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Breeding Quality Improvement Management

Improvement in Food Variety

Agriculture and animal husbandry are the primary sources of food from plants and animals respectively. To meet the increasing food demand, efforts like the Green Revolution and White Revolution have been implemented to increase crop and livestock production. Sustainable practices are essential to avoid environmental damage. Different crops require specific conditions such as temperature, water, and light. Kharif crops like rice and cotton grow in the rainy season, while Rabi crops like wheat and mustard grow in winter. Crop variety improvement, production enhancement, and protection management increase yields. Techniques like hybridisation and genetic modification introduce beneficial traits, aiming to develop crops adaptable to various climates and conditions.

Desirable Characteristics of Crop Plants

- Increased yield
- Improved quality, such as baking quality in wheat and protein quality in pulses
- Resistance to biotic (living) and abiotic (non-living) stresses
- Reduced duration of plant maturity
- Broad adaptability to different environmental conditions
- Variety improvement may target one or several of these traits

Plant Nutrients

Plants require sixteen essential nutrients obtained from air, water, and soil. These include nine macronutrients such as nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, carbon, oxygen, and hydrogen. Seven micronutrients include iron, manganese, boron, zinc, copper, molybdenum, and chlorine. Carbon and oxygen come from air, while hydrogen is obtained from water.

Animal Husbandry

Animal husbandry involves rearing animals like cattle, goats, sheep, poultry, and fish to meet food demands. It plays a vital role in food security and rural economy.

Cattle Farming

In India, cows and buffaloes serve as draught animals and milch animals for milk production. Long lactation periods are desirable in milch animals. Cross-breeding exotic breeds with local breeds combines high milk yield with disease resistance. Proper management includes providing well-ventilated, hygienic shelters, balanced feeding with roughage and concentrates, and disease control through vaccinations.

Poultry Farming

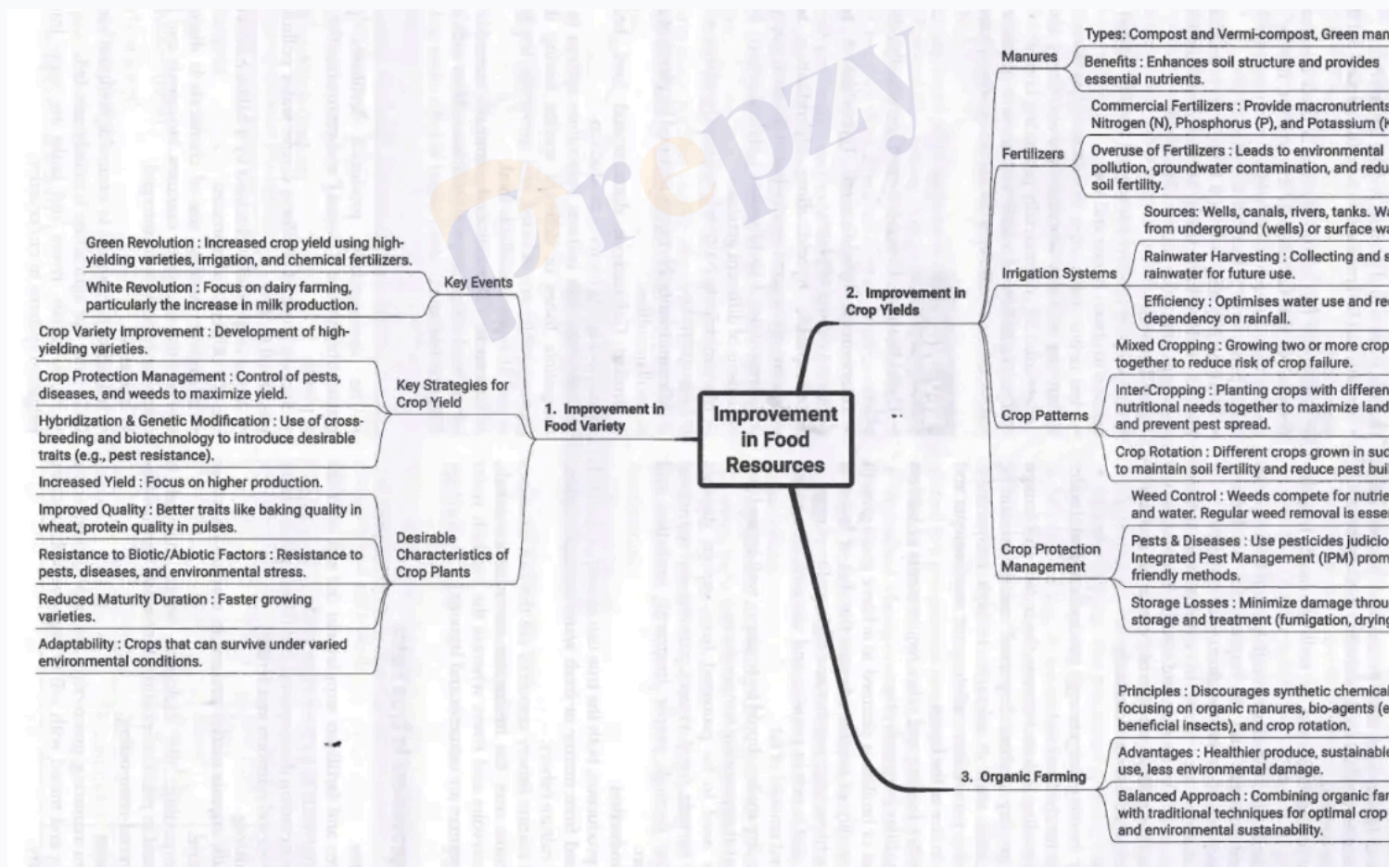
Poultry farming focuses on egg and broiler (meat) production. Cross-breeding Indian and foreign breeds improves traits like heat tolerance and maintenance requirements. Broilers require protein-rich diets for growth, while layers need diets that support high-quality egg production. Farms must be hygienic, well-lit, and temperature-controlled. Disease prevention includes sanitation and vaccination.

