

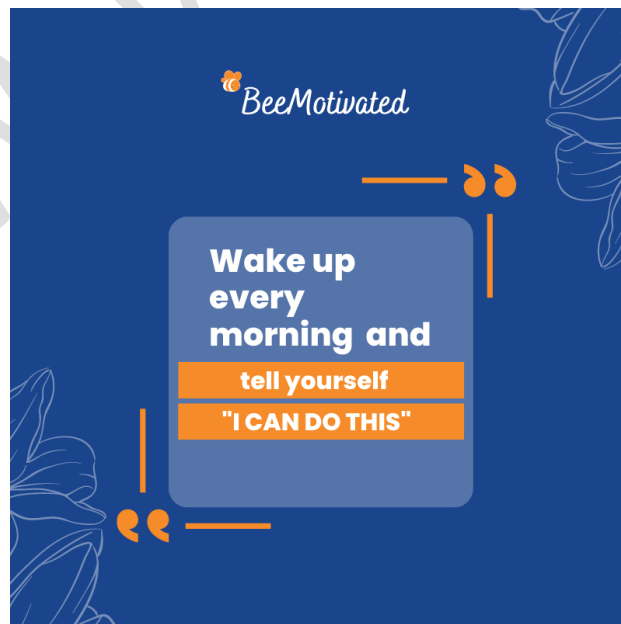


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# NABARD Ph 2 2021

Agriculture- Memory Based

Objective + Descriptive with answers



1. The Universal Soil Loss Equation (USLE) estimates average annual soil loss. The USLE is an empirically based equation, and computes sheet and rill erosion as follows:

$A=RKLSCP$  where K stands for \_\_\_\_\_

- a) Rainfall erosivity factor
- b) Soil erodibility factor
- c) Slope length factor
- d) Slope steepness factor
- e) Support practice factor

**Answer: b) K – Soil erodibility factor**

**Explanation:** The K factor in the Universal Soil Loss Equation measures the soil's inherent susceptibility to erosion, influenced by its texture, structure, permeability, and organic matter.

In this equation A is computed soil loss, R is the rainfall-runoff erosivity factor, L is the slope length factor, S is the slope steepness factor, C is a cover management factor, and P is a supporting practices factor.

2. C4 plants utilize the Hatch and Slack pathway for carbon fixation, which allows them to thrive in hot and dry climates. Among the following, which plant is categorized as a C4 plant?

- a) Rice
- b) Wheat
- c) Mango
- d) Pineapple
- e) Grapes

**Ans: d Pineapple**

**Explanation:** C4 plants, like pineapple, use the Hatch and Slack pathway to fix carbon more efficiently in high-temperature environments. This adaptation helps reduce photorespiration and enhances growth in arid conditions, unlike C3 plants such as rice and wheat, which use the Calvin cycle.

3. A system in which forest trees are grown along with agricultural crops and grasses for livestock on the same land at the same time is known as \_\_\_\_\_

- a) Agri silviculture
- b) Silvi pastoral system
- c) Agrisilvipastoral system
- d) Hortisilvipastoral system
- e) None of the above

**Ans: c Agrisilvipastoral system**

**Explanation-** The agrisilvipastoral system is a sustainable land management practice that integrates forest trees, agricultural crops, and grasses on the same piece of land. This system optimizes land use by combining agriculture and forestry, along with livestock rearing, thereby improving biodiversity, soil health, and productivity. The other systems mentioned focus on combining only trees and crops (Agri silviculture) or trees and pasture (Silvi pastoral).

**4. Which of the following is a key agronomic practice in Integrated Pest Management (IPM) aimed at preventing pest outbreaks?**

- a) Overuse of synthetic pesticides
- b) Rotation of crops and use of resistant varieties
- c) Monoculture farming
- d) Exclusive use of herbicides
- e) Complete dependence on organic farming

**Answer: b) Rotation of crops and use of resistant varieties**

**Explanation:** Crop rotation and resistant varieties are essential agronomic practices in IPM to naturally reduce pest populations and outbreaks.

**5. SHGs are often provided financial assistance to help members engage in which of the following activities?**

- a) Real estate investments
- b) Savings and credit activities, including microenterprise development
- c) International trade
- d) Stock market trading
- e) Political campaigns

**Answer: b) Savings and credit activities, including microenterprise development**

**Explanation:** SHGs primarily focus on savings and micro-lending among members, and financial assistance is aimed at encouraging microenterprise development.

**6. Urea, as a fertilizer, can lead to certain issues in soil management if overused. Which of the following is a potential problem of excessive urea application?**

- a) Buttoning disorder in cauliflower
- b) Nitrogen leaching and soil acidification
- c) Deflocculation of soil particles
- d) Waterlogging
- e) Soil salination

**Answer: b) Nitrogen leaching and soil acidification**

**Explanation:** Excessive use of urea can lead to nitrogen leaching into groundwater and soil acidification, which can affect long-term soil health.

**7. A plant showing yellowing between the veins (interveinal chlorosis) on older leaves is most likely deficient in which essential nutrient?**

- a) Phosphorus
- b) Nitrogen
- c) Magnesium
- d) Potassium
- e) Calcium

**Answer: c) Magnesium**

**Explanation:** Magnesium deficiency in plants often leads to chlorosis between veins in older leaves, as magnesium is mobile and can be transported to new growth areas.

8. **In alley cropping systems, which of the following is a key consideration for choosing tree species to plant between crop rows?**

- a) Tree species should require high water input
- b) Trees should be slow-growing to avoid competition with crops
- c) Trees should provide benefits like nitrogen fixation or fodder
- d) Trees should grow taller than 50 meters
- e) Trees should not be used for timber

**Answer: c) Trees should provide benefits like nitrogen fixation or fodder**

**Explanation:** Tree species in alley cropping are often chosen for their ability to fix nitrogen, provide fodder, or contribute to soil fertility without excessive competition for resources.

### Paragraph for question 9 to 12

*Chlorophyll pigments, specifically a and b, play a crucial role in photosynthesis and are produced within the chloroplasts of leaf tissues. These molecules possess hydrophobic characteristics due to their phytol tail, and their structure resembles hemoglobin, except chlorophyll holds a magnesium ion at its core instead of iron. Synthesizing chlorophyll is resource-intensive, requiring nitrogen atoms, and as leaves age, the chlorophyll breaks down, with the plant reabsorbing much of the nitrogen for future use. Apart from Chlorophyll there are other pigments like  a  pigment which is primarily involved in protecting plant tissues from excessive light by absorbing harmful ultraviolet radiation. Some of the pigments like  b  water-soluble and often found in the vacuoles of plant cells.*

Based on the given paragraph answer the following questions:

9. **Find the suitable word for blank “a”.**

- a) Chlorophyll a
- b) Xanthophylls
- c) Anthocyanins
- d) Carotenes
- e) Flavonoids

**Answer: e) Flavonoids**

**Explanation:** Flavonoids are responsible for protecting plant tissues from harmful ultraviolet light and are commonly found in the epidermal layers of leaves.

10. **Chlorophyll a is a primary pigment in photosynthesis, but what role do accessory pigments such as chlorophyll b and carotenoids play?**

- a) They store energy
- b) They absorb different wavelengths of light and pass energy to chlorophyll a
- c) They produce oxygen

- d) They absorb water
- e) They reduce carbon dioxide

**Answer: b) They absorb different wavelengths of light and pass energy to chlorophyll a**

**Explanation:** Accessory pigments like chlorophyll *b* and carotenoids broaden the range of light absorption, funneling energy to chlorophyll *a* for photosynthesis.

**11. Find the suitable word for blank “b”.**

- a) Chlorophyll
- b) Carotenoids
- c) Xanthophyll
- d) Anthocyanins
- e) Betalains

**Answer: d) Anthocyanins**

**Explanation:** Anthocyanins are water-soluble pigments found in the vacuoles of plant cells, contributing to red, purple, and blue colors.

**12. Phycobilins are pigments found in which group of organisms?**

- a) Land plants
- b) Green algae
- c) Red algae and cyanobacteria
- d) Fungi
- e) Mosses

**Answer: c) Red algae and cyanobacteria**

**Explanation:** Phycobilins are water-soluble pigments found in red algae and cyanobacteria, contributing to their distinctive colors.

### Paragraph for question 13 to 16

*Mutations are alterations in the DNA sequence that can occur in various forms, such as point mutations, where a single base is changed, or deletions and insertions, which result in the loss or addition of DNA segments. Substitutions involve the replacement of bases, while inversions reverse a DNA segment. Frameshift mutations, caused by insertions or deletions, disrupt the reading frame of genes. When a mutation leads to the replacement of one amino acid with another in a plant protein, it is known as \_\_\_\_\_ “a” \_\_\_\_\_. Mutations play a significant role in plant breeding, as they can introduce beneficial traits, enhance \_\_\_\_\_ b \_\_\_\_\_, and improve crop resistance to diseases or environmental stresses.*

**13. Which of the following is a specific mutagen commonly used in plant breeding to induce genetic mutations?**

- a) Ethyl methanesulfonate (EMS)
- b) Glyoxylate
- c) Gene splicing
- d) Polyethylene glycol

e) Glucagon

**Answer: a) Ethyl methanesulfonate (EMS)**

**Explanation:** Ethyl methanesulfonate (EMS) is a chemical mutagen widely used in plant breeding to induce mutations in DNA, leading to genetic variations that can be harnessed for developing improved plant traits. The other options are not mutagens but involve different genetic modification or breeding techniques.

**14. What will be the suitable for blank-“a”**

- a) Silent mutation
- b) Missense mutation
- c) Nonsense mutation
- d) Frameshift mutation
- e) Deletion

**Answer: b) Missense mutation**

**Explanation:** A missense mutation results in the substitution of one amino acid for another, which may affect the protein's function depending on the location and nature of the change.

**15. Which type of mutation is least likely to affect the phenotype of a plant, as it does not change the amino acid sequence?**

- a) Missense mutation
- b) Silent mutation
- c) Nonsense mutation
- d) Frameshift mutation
- e) Insertion

**Answer: b) Silent mutation**

**Explanation:** Silent mutations do not alter the amino acid sequence of the protein, and therefore, they are less likely to have a visible effect on the plant's phenotype.

**16. What will be the suitable for blank-“b”**

- a) Homogeneous traits
- b) Genetic uniformity
- c) Genetic diversity
- d) Decreased yield
- e) Longer flowering periods

**Answer: c) Genetic diversity**

**Explanation:** Induced mutations help introduce genetic diversity, which is essential for improving crop resilience and traits in plant breeding programs.

#### **Paragraph for question 17 to 20**

*Agroforestry integrates trees with crops and/or animals to create sustainable agricultural systems, enhancing ecological and economic benefits. The three main types include agrisilvicultural systems, which combine trees with crops, \_\_\_a\_\_\_ systems, integrating trees with pastures or animals, and \_\_\_b\_\_\_ systems, which involve animals, trees, and crops together. These systems*

contribute to improved biodiversity, soil health, and resource efficiency, making them valuable for modern agricultural practices and environmental conservation.

**17. Which of the following is most appropriate for blank “a”?**

- a) Horti-silviculture
- b) Silvopastoral systems
- c) Agrisilviculture
- d) Agro-pastoral system
- e) None of them

**Ans: b**

**Explanation:** Silvopastoral systems combine trees with pastures and livestock grazing, providing shade, fodder, and environmental benefits like improved soil quality.

**18. Which of the following is most appropriate for blank “b”?**

- a) Silvopastoral systems
- b) Agro-silvopastoral system
- c) Agrisilviculture
- d) Agro-pastoral system
- e) None of them

**Answer: b. Agro-silvopastoral system**

An agrosilvopastoral system is a land use management approach that combines crops, livestock, and trees to optimize ecological, economic, and social benefits.

**19. Which agroforestry practice involves planting trees or shrubs along the edges of fields to protect crops from wind and reduce erosion?**

- a) Alley cropping
- b) Windbreaks
- c) Taungya system
- d) Silvopastoral system
- e) Agroforestry buffer zones

**Answer: b) Windbreaks**

**Explanation:** Windbreaks are rows of trees or shrubs planted along the edges of fields to reduce wind speed, protect crops, and minimize soil erosion.

**20. In order to measure the diameter at breast height \_\_\_\_ is used.**

- a) Tree caliper
- b) Abney level
- c) Dendrometer
- d) Clinometer
- e) Pycnometer

**Ans: Tree caliper**

DBH is usually measured with tree caliper or diameter tape.

**Paragraph for question 21 to 24**

Herbicides are chemical substances used to control or kill unwanted plants (weeds). They can be classified into selective herbicides, which target specific plant species without affecting others for example a and non-selective herbicides, which kill all vegetation they come into contact with. Herbicides can also be categorized by their mode of action, such as contact herbicides, which kill only the plant parts they touch, or systemic herbicides, which are absorbed and transported throughout the plant, killing it entirely.

**21. Which of the following is an example of a systemic herbicide?**

- a) Paraquat
- b) Glyphosate
- c) Bromoxynil
- d) Diquat
- e) Oxyfluorfen

**Answer: b) Glyphosate**

**Explanation:** Glyphosate is a systemic herbicide, meaning it is absorbed by the plant and moves through its tissues, killing it entirely.

**22. What is the mode of action for herbicides like atrazine, which affect photosynthesis in plants?**

- a) They block protein synthesis
- b) They inhibit the photosystem II in chloroplasts
- c) They disrupt DNA replication
- d) They destroy plant cell walls
- e) They interfere with seed germination

**Answer: b) They inhibit the photosystem II in chloroplasts**

**Explanation:** Atrazine and other similar herbicides work by inhibiting photosystem II, preventing the plant from performing photosynthesis, ultimately leading to its death.

**23. What is the primary time of application for a pre-emergence herbicide?**

- a) 10 to 15 days before sowing of crop
- b) 1 to 2 days after sowing of crop
- c. 10 to 15 days after sowing of crop
- d) It can be applied any time before emergence of weeds
- e) Before the sowing season of crop

**Answer: b**

**Explanation:** Pre-emergence herbicides are applied before weed seeds germinate, often right after planting crops, to create a barrier that prevents weeds from growing. Therefore they have to be applied 1 to 2 days after sowing of crop.

**24. Which of the following is selective herbicides that can be filled in the blank “a”?**

- a) Atrazine



- b) 2,4-D
- c) Diquat
- d) Glyphosate
- e) Paraquat

**Answer: b) 2,4-D**

**Explanation:** 2,4-D is a selective herbicide that targets broadleaf weeds and is commonly used in grassy areas like lawns and pastures.

### Paragraph for question 25 to 28

Mango (*Mangifera indica*) is one of the most important fruit crops cultivated in tropical and subtropical regions. India, renowned for its diverse mango varieties, offers a delightful array of flavors and textures that cater to every palate. The popular varieties include Alphonso, Dasher, Kesar, and Langra. Most of the south Indian varieties are regular bearer whereas the north Indian varieties are alternate bearer. In order to induce regular flowering in these varieties \_\_\_a\_\_\_ is practiced. The \_\_\_b\_\_\_ variety, often regarded as the “King of Mangoes,” is celebrated for its rich sweetness and creamy texture, particularly prominent in regions like Maharashtra and Gujarat but is susceptible to Spongy tissue disorder. The Langra, known for its unique tangy flavor and fibrous flesh, is popular in Uttar Pradesh and Bihar. Meanwhile, the Kesar mango from Gujarat is cherished for its vibrant color and intense aroma.

**25. Which of the following is most suitable for \_\_\_a\_\_\_.**

- a) High-density planting
- b) Smudging
- c) Grafting
- d) Paclobutrazol application
- e) Mulching

**Answer: d) Paclobutrazol application**

**Explanation:** Paclobutrazol is a growth regulator used in mango cultivation to induce flowering and fruiting during the off-season.

**26. Which of the following is most suitable for \_\_\_b\_\_\_.**

- a) Dasher
- b) Bombay Green
- c) Alphonso
- d) Chausa
- e) Totapari

**Ans: c**

Alphonso mangoes are susceptible to a physiological disorder called spongy tissue. This disorder can affect the flavor and quality of the pulp.

**27. The causal agent of anthracnose disease in mango is \_\_\_**

- a) *Fusarium oxysporum*

- b) *Colletotrichum gloeosporoides*
- c) *Oidium mangiferae*
- d) *Xanthomonas campestris*
- e) *Alternaria alternata*

**Ans: b**

The fungus *Colletotrichum gloeosporioides var minor* is the causal agent of anthracnose disease in mango.

### 28. The mango variety Mallika is the cross between

- a) Dasher x Neelum
- b) Neelum x Dasher
- c) Alphonso x Neelum
- d) Neelum x alphonso
- e) Banganpalli x alphonso

**Ans: Neelum x Dasher**

Mallika-Cross of Neelum x Dashehari. It has highest Vitamin A content.

### Descriptive questions (10 Marks)

#### 1. What is the role of KVKs in agriculture, describe mandate, Programmes and initiatives?

##### Introduction:

Krishi Vigyan Kendras (KVKs) play a vital role in India's agricultural extension system. Established by the Indian Council of Agricultural Research (ICAR), KVKs aim to bridge the gap between agricultural research and the farming community. These district-level institutions serve as knowledge hubs to disseminate innovative agricultural technologies and practices among farmers, ultimately contributing to improved productivity, income, and sustainability.

##### Mandate of KVKs:

The mandate of KVKs revolves around facilitating effective transfer of technology to farmers.

Key components of their mandate include:

1. Conduct operational area surveys to identify training needs of the farming community.
2. Plan and conduct production-oriented short and long training courses on and off campus for various groups, prioritizing the poor and weaker sections.
3. Organize non-formal educational programs like field days, farm visits, farmer fairs, and farm science clubs to support training.
4. Establish farm science clubs in schools and villages to foster interest in agricultural sciences among youth.
5. Maintain campus farms for practical training and demonstrate the latest agricultural techniques.
6. Provide practical facilities to vocational agriculture students and teachers.
7. Educate rural illiterates and drop-outs to become better farmers and citizens.
8. Offer training in home-making, nutrition, and home crafts for rural communities.
9. Expand training to include areas like cottage industries for integrated rural development.

