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AGRICULTURE

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Answers Answers Answers Answers Explanation Answers Explanation Answers Explanation Answers Answers Explanation Answers Answers Explanation Answers Answers Explanation Answers Answers Explanation Answers Answers Explanation

Detailed Explanation

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1. Ans: C

Exp:

- In India, saffron Corms (seeds) are cultivated during the **months of June and July** and at some places in **August and September.**
  - It starts flowering in October.
- **Conditions:**
  - **Altitude:** Saffron grows well at an **altitude of 2000 meters above sea level.** It needs a photoperiod **(sunlight) of 12 hours.**
  - **Soil:** It grows in many different soil types but thrives best in **calcareous** (soil that has calcium carbonate in abundance), **humus-rich and well-drained** soil with a pH between 6 and 8.
  - **Climate:** For saffron cultivation, we need an explicit **climatological summer and winter** with temperatures ranging from no more than 35 or 40 degree Celsius in summer to **about –15 or –20 degree Celsius in winter. Hence, