Course Title: Post-Harvest Management & Value Addition for Agricultural Products

- **Duration:** 5 Days (approximately 35-40 instructional hours)
- **Course Goal:** To equip agricultural producers, food processors, agribusiness professionals, and extension workers with the advanced knowledge, practical skills, and modern technologies for optimizing post-harvest handling, minimizing losses, maintaining product quality, and implementing effective food processing techniques to enhance value, extend shelf-life, and improve the marketability and profitability of agricultural commodities.
- **Core Focus:** Bridging the critical gap between farm production and the consumer by mastering the science and practice of post-harvest handling and value-added processing.

Learning Objectives:

Upon successful completion of this workshop, participants will be able to:

- **Analyze** the physiological and biochemical causes of post-harvest losses in various crops.
- **Implement** best practices for harvesting, handling, cleaning, sorting, and grading to maintain quality.
- **Apply** appropriate pre-cooling, packaging, and transportation methods for perishable products.
- **Design** and manage optimal storage conditions (temperature, humidity, atmosphere) to extend the shelf-life of different commodities.
- **Execute** key food processing and preservation techniques, such as drying, milling, and basic fermentation/bottling.
- **Understand** and apply principles of quality control and food safety (including HACCP basics) in post-harvest and processing operations.
- **Identify** and evaluate viable opportunities for value addition based on market demand.
- **Assess** the economic feasibility of different post-harvest and processing interventions.
- **Develop** a comprehensive action plan to reduce losses and add value to a selected agricultural product.

Target Audience:

- Farmers and leaders of Farmer Organizations/Cooperatives.
- Small to Medium-Scale Food Processors and Agribusiness Entrepreneurs.
- Post-Harvest Specialists and Agricultural Extension Officers.
- Quality Control Managers in food businesses.
- Development practitioners working on food security and agricultural value chains.

Prerequisites:

- A basic understanding of agricultural production.
- An interest in food handling, processing, and business development.

Teaching Methodology:

This is a highly interactive and practical workshop. The methodology includes:

- **Interactive Lectures & Case Studies:** Introducing scientific principles using real-world examples.
- **Hands-on Practical Sessions & Demonstrations:** The core of the course. This includes quality assessment, packaging exercises, and small-scale processing (e.g., drying, juicing, simple preservation).
- **Field Visit (if feasible):** A structured visit to a packhouse, cold storage facility, or local food processing unit.
- **Problem-Solving Workshops:** Participants work in groups to solve common post-harvest challenges.
- **Guest Speakers (optional):** Inviting a successful food processor, a packaging expert, or a food safety officer.
- **Action Planning:** Developing practical plans that can be implemented in participants' own enterprises.

Materials Provided:

- Comprehensive digital or printed workbook with post-harvest principles, processing techniques, and quality control guides.
- A "Post-Harvest Toolkit" with guides for assessing produce quality, checklists for good handling practices, and temperature management charts.
- Materials for hands-on activities (e.g., various types of packaging, produce for quality assessment, ingredients for simple processing).
- Templates for a post-harvest loss assessment, a quality control plan, and a simple processing business plan.
- Certificate of Completion.

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Detailed Day-by-Day Curriculum

Day 1: The Post-Harvest Challenge – Understanding Losses & Quality

- **Module 1: The Importance of Post-Harvest Management (Approx. 2 hours)**
  - Welcome, introductions, and course objectives.
  - The scale of post-harvest losses: Global and local perspectives.
  - The economic, social, and environmental impact of these losses.
  - Defining Post-Harvest Management as a critical part of the food system.
  - **Activity:** "My Post-Harvest Story" – Participants share personal experiences with produce spoilage and its consequences.
- **Module 2: Post-Harvest Physiology: Why Do Products Spoil? (Approx. 2.5 hours)**
  - Understanding the science behind spoilage for:
    - **Perishables (Fruits & Vegetables):** Respiration, transpiration, ethylene production, ripening, and senescence.
    - **Durable (Grains & Legumes):** Moisture content, insect infestation, fungal growth.
  - Key factors that accelerate spoilage: Temperature, humidity, physical damage, and microorganisms.
- **Module 3: Assessing Quality & Quantifying Losses (Approx. 3 hours)**
  - Defining quality attributes for different commodities (size, color, firmness, defects, nutritional value).
  - Simple, practical methods for assessing produce quality.
  - Techniques for conducting a post-harvest loss assessment at different points in the value chain (farm, transport, market).
  - **Hands-on Workshop:** Participants work in groups to assess the quality of different produce samples and practice a simple loss assessment calculation.
  - **End of Day 1 Recap & Q&A.**