10. Implement ICAR and related organizational schemes to enhance training programs.

#### Programmes of KVKs:

1. On-Farm Trials (OFTs): KVKs conduct trials to evaluate new technologies under actual farming conditions. These trials help identify the adaptability of specific practices to local needs.
2. Farmers' Training Programs: KVKs organize a wide range of training programs focusing on different aspects of agriculture, such as crop production, horticulture, livestock management, and integrated pest management.
3. Demonstration of Technologies: By showcasing new agricultural technologies through frontline demonstrations, KVKs promote the adoption of advanced methods in fields such as soil health management, water conservation, and high-yield crop varieties.

#### Initiatives of KVKs:

1. Integrated Farming Systems (IFS): Promoting a holistic approach to farming, KVKs encourage farmers to adopt integrated systems that combine crop, livestock, and aquaculture practices for enhanced sustainability.
2. Doubling Farmers' Income: In alignment with national goals, KVKs implement strategies to double farmers' income by focusing on crop diversification, value addition, and market linkages.
3. Climate-Resilient Agriculture: KVKs promote climate-resilient agricultural practices to help farmers adapt to the challenges posed by changing weather patterns.

#### Conclusion:

KVKs are vital in modernizing Indian agriculture by promoting scientific practices, skill development, and sustainable farming. Their efforts enhance productivity, profitability, and contribute to rural development and food security.

## 2. What are GM crops? What are their advantages and disadvantages?

#### Introduction:

Genetically Modified (GM) crops are plants that have been altered using biotechnology to introduce desirable traits like such as resistance to pests, herbicides, or environmental conditions, improved nutritional content, or enhanced growth rates etc. from other organisms. The development of GM crops has significantly impacted modern agriculture, offering new possibilities for enhancing food security and crop resilience.

#### History of GM Crops:

The concept of genetically modifying crops began in the 1970s with advancements in biotechnology. The first genetically modified plant (GMP) was a tobacco resistant to antibiotics in 1983. The Flavr Savr tomato was introduced as the first genetically engineered whole food in 1994. It was engineered to have a longer shelf life. Since then, several GM crops, such as Bt cotton and Bt Brinjal, have been widely adopted around the world.

#### Examples of GM Crops:

1. **Bt Cotton:** Engineered with genes from the bacterium *Bacillus thuringiensis* (Bt), Bt cotton is resistant to bollworm, a major pest for cotton crops.

2. **Golden Rice:** This rice variety is modified to produce beta-carotene, a precursor of vitamin A, to address vitamin A deficiency in developing countries.
3. **Dhara Mustard Hybrid-11:** is an indigenously developed transgenic mustard. It is a genetically modified variant of Herbicide Tolerant (HT) mustard.

#### Advantages of GM Crops:

1. **Increased Yield:** GM crops often exhibit higher yields due to their resistance to pests, diseases, and herbicides, reducing crop losses and improving productivity.
2. **Reduced Pesticide Use:** Crops like Bt cotton and Bt corn are naturally resistant to pests, decreasing the need for chemical pesticides, which benefits the environment and lowers input costs for farmers.
3. **Enhanced Nutritional Content:** Some GM crops, such as Golden Rice, are engineered to have higher nutritional value, addressing malnutrition in certain regions.
4. **Climate Resilience:** GM crops can be modified to withstand harsh environmental conditions like droughts or salinity, helping farmers cope with climate change.

#### Disadvantages of GM Crops:

1. **Environmental Concerns:** GM crops may lead to reduced biodiversity and unintended harm to non-target organisms, including beneficial insects or wildlife.
2. **Resistance Development:** Overuse of GM crops could result in the evolution of resistant pests or weeds, necessitating stronger chemicals or new technologies.
3. **Economic and Ethical Issues:** The patenting of GM crops can create economic dependence for farmers, especially smallholders. Additionally, concerns about long-term health effects and ethical implications continue to fuel debates about GM technology.

#### Conclusion:

GM crops offer significant benefits like higher yields and reduced pesticide use, but also pose environmental and ethical concerns. Responsible management and regulation are essential for their sustainable role in global food security.

### 3. Describe harvesting and post processing of Jute crop.

#### Introduction:

Jute, the "Golden Fiber," is a natural, biodegradable crop mainly grown in India and Bangladesh, used for products like sacks and ropes. Its quality, impacting market value, depends on careful harvesting and post-processing to maintain strength and durability.

#### Harvesting of Jute Crop:

Jute is typically harvested when the plants reach a height of 8-12 feet, which occurs around 100-120 days after sowing. At this stage, the plants begin to flower, indicating that they have reached maturity. Delayed harvesting can result in coarse fiber, so it is crucial to time the harvest correctly. The jute stalks are cut close to the ground, either manually or with the help of sickles. These stalks are then bundled and left in the field for a few days to allow the leaves to shed, which aids in easier post-processing.

