PRELIMS QUESTION

Q1. Consider the following statements regarding Biopesticides

1. Biopesticides are anything that kills pest and are natural in origin.
2. Biopesticides are more toxic than conventional pesticides
3. Biopesticide is effective only when used in large quantity.

Which of the above statements is/are correct?

(a) 1 only (b) 1 and 3 only

(c) 2 only (d) 2 and 3 only

Answer: (A)

Explanation:

Advantages of Biopesticides:

Biopesticides are usually inherently less toxic than conventional pesticides.

Biopesticides generally affect only the target pest and closely related organisms, in contrast to broad-spectrum, conventional pesticides that may affect organisms as different as birds, insects and mammals.

Biopesticides often are effective in very small quantities and often decompose quickly, resulting in lower exposures and largely avoiding the pollution problems caused by conventional pesticides.

When used as a component of Integrated Pest Management (IPM) programs, biopesticides can greatly reduce the use of conventional pesticides, while crop yields remain high.

Q2. Consider the following statements regarding climate-smart agriculture;

1. Climate-smart agriculture considers the singularity of social, economic and environmental aspects.
2. The burning of crop fields and residues is one of the important reasons for climate change.
3. Demand-side measures and value chain upgradation are key components of climate-smart agriculture.

Which of the above statements is/are correct?

(a) 1 only (d) 1 and 2 only

(c) 2 only (d) 2 and 3 only

Answer: (D)

Explanation:

Climate-smart agriculture: Climate-smart agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support the development and ensure food security in a changing climate. CSA aims to tackle three main objectives:

- Sustainably increasing agricultural productivity and incomes
- Adapting and building resilience to climate change
- Reducing and removing greenhouse gas emissions, where possible.

Importance of Climate-Smart Agriculture:

- Climate-Smart Agriculture (CSA) takes into consideration the diversity of social, economic and environmental contexts, including agro-ecological zones.
- Implementation requires the identification of climate-resilient technologies and practices for the management of water, energy, land, crops, livestock.
- The Intergovernmental Panel on Climate Change (IPCC) has highlighted that future agricultural growth will be impacted by climate change. This phenomenon leads to an increase in the frequency and intensity of extreme events such as drought, heavy rainfall, flooding and high maximum temperatures. Water scarcity and dry regions are likely to increase significantly by the end of the century.
- Besides, greenhouse gas emissions from agriculture, including due to the burning of crop fields and residues, are a principal contributor to climate change. Hence, there is a dire need to initiate a paradigm shift in agricultural development approaches and practices to mitigate the effects of climate change and make agriculture sustainable.

Elements of Climate-Smart Agriculture:

- The management of land, crops, livestock, aquaculture and capture fisheries to balance near-term food security and livelihoods need with priorities for adaptation and mitigation. Ecosystem and landscape management to conserve ecosystem services that are important for food security, agricultural development, adaptation and mitigation
- Services for farmers and land managers that can enable them to better manage the risks and impacts of climate change and undertake mitigation actions
- Changes in the wider food system including demand-side measures and value chain interventions that enhance the benefits of climate-smart agriculture.

Initiatives for CSA in India:

- The Government of India is implementing the National Mission of Sustainable Agriculture (NMSA), one of the eight missions under the National Action Plan on Climate Change (NAPCC).
- Parallelly, the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) envisages “Per Drop More Crop", that is, promoting micro/drip irrigation to conserve water.
- There is also a push to cluster-based organic farming through the Paramparagat Krishi Vikas Yojana (PKVY).
- The mission of these programmes is to extensively leverage adaptation of climate-smart practices and technologies in conjunction with the Indian Council of Agricultural Research (ICAR) and state governments.
- Currently, the Kisan Call Centre Services, Kisan Suvidha mobile application and Common Service Centres are supplementing the efforts towards farmer extension services initiated by the Agriculture Technology Management Agency (ATMA), a flagship farmer-oriented

programme to Improvise various skills not only in agriculture but also in other allied departments like Animal Husbandry, Horticulture, Fisheries and Sericulture.

Q3. Consider the following statement regarding Paris Agreement on Climate Change;

1. It aims to limit global warming well below 3℃ by end of the decade.
2. A fund of $100 Million will be set aside for this initiative.
3. The first stocktake will concide with SDG year of 2030.

Which of the above statements is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) None of the above

Answer: (D)

Explanation:

Paris agreement on climate change:

At COP 21 in Paris, on 12 December 2015, Parties to the UNFCCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Paris Agreement builds upon the Convention and - for the first time - brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so.

Provisions of the Paris Agreement:

- The Paris Agreement aims to limit global warming well below 2 degree Celsius and as close to 1.5 degree Celsius as possible, to increase economic and social ability to adapt to extreme climate.
- The Paris Agreement sends a powerful signal to markets that now is the time to invest in the low emission economy. It contains a transparency framework to build mutual trust and confidence.
- The agreement requires all countries to take action while recognizing their differing situations and circumstances. Under the Agreement, countries are responsible for taking action on both mitigation and adaptation.
- The agreement not only formalizes the process of developing national plans but also provides a binding requirement to assess and review progress on these plans. This mechanism will require countries to activate Windows to continuously upgrade their commitments and ensure that there will be no backtracking.
- To begin implementing post-2020 climate plans, countries will need to mobilize resources including the $100 billion pledged by developed countries and making investments in a low-carbon direction.
- There is a duty on all parties to take climate action, according to the principle of common but differentiated responsibilities and respective capacities, in the light of different national

circumstances. The Agreement requires all parties to put forward their best efforts through nationally determined contributions (NDCs).

- The agreement includes a global stocktake to assess collective progress toward meeting the agreement's long-term goals. The first stocktake will take place in 2023. The second process is the submission by parties of new NDCs, informed by the global stocktake.

Q4. Green new deal was recently in news; it was launched by

1. UNDP
2. UNFCCC
3. US Congress Representatives
4. British Parliament

Which of the above option/s is correct?

(a) 1 only
(b) 2 only
(c) 3 only
(d) 4 only

Answer: (C)

Explanation:

Green New Deal:

The Green New Deal is a congressional resolution that lays out a grand plan for tackling climate change. Introduced by Representative Alexandria Ocasio-Cortez of New York and Senator Edward J. Markey of Massachusetts, both Democrats, the proposal calls on the federal government to wean the United States from fossil fuels and curb planet-warming greenhouse gas emissions across the economy. It also aims to guarantee new high-paying jobs in clean energy industries.

Provisions of Green New Deal:

The goal of the Green New Deal is to reduce greenhouse gas emissions to avoid the worst consequences of climate change while also trying to fix societal problems like economic inequality and racial injustice.

The resolution uses as its guide two major reports issued last year by the United Nations and by federal scientists warned that if global temperatures continue to rise, the world is headed for more intense heat waves, wildfires and droughts.

The research shows that the US economy could lose billions of dollars by the end of the century because of climate change. Currently, carbon emissions are rising, by 3.4% last year in the US and by 2.7% globally, according to early estimates.

Supporters of the Green New Deal also believe that change can't just be a technological feat, and say it must also tackle poverty, income inequality and racial discrimination.

It claims that the entire world needs to get to net-zero emissions by 2050 — meaning as much carbon would have to be absorbed as released into the atmosphere.

The plan calls for the launch of a 10-year mobilization to reduce carbon emissions. It envisions:

sourcing 100% of the country's electricity from renewable

- Digitizing the nation's power grid
- Upgrading every building in the country to be more energy-efficient

- Overhauling the nation's transportation system by investing in electric vehicles and high-speed rail

Q5. Which of the following among the list are persistent organic pollutants;

1. Aldrin
2. Chlordane
3. Chlordecone
4. Methanol
5. Dicofol
6. Heptachlor

Which of the above points is/are correct?

(a) 1, 2, 3, 5 and 6 only
(b) 1, 2, 3, 4 and 6 only
(c) 2, 3, 4 and 5 only
(d) 1, 2, 3, 4, 5 and 6 only

Answer: (A)

Explanation:

All of the above are Persistent Organic Pollutants except methanol.

Q6. Recently sustainable finance forum for private capital to green investment has been formed;

1. Between India-UK
2. Between India-USA
3. Between India-UAE
4. Between India-Russia

Which of the above option is correct?

(a) 1 only
(b) 2 only
(c) 3 only
(d) 4 only

Answer: (A)

Q7. Global action for reconciling economic growth and environmental preservation was recently in news consider the following statements regarding this;

1. It is an MoU between Government of India and China
2. Japan bank of international cooperation will be funding 100% of the project.

Which of the above statements is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (D)

Explanation:

<u>Green Initiative:</u>

NTPC Ltd. enters into a foreign currency loan agreement with the Japanese Government's financial institution for JPY 50 billion under the GREEN initiative

A brief note on the agreement:

- As per the agreement, Japan Bank for International Cooperation(JBIC) will provide 60% of the facility amount and the balance will be given by commercial banks of Japan under the JBIC guarantee.
- The facility is extended under JBIC's outreach for projects, which ensure the conservation of the global environment.
- The loan proceeds will be utilized by NTPC Ltd, the PSU under the Ministry of Power, for funding its CAPEX for Flue Gas Desulphurization (FGD) & Renewable Energy projects.
- FGD substantially reduces the SOx emission in the flue gases of thermal power plan d is a critical step towards environmental sustainability.

About GREEN initiative:

JBIC responds to global environmental problems by promoting the growth of developing countries under its environmental operations called "Global action for Reconciling Economic growth and ENvironmental preservation" ("GREEN") and providing various financial instruments to support the overseas deployment of Japan's advanced environmental technology.

Under the GREEN operations, JBIC provides enhanced support for environmental projects in developing countries in the form of loans, guarantees and equity financing, while mobilizing private sector funds.

GREEN projects include the development of photovoltaic generation facilities using advanced environmental technologies and highly energy-efficient power plants, as well as the installation of energy-saving equipment which are intended to help protect the global environment.

Q8. An indicator species is the one whose status provides information on the overall condition of the ecosystem and other species in that ecosystem. Consider the following species and the indications they show in an ecosystem.

1. Mosses: A. Help indicate acidic soil
2. Lichens: B. Help indicate air pollution
3. Fungi: C. Help indicate old-growth forests where an abundance coarse woody debris exists

Select the correct match using the codes given below.

(a) 1A, 2B, 3C
(b) 1C, 2B, 3A
(c) 1B, 2C, 3A
(d) 1A, 2C, 3B

Answer: (A)

Explanation:

Some of the examples of indicator species are given below. They reflect the quality and changes in environmental conditions as well as aspects of community composition. Stoneflies: indicate high oxygen water - Stoneflies spend the majority of their lives as nymphs. Many species require a high concentration of dissolved oxygen and are found in clean swift streams with gravel or stone bottom.

Mosses: some moss species indicate acidic soil. Delicate mosses found on rocks and trees in cities around the world can be used to measure the impact of atmospheric change and could prove a low-cost way to monitor urban pollution. The "bioindicator" responds to pollution or drought-stress by changing shape, density or disappearing, allowing scientists to calculate atmospheric alterations

Lichens: some species indicate low air pollution. Lichens as a group have a worldwide distribution and grow almost on any surface, for example, soil, bark, roof tiles or stone. Because lichens get all their nutrients from the air, many species are very sensitive to air pollution.

Fungi: Can indicate old-growth forests where an abundance of coarse woody debris exists.

Mollusca: numerous bivalve molluscs indicate water pollution status. Mollusca and quite often bivalve molluscs are used as bioindicators to monitor the health of an aquatic environment, either fresh or seawater.

Q9. A phenotype usually results from the interaction of

(a) Genotype and environment (b) Ecosystem and biome

(c) Species and Genotype (d) Alleles and Species

Answer: (A)

Explanation:

A phenotype results from the expression of an organism's genetic code, its genotype, as well as the influence of environmental factors and the interactions between the two. E.g. while two fishes may carry similar genes, but they exhibit different colours on their fins due to being in a different habitat. Phenotypic variation (due to underlying heritable genetic variation) is the fundamental prerequisite for evolution by natural selection. It is the living organism as a whole that contributes (or not) to the next generation, so natural selection affects the genetic structure of a population indirectly via the contribution of phenotypes. Without phenotypic variation, there would be no evolution by natural selection. The interaction between genotype and phenotype has often been conceptualized by the following relationship:

Genotype (G) Environment (E) → Phenotype (P)

Q10. Eutrophication of a water body necessarily involves

1. Gradual heating of the water body
2. Inflow of nutrients in the water body
3. Calcification of bed deposits

Select the correct answer using the codes below.

(a) 1 only (b) 2 and 3 only

(c) 2 only (d) 1, 2 and 3

Answer: (C)

Explanation:

It is the process by which a body of water acquires a high concentration of nutrients, especially

phosphates and nitrates. These typically promote the excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish.

Statement 1: Heated Industrial effluents increase the temperature of the water body and typically decrease the level of dissolved oxygen of water. This can harm aquatic animals such as fish, amphibians and other aquatic organisms. But, this is not necessary with Eutrophication.

Statement 2 and 3: Eutrophication is a natural, slow-ageing process for the water body, but human activity (industrial effluents e.g.) greatly speeds up the process. A keystone species is a plant or animal that plays a unique and crucial role in the way an ecosystem functions (e.g. sea star). Keystone species may be severely affected by Eutrophication.

Q11. Humus is the dark organic matter that forms in the soil when plant and animal matter decays. Consider the following about it.

1. It contains nitrogen that is essential for plant growth and helps in nutrient retention.
2. It contributes to moisture retention in the soil by increasing microporosity.

Which of the above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) None

Answer: C

Explanation:

Learning: Humus should be differentiated from decomposing organic matter. The latter is rough-looking material and the remains of the original plant are still visible. Fully humified organic matter, on the other hand, has a uniformly dark, spongy, jelly-like appearance, and is amorphous. It may remain like this for millennia or more. The process of humification can occur naturally in soil or the production of compost. Humus has a characteristic black or dark brown colour and is organic due to an accumulation of organic carbon. The rate at which raw organic matter is converted into humus promotes (when fast) or limits (when slow) the coexistence of plants, animals, and microbes in the soil. Effective humus and stable humus are further sources of nutrients to microbes, the former provides a readily available supply and the latter acts as a longer-term storage reservoir.