Day 2: Best Practices in Handling, Grading & Packaging

- **Module 4: Optimal Harvesting & Field Handling (Approx. 2.5 hours)**
  - The critical link between pre-harvest factors and post-harvest life.
  - Determining the right time to harvest (maturity indices).
  - Best practices for harvesting to minimize mechanical injury.
  - Importance of field sorting and maintaining shade.
- **Module 5: Packhouse Operations: Cleaning, Sorting & Grading (Approx. 3 hours)**
  - The purpose and layout of a simple packhouse.
  - Techniques for cleaning and sanitizing produce.
  - The importance of sorting (removing defective items) and grading (categorizing by quality).
  - Developing simple grading standards based on market requirements.
  - **Intensive Hands-on Workshop:** Participants practice sorting and grading a batch of local produce according to pre-defined standards.
- **Module 6: Modern Packaging for Shelf-Life & Market Appeal (Approx. 2 hours)**
  - The functions of packaging: Protection, preservation, convenience, and marketing.
  - Types of packaging materials and their properties.
  - Introduction to advanced packaging concepts: Modified Atmosphere Packaging (MAP) and Active Packaging.
  - Choosing the right package for your product and market.
  - **Activity:** "Package Design Challenge" – Groups design and present a packaging concept for a specific product.
  - **End of Day 2 Recap & Q&A.**

Day 3: Temperature Management & Storage Technologies

- **Module 7: The Cold Chain: Temperature & Humidity Management (Approx. 3 hours)**
  - The critical role of temperature in controlling spoilage.
  - **Pre-cooling:** Why and how to remove field heat quickly (forced-air, hydro-cooling).
  - Optimal storage temperatures and relative humidity for various commodities.
  - The principles of the "cold chain" and avoiding breaks.
- **Module 8: Storage Technologies for Small & Medium Scale (Approx. 2.5 hours)**
  - Improving traditional storage structures.
  - Low-cost cooling technologies (e.g., Evaporative Cooling, CoolBot™ technology).
  - Principles of refrigerated cold storage.
  - Introduction to Controlled Atmosphere (CA) storage.
  - **Field Visit/Virtual Tour:** Explore a local cold storage or packhouse facility if possible.
- **Module 9: Post-Harvest Management for Grains & Legumes (Approx. 2 hours)**
  - Specific challenges for durable crops.

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- The critical role of **drying** to safe moisture levels.
- Hermetic storage technologies (e.g., PICS bags, cocoons) for insect control.
- Good warehouse management practices.
- **Demonstration:** Showing how to use a simple moisture meter.
- **End of Day 3 Recap & Q&A.**

Day 4: Introduction to Value Addition & Processing

- **Module 10: Principles of Food Processing & Preservation (Approx. 2 hours)**
  - Why add value? (Increased income, new markets, shelf-life extension).
  - Core principles of food preservation: Controlling water activity, temperature, pH, and oxygen.
  - Overview of key processing techniques.
- **Module 11: Drying & Dehydration as a Value-Added Process (Approx. 3 hours)**
  - Techniques for producing high-quality dried products (fruits, vegetables, herbs, fish).
  - Solar drying technologies (direct, indirect).
  - Introduction to mechanical dryers.
  - Pre-treatments and quality control for dried products.
  - **Hands-on Workshop:** Preparing a fruit or vegetable for solar drying.
- **Module 12: Milling, Juicing & Simple Preservation Techniques (Approx. 2.5 hours)**
  - **Milling:** Adding value to grains and legumes.
  - **Juicing & Pulping:** Creating juices, nectars, and squashes.
  - **Preservation with Sugar & Acid:** Principles of making jams, jellies, and pickles.
  - Basic pasteurization for shelf-life.
  - **Hands-on Demonstration:** A step-by-step demonstration of making a simple jam or pickle.
  - **End of Day 4 Recap & Q&A.**

Day 5: Food Safety, Business Planning & Your Action Plan

- **Module 13: Food Safety & Quality Control in Processing (Approx. 2.5 hours)**
  - The importance of hygiene and sanitation.
  - Good Manufacturing Practices (GMPs).
  - Introduction to Hazard Analysis and Critical Control Points (HACCP): The 7 principles.
  - Developing a simple food safety plan for a small processing unit.
- **Module 14: The Business of Post-Harvest & Value Addition (Approx. 2.5 hours)**
  - Conducting a simple cost-benefit analysis for a new post-harvest technology or processing venture.
  - Identifying market opportunities for value-added products.
  - Basic branding and labeling for processed foods.
  - Understanding local food processing regulations.
- **Module 15: Your Post-Harvest & Value Addition Action Plan (Capstone) (Approx. 2 hours)**
  - **Capstone Workshop:** Participants select a specific commodity they work with.
  - They will develop a practical action plan to either:
    1. Significantly reduce post-harvest losses.
    2. Introduce a new value-added product.
  - The plan will include key steps, required resources, quality checks, and a basic financial estimate.
- **Module 16: Course Review & Commitment to Action (Approx. 1 hour)**
  - Review of key post-harvest and value-addition strategies.
  - Open forum for final questions and sharing key insights.
  - Participants share one key commitment from their action plan.
  - Course evaluation and closing.

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