#### Post-Processing of Jute:

1. **Retting** **Process:**  
The first step after harvesting is retting, a process where the jute stalks are submerged in slow-running water (preferably in rivers, ponds, or tanks) for 15-20 days. During this time,

microbial activity helps break down the plant tissues, separating the fiber from the woody stalk. The quality of retting significantly influences the final fiber quality, with inadequate retting leading to coarse and brittle fibers.

2. **Stripping the Fiber:**

After retting, the fibers are extracted from the stalks in a process known as stripping. The workers hold the base of the stalks and strip the fibers by hand, pulling them free from the woody core. Once stripped, the fibers are washed thoroughly to remove any dirt or residual plant material.

3. **Drying:**

The fibers are then spread out to dry in the sun. Drying is crucial to prevent mold growth and deterioration of the fibers. Sun-drying ensures that the fibers retain their natural color and strength. Typically, the fibers are dried for two to three days.

4. **Grading and Baling:**

Once dried, the jute fibers are sorted and graded based on their quality—strength, luster, color, and length. Higher-quality fibers are separated for export or use in premium products. After grading, the fibers are bundled into bales for transportation to mills where further processing occurs.

**Conclusion:**

Efficient harvesting and processing of jute are crucial for maintaining its quality and meeting the demand for sustainable products. By ensuring high fiber standards, the jute industry remains a key player in eco-friendly textiles and packaging worldwide.

## Descriptive questions (15 Marks)

### 1. What is the need of crop insurance, Mention the salient features of PMFBY and what are the challenges of PMFBY?

**Introduction:**

Agriculture is crucial to India's economy, but farmers face high risks from unpredictable weather, pests, and market fluctuations. Crop insurance serves as a financial safeguard, compensating farmers for crop failures. The Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016, aims to provide comprehensive crop insurance coverage for farmers across India.

**Need for Crop Insurance:**

**Crop insurance is essential for the following reasons:**

1. **Mitigating Risk:** Crop insurance provides financial compensation for losses due to erratic weather and natural disasters, reducing the risks of farming.
2. **Farmer Protection:** It safeguards small farmers from debt by compensating for crop failures, reducing their reliance on loans.
3. **Promoting Investment:** Insurance encourages farmers to invest in better seeds and technologies, fostering modern agricultural practices and productivity.
4. **Stabilizing Incomes:** Crop insurance helps stabilize farmer incomes, ensuring financial security even in bad seasons.

**Salient Features of Pradhan Mantri Fasal Bima Yojana (PMFBY):**

PMFBY was launched to replace previous crop insurance schemes with a more comprehensive, farmer-friendly approach. The following are its salient features:

1. **Coverage:** PMFBY covers all food and oilseed crops along with annual commercial and horticultural crops. It provides insurance against risks such as natural calamities, pests, diseases, and post-harvest losses.
2. **Low Premium Rates:** The premium for farmers is kept at a very low rate—2% of the sum insured for Kharif crops, 1.5% for Rabi crops, and 5% for commercial and horticultural crops. The remainder of the premium is subsidized by the government.
3. **Full Coverage:** The scheme provides comprehensive coverage, including pre-sowing to post-harvest losses up to 2 weeks. This includes protection against losses due to natural calamities like drought, floods, hailstorms, pests, and diseases.
4. **Use of Technology:** PMFBY emphasizes the use of technology for better efficiency and transparency. Smart phones, drones, and remote sensing technology are used for quick and accurate assessment of crop losses, reducing delays in claim settlement.
5. **Timely Claim Settlement:** PMFBY ensures prompt claim settlement, so that farmers receive their compensation on time without unnecessary delays, which are common in traditional insurance models.

**Challenges of PMFBY:**

Despite its benefits and widespread implementation, PMFBY faces several challenges:

1. **Awareness and Access:** Many farmers, particularly small and marginal ones, are not fully aware of the scheme's benefits, leading to lower enrolment rates. Additionally, in remote areas, access to financial institutions and enrolment procedures can be difficult.
2. **Data Accuracy:** While technology is used for crop loss assessment, there have been concerns regarding the accuracy of data collection, particularly in large-scale disasters where assessments may not be conducted thoroughly.
3. **State Participation:** PMFBY is a joint initiative of the central and state governments, but there are instances where states have delayed premium payments, which in turn delays compensation to farmers. Some states have even withdrawn from the scheme, citing financial burdens.
4. **Regional Disparities:** There is an uneven implementation of PMFBY across different regions, with some states showing high participation while others lag behind, affecting the overall reach of the scheme.

**Conclusion:**

Crop insurance is crucial for safeguarding the livelihoods of farmers in India, especially in a climate-sensitive agricultural environment. PMFBY, with its comprehensive coverage and low premiums, has the potential to significantly reduce farmers' risks and stabilize their incomes. However, the challenges of delayed claim settlements, inadequate awareness, and regional disparities must be addressed to fully realize the scheme's potential. With necessary reforms and improvements, PMFBY can serve as a robust safety net for millions of farmers, promoting agricultural resilience and sustainability in India.

## 2. What are the main causes for the poor productivity of crops in agriculture?

### Introduction:

Agriculture is vital to the economy of developing countries like India, yet crop productivity often remains low. Crop productivity, the output per unit of input, is key to food security and economic growth. Addressing social, environmental, and technological factors is essential for improving productivity and promoting sustainable agriculture.

### Main Causes for Poor Productivity of Crops:

#### 1. Fragmented Landholdings:

One of the primary causes of low productivity is the fragmentation of agricultural land, particularly in countries like India, where small and marginal farmers own most of the land. These small plots are often uneconomical to cultivate with modern machinery or advanced agricultural techniques, resulting in lower efficiency and reduced yields.

#### 2. Degradation of Soil Quality:

Poor soil health is another significant factor in declining crop productivity. Continuous use of chemical fertilizers and pesticides depletes the soil's natural nutrients and reduces its fertility. In addition, practices like overgrazing, deforestation, and improper irrigation lead to soil erosion, salinization, and desertification, further diminishing its ability to sustain healthy crop growth.

#### 3. Inadequate Irrigation Facilities:

Agriculture in many regions is heavily reliant on rainfall, making crop productivity highly vulnerable to monsoon failures or erratic rainfall patterns. Poor irrigation infrastructure exacerbates this problem, leaving vast tracts of agricultural land unwatered.

#### 4. Outdated Farming Techniques:

Many farmers still rely on traditional methods of farming, which are often less efficient than modern techniques. The lack of awareness and training on advanced farming practices, such as the use of improved seeds, precision farming, crop rotation, and conservation agriculture, hampers productivity.

#### 5. Inadequate Access to Quality Inputs:

The availability and affordability of quality agricultural inputs such as seeds, fertilizers, and pesticides play a crucial role in crop productivity. Poor-quality seeds, counterfeit or substandard fertilizers, and inappropriate use of pesticides contribute to lower yields.

#### 6. Pest and Disease Infestations:

Pest attacks and plant diseases cause significant crop losses every year. Farmers often lack access to adequate pest control measures, either due to financial constraints or lack of knowledge. In some cases, excessive use of pesticides has led to resistant pests, further exacerbating the problem. Climate change also intensifies the frequency and spread of pests and diseases, putting crop productivity at risk.

#### 7. Lack of Agricultural Credit and Financing:

Many farmers, especially smallholders, face challenges in accessing formal financial institutions for credit. Without adequate financing, farmers cannot afford the necessary inputs, machinery, or infrastructure improvements that would help boost productivity.

High interest rates from informal lenders can trap farmers in debt, limiting their ability to invest in better farming practices.

**8. Climate Change and Environmental Factors:**

Changing climatic patterns, including erratic rainfall, rising temperatures, and more frequent extreme weather events, pose significant challenges to crop productivity. Droughts, floods, and heatwaves can lead to crop failure, while increased CO<sub>2</sub> levels may alter growing seasons. Climate change also affects water availability and the occurrence of pests, adding further stress to the agricultural system.

**9. Lack of Access to Markets and Infrastructure:**

Poor access to markets, transportation, and storage facilities prevents farmers from selling their produce at fair prices, leading to post-harvest losses and reduced incentives to improve productivity. Inadequate infrastructure, such as roads and cold storage, also results in a lack of timely access to markets, especially for perishable crops, leading to wastage.

**10. Policy and Institutional Challenges:**

Inconsistent policies and poor implementation of agricultural schemes limit productivity, with farmers often missing out on subsidies and support due to bureaucratic inefficiencies. Inadequate extension services further prevent farmers from adopting modern practices and technologies.

**Conclusion:**

Improving crop productivity requires addressing challenges like land fragmentation, soil degradation, and outdated techniques through investment and modern farming methods. Sustainable interventions can boost farm incomes and agricultural output, ensuring food security and economic growth.

**3. Describe following.**

**1. Rhizobium biofertilizer**

**2. Organic Farming v/s Conventional Farming**

**3. Role of FPOs**

**4. Animal Husbandry, importance in agriculture**

Ans:

**1. Rhizobium Biofertilizer:**

Rhizobium biofertilizer is an eco-friendly, sustainable agricultural solution that enhances soil fertility by promoting nitrogen fixation in leguminous plants such as peas, beans, and lentils. This symbiotic bacterium forms nodules on plant roots, converting atmospheric nitrogen into ammonia, a form usable by plants for growth. By naturally enriching the soil with essential nutrients, Rhizobium biofertilizers reduce the need for synthetic chemical fertilizers, thus promoting sustainable farming practices. Additionally, Rhizobium is associated with producing plant growth-promoting substances, solubilizing phosphates, and offering protection against pathogens. It can enhance crop yields by 20-25% and significantly reduce the need for nitrogenous fertilizers. Its



widespread adoption is supported by farmers, agricultural officers, and state agriculture departments, contributing to improved crop productivity and soil health.

## **2. Organic Farming vs Conventional Farming:**

Organic farming and conventional farming are two distinct agricultural practices with differing approaches to crop production. Organic farming emphasizes natural methods, avoiding synthetic pesticides, fertilizers, and genetically modified organisms (GMOs). Instead, it relies on organic fertilizers like compost and manure, crop rotation, biological pest control, and green manure to enhance soil fertility and promote biodiversity. Organic farming is considered more environmentally friendly, as it minimizes chemical runoff, preserves soil health, and fosters a more balanced ecosystem.

Conventional farming, on the other hand, uses chemical fertilizers, pesticides, herbicides, and GMOs to maximize crop yield and efficiency. It often focuses on large-scale production, aiming for high yields with fewer labor-intensive practices. While conventional farming has led to increased food production, it is associated with concerns about environmental degradation, such as soil erosion, water pollution, and loss of biodiversity due to the extensive use of chemicals.

The key difference lies in sustainability: organic farming aims for long-term environmental health and reduced chemical dependency, while conventional farming prioritizes short-term productivity and higher yields. However, organic farming often requires more labor and time, making it less efficient for large-scale production. Both methods have their merits, and balancing them could ensure food security and environmental sustainability.

## **3. Role of FPOs (Farmer Producer Organizations):**

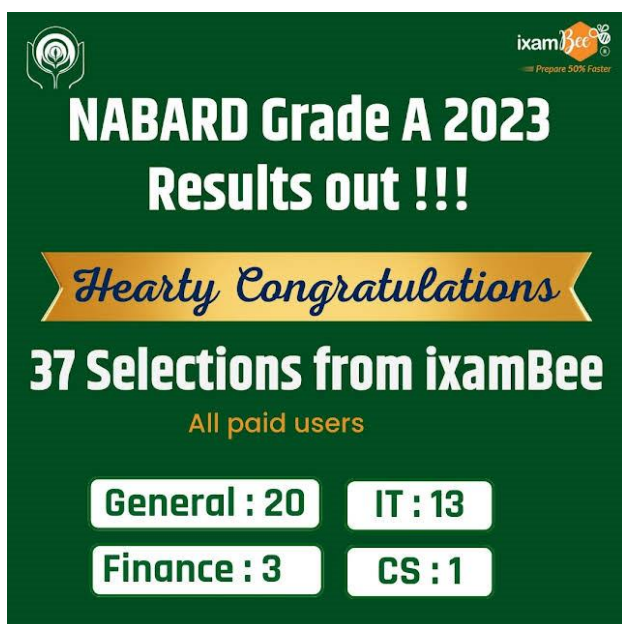
Farmer Producer Organizations (FPOs) play a vital role in empowering small and marginal farmers by addressing the challenges of fragmented, small-scale farming. By pooling resources and collective efforts, FPOs provide farmers with better access to inputs like seeds, fertilizers, and machinery, along with improved market linkages. They enhance farmers' bargaining power, allowing them to bypass intermediaries and sell their produce directly to markets, which increases profitability. FPOs also offer training in modern agricultural techniques, facilitating knowledge transfer and adoption of innovative practices. Additionally, FPOs help farmers access credit, financial advice, and technical support, making them more competitive in emerging market opportunities.

The collective model of FPOs helps farmers achieve economies of scale, reduce risks, and improve productivity, contributing to better livelihoods and long-term agricultural sustainability. Supported by the government, FPOs are essential for promoting rural development and ensuring food security across India.

#### 4. Animal Husbandry: Importance in Agriculture:

Animal husbandry plays a crucial role in agriculture by supporting farmers' livelihoods and contributing to the food supply. It involves the breeding, care, and management of livestock such as cows, goats, poultry, and marine animals for producing milk, eggs, meat, and other products. These animal-derived foods are rich in nutrients like proteins, vitamins, and minerals, essential for human nutrition. Additionally, animal husbandry provides employment to many farmers, improving their income and living standards.

By developing high-yielding animal breeds through selective breeding, animal husbandry enhances the productivity of milk, meat, and eggs. It also promotes better animal health through proper care, shelter, and disease management. Furthermore, it supports environmental sustainability through effective waste management. Overall, animal husbandry is an integral part of agriculture, contributing to food security, rural development, and economic growth.



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