Fish Production

Fish production includes capture fishing and culture fishery from marine, freshwater, and brackish water sources. Marine fish like pomfret, tuna, mackerel, and sardines are caught using nets and located with satellites and echo sounders. Marine fish farming includes species like mullets, oysters, and prawns. Freshwater fish farming commonly uses composite fish culture, where multiple species with different feeding habits are together to maximize yield. Hormonal stimulation is used to breed fish and ensure seed supply.

Bee-Keeping

Bee-keeping is a low-investment activity producing honey and wax. Indian bee species include *Apis cerana indica*, *Apis dorsata*, and *Apis florea*, while *Apis mellifera* is an Italian variety used commercially. The quality of honey depends on the availability of pasturage and flower types.



Solved Examples

Example 1: Explain why hybridisation is important in crop improvement.

Solution: Hybridisation involves crossing genetically dissimilar plants to combine desirable traits such as higher yield, disease resistance, and adaptability. This results in improved crop varieties that can survive in diverse conditions and produce better yields.

Example 2: Describe the role of micronutrients in plant growth.

Solution: Micronutrients like iron, manganese, boron, zinc, copper, molybdenum, and chlorine are required in small amounts but are essential for various physiological functions in plants, including enzyme activation, chlorophyll synthesis, and disease resistance, thereby supporting healthy growth.

Practice Set

- **Level 1 (Easy):** List three desirable characteristics of crop plants.
- **Level 2 (Moderate):** Explain the importance of balanced feeding in cattle farming.
- **Level 3 (Challenging):** Discuss how composite fish culture increases fish production.

Answer Key

- **Level 1:** Increased yield, resistance to diseases, broad adaptability.
- **Level 2:** Balanced feeding with roughage and concentrates ensures healthy maintenance and optimal milk production in cattle.
- **Level 3:** Composite fish culture involves raising multiple fish species with different feeding habits together, utilizing all available food resources in the pond, thus increasing overall fish yield.

Improvement Crop Yields

Manures and Fertilisers

Manures are decomposed organic wastes from plants and animals that improve soil fertility and structure. Composting is the biological decomposition of waste in pits, and vermicomposting uses earthworms to accelerate this process. Fertilisers are commercially produced nutrients supplying essential macronutrients like nitrogen, phosphorus, and potassium. Excessive fertiliser use can cause water pollution and soil degradation. A balance between manures and fertilisers yields the best crop production. Organic farming promotes minimal chemical use, relying on organic manures, bio-agents, and healthy cropping systems.

Irrigation

Irrigation supplements rainfall to ensure crop growth. Common systems include wells (using underground water), canals (from rivers or reservoirs), and river lift systems. Rainwater harvesting and watershed management help conserve water for agricultural use.

Crop Patterns

Mixed cropping involves growing two or more crops together to reduce crop failure risk. Inter-cropping grows crops with different nutrient requirements to maximize nutrient use and reduce pests. Crop rotation grows different crops in succession on the same land to maintain soil fertility and maximize returns.

Nutrient Management and Pest Control

Weeds, pests, and diseases reduce crop yields by competing for resources or damaging plants. Weed removal is essential. Pesticides control pests but should be used judiciously to avoid environmental harm. Preventive methods like proper cleaning, drying, and fumigation protect stored crops from losses.

Solved Examples

Example 1: What is vermicomposting and how does it benefit soil?

Solution: Vermicomposting is the process of decomposing organic waste using earthworms. It produces nutrient-rich compost that improves soil structure, fertility, and aeration, promoting healthy plant growth.

Example 2: Explain the advantage of crop rotation.

Solution: Crop rotation involves growing different crops in a planned sequence on the same land. It helps maintain soil fertility, reduces pest and disease buildup, and improves crop yields.

Practice Set

- **Level 1 (Easy):** Define organic farming.
- **Level 2 (Moderate):** Describe the role of irrigation in agriculture.
- **Level 3 (Challenging):** Explain the importance of balanced use of manures and fertilisers.

Answer Key

- **Level 1:** Organic farming is a system with minimal or no chemical use, relying on organic manures, bio-agents, and healthy cropping systems.
- **Level 2:** Irrigation provides water to crops when rainfall is insufficient, ensuring successful agriculture.
- **Level 3:** Balanced use of manures and fertilisers maintains soil fertility and prevents pollution, leading to optimal crop yields.

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