MAINS QUESTION

Q1. Climate-smart agriculture is the need of the hour. What do you understand by the term climate-smart agriculture? What is the importance of climate-smart agriculture and elements of climate-smart agriculture? (15 Marks, 250 Word)

For model answer Prelims Q2 for a detailed explanation

Snippets

Singhori Wildlife sanctuary:

Located in Madhya Pradesh

Established in 1976

two main streams in the sanctuary i.e. Ghoghara River and Barna River.

home of animal species like Royal Bengal Tiger, Leopard, Sambhar, Chital and Wild Boar.

The forests in the Singhori Wildlife Sanctuary are of Tropical Dry deciduous types. The trees in this forest are Daora (Anogeissus latifolia), Bija (Pterocarpus marsupium), Salai (Boswellia serrata), Khair (Acacia catechu), Saja (Terminalia alata), Tendu (Diospyros melanoxylon) also occur Bamboo (Dendrocalamus strictus). This area is also covered with Teak forests and Tropical Mixed deciduous forests.

Status of Organic Farming in India:

India is home to 30% of the total organic producers in the world but used to account for just 2.59% (1.5 million hectares of the total organic cultivation area of 57.8 million hectares, according to the World of Organic Agriculture 2018 report. At the same time, most organic farmers are struggling due to poor policy measures, rising input costs and limited market, says a study by ASSOCHAM.

Statistics of Organic Farming Cultivable land area under organic farming has more than doubled from 11.83 lakh ha in 2014 to 29.17 lakh hain 2020. Over the years, the organic promotion activities led to the development of state-specific organic brands, increased domestic supply and exports of organic produce from the northeast region. As per international resource data from the Research Institute of Organic Agriculture (FiBL) and the International Federation of Organic Agriculture Movements (IFOAM) Statistics 2020, India stands at 9th position in terms of certified agricultural land with 1.94 million ha(2018-19).

Status of other countries (area under organic certification)

- China (3rd position)-3.14 million hectare
- USA (7th position)-2 million hectare
- India (9th position)-1.94 million hectare
- Brazil (12th position)-1.18 million hectare

Assistance Provided by Different Government Schemes

- **Paramparagat Krishi Vikas Yojana (PKVY):** The scheme promotes cluster-based organic farming with PGS certification. Cluster formation, training, certification and marketing are supported under the scheme. The assistance of Rs.50,000 per ha/3 years is provided out of which 62% i.e., Rs. 31,000 is given as an incentive to a farmer towards organic inputs.
- **Mission Organic Value Chain Development for North Eastern Region (MOVCDNER):** The scheme promotes 3rd party certified organic farming of niche crops of the northeast region through farmers producer organizations (FPOs) with a focus on exports. Farmers are assisted of Rs 25000/ha/3 years for organic inputs including organic manure and bio fertilisers etc. Support for the formation of FPOs, capacity building, post-harvest infrastructure up to Rs 2 crores is also provided in the scheme.
- **Capital Investment Subsidy Scheme (CISS) under Soil Health Management Scheme:** 100% assistance is provided to state government/government agencies for setting up of mechanized fruit/vegetable market
- Waste/agro waste compost production unit up to a maximum limit of Rs.190 lakh/unit (3000 Total Per Annum TPA capacity). Similarly, for individuals/private agencies assistance up to 33% of the cost limit to Rs 63 lakh/unit as capital investment is provided.
- **National Mission on Oilseeds and Oil Palm (NMOOP):** Financial assistance at 50% subsidy to the tune of Rs. 300/- per ha is being provided for different components including bio-fertilizers, supply of rhizobium culture/phosphate solubilising bacteria (PSB)/zinc solubilising bacteria (ZSB)/azotobacter/mycorrhiza and vermicompost.
- **National Food Security Mission (NFSM):** Financial assistance is provided for the promotion of bio-fertilizer (rhizobium/PSB) at 50% of the cost limited to Rs.300 per ha.

Prime Minister launched Kisan Suryoday Yojana in Gujarat:

About Kisan Suryoday Yojana Under this yojana, Rs 3,500 crore will be spent over the next three years for providing solar power to farmers for irrigation during the daytime It aims to provide 16 hours(between 5 AM to 9 PM) of power supply to farmers in the state every day The state government has allocated a budget of Rs 3500 crore for installing transmission infrastructure under this scheme by 2023. 234'66-Kilowatt transmission lines, with a total length of 3490 circuit kilometres (CKM) will be established under the project, in addition to 220 KV substations. Under this scheme, farmers in 1,055 villages in Junagadh, Gir Somnath and Dahod districts will be given solar power and this scheme will be extended to farmers across the state of Gujarat in the next three years Source:

Map for Mega Food Parks in India