifying bodies.

MODULE 5

(AGRICULTURAL ECONOMICS, MARKETING AND POLICY)

Marks: 13

Study hours: 35

Approach

The knowledge of economics is helpful for the allocation, distribution, and utilization of farming resources. This knowledge enables farmers to optimize their production processes, manage costs effectively, and enhance the overall efficiency of their operations. This module introduces various principles, concepts, and factors of agricultural economics as well as their potential applications in real market situation. Additionally the role various marketing institutions, functionaries, government policy initiatives are discussed to make the learners aware about scope of availing the credit and insurance facility in market.

Lesson 20:

Basics of agricultural economics

Topics:

The lesson covers:

- Principles of economics
- Agricultural economics: definition, nature and scope

- Characteristics of Indian agriculture as an industry, and its role in the national economy
- Concept of demand and supply
- Price determination
- Factors of production
- Elements of costs and benefits

Learning Outcomes

The learner:

- explains the importance of learning economics;
- describes agricultural economics in terms of definition, nature and scope;
- infers characteristics of Indian agriculture industry;
- identifies the factors of production;
- summarizes the concept of demand and supply as well as their factors;
- defines the cost and revenue concepts and
- demonstrates the practical applications and utility of demand, supply, price, and costs.

Lesson 21:

Agricultural marketing and policy

Topics:

The lesson covers:

- Concept of agricultural marketing
- Utility in marketing
- Marketing channels
- Marketing functionaries
- Marketing functions

- Marketing institutions
- Government policy support

Learning Outcomes

The learner:

- explains the concepts of agricultural marketing;
- identifies marketing channels;
- describes marketing functions;
- recognizes different marketing institutions and their role and
- discusses Government policies to facilitate the marketing of agricultural goods.

Lesson 22:

Agricultural finance and credit in India

Topics:

The lesson covers:

- Importance of credit and finance in agriculture
- Commercial banks
- Cooperative credit structure
- Major types of institutional credit
- Micro finance in India
- Crop insurance
- Kisan Credit Card (KCC)

Learning Outcomes

The learner:

- recalls the necessity of timely availability of credit in agriculture;

- identifies the various public and private agencies working in the field of agricultural finance;
- differentiates between a cooperative bank and commercial bank and describes their role in agriculture finance;
- explains the concept of microfinance and how the model works in India and
- assesses the significance of crop insurance and the Kisan Credit Card in supporting the farmers.

MODULE 6

(ENTERPRISES IN AGRICULTURE)

Marks: 05

Study hours: 20

Approach

This module aims to deliver the joy of self-employment among the learners through development of entrepreneurial capabilities. Also how the learners can benefit the society by forming self-help groups is also discussed. Further the learner will also be able to explore the diverse educational and occupational opportunities existing in agriculture and allied sectors.

Lesson 23:

Entrepreneurship: nature, types and levels

Topics:

The lesson covers:

- Meaning and definition of entrepreneurship
- Need to become an entrepreneur
- Traits of a good entrepreneur
- Different stages of entrepreneurship

- Types of enterprises
- Entrepreneurship as a career
- Case studies of successful entrepreneurs

Learning Outcomes

The learner:

- defines the concept of entrepreneur, entrepreneurship and enterprise;
- appraises entrepreneurship as a career option;
- plans to inculcate the skills of a successful entrepreneur;
- identifies the stages of enterprise development;
- differentiates between MSMEs and large enterprises and
- cites examples of successful entrepreneurial models in agriculture.

Lesson 24:

Importance of self-help groups in agriculture and village economy

Topics:

The lesson covers:

- Concept and definition of Self-Help Groups (SHGs)
- Need of self-help groups
- Characteristics of self-help groups
- The rise of SHGs: emergence and evolution in India
- Developmental stages of self-help groups in India
- Functions of self-help groups
- Constraints of self-help groups (SHGs)

- Future course for effective self-help groups
- Examples of self-help groups in India

Learning Outcomes

The learner:

- explains the concept and meaning of self-help groups;
- appraises the merits of forming self-help groups among local people;
- describes the evolution of SHGs over time and
- persuades the local youth and women to form self-help groups for their socio-economic development.

Lesson 25:

Career opportunities in agriculture

Topics:

The lesson covers:

- Scope of agriculture as a profession
- Educational programmes available in agriculture science
- Popular job opportunities in agriculture sector
- Success stories of agri-entrepreneurs

Learning Outcomes

The learner:

- recognizes the employment opportunities in the field of agriculture;
- identifies agriculture related educational programmes available in India and
- explains the roles and responsibilities of popular professions of the agriculture field.

PRACTICAL WORK

Purpose:

The objective of teaching agriculture extends beyond imparting knowledge of terms, facts, concepts, and principles—it enables learners to grasp these concepts through hands-on activities and practical applications. The development of practical skills in agriculture enhances understanding through firsthand experience and reciprocal support. It emphasizes the acquisition of essential psychomotor skills, which are crucial for effective learning. Recognizing the importance of hands-on training, the agriculture course integrates practical work as a core component alongside theoretical knowledge.

This course aims to develop the following essential skills:

- (i) **Observational skills** – Identifying key characteristics in crops, soil samples, and plant specimens, as well as recognizing essential parts during field studies and dissections.
- (ii) **Manipulative skills** – Proper handling, operation, and reading of agricultural tools, equipment, and laboratory instruments.
- (iii) **Collection and preservation skills** – Gathering, classifying, and preserving soil samples, seeds, plant specimens, and other agricultural materials.
- (iv) **Analytical and documentation skills** – Recording field observations, drawing and labeling agricultural specimens, analyzing experimental data, and interpreting results for better decision-making in farming practices.

List of Exercises:

1. Study of morphological character of field crops and their seeds
2. Study of morphological character of seeds and plants of commonly cultivated vegetable crops
3. Identification and preparation of herbarium of common weeds
4. Calculation of seed rate of crops
5. Study on methods of nursery raising of vegetable crops and their protection
6. Study of agricultural/horticultural tools and implements
7. Calculation of fertilizer requirement of a cultivated land
8. Collection and processing of soil samples for laboratory analysis
9. Determination of soil moisture by gravimetric method
10. Interpretation of soil health card
11. Collection and identification of common plant diseases
12. Identification of insect pests of crop plants
13. Calculation of pesticide requirement of crops
14. Estimation of post-harvest losses in fruits and vegetables
15. Identification of various food storage structures
16. Platform tests of raw milk
17. Determination of the cost of cultivation

18. Understanding the consumer behaviour in market

which can be accessed through NIOS website (www.nios.ac.in).

SCHEME OF STUDY

This course provides you with package of learning opportunities which comprise of:

- Printed Self Learning Material (SLM) is in three parts i.e. Book-1, Book -2 and a laboratory manual.
- Supplementary Materials in the form of Audio and Video Programmes.
- Video tutorials of Krishi: Production, Processing & Marketing are available on the NIOS website (www.nios.ac.in) as well as YouTube.
- 30 Personal Contact Programme (PCP) sessions for theory part and 06 Personal Contact Programme (PCP) sessions for practicals at your study centre. Please contact your study centre for the PCP schedule or visit our NIOS website at www.nios.ac.in.
- Face-to-Face Personal Contact Programme (PCP) at your study centre, live Personal Contact Programmes (PCPs) through audio streaming are offered on Mukta Vidya Vani,

SCHEME OF EVALUATION

The learner will be assessed through Continuous and Comprehensive Evaluation (CCE) in the form of Tutor Marked Assignment (TMA), Public Examination and Practical Examination. The details are given in following table.

PRACTICAL EXAMINATION

There will be a practical examination of 3 hours duration and maximum marks 20, apart from the theoretical examination. The distribution of marks is as follows

- Regular Participation in PCP Classes – 2 marks
 - Activities Performed in PCP Classes – 2 marks
 - Maintenance of Practical Record – 2 marks
 - Preparation of herbarium sheet – 2 marks
 - peer group interaction - 2 marks
 - Activities performed in final examination – 7 marks
- Viva-voce – 3 marks

Mode of Evaluation	Syllabus	Duration	Weightage
Tutor Marked Assignment (TMA)	Lessons marked for TMA (See bifurcation of syllabus)	Self-Paced	20% of Theory
Public/Final Examination	Lessons marked for public examination (See bifurcation of syllabus)	3 hours	80%
Practical Examination	The practical exercises mentioned in manual	3 hours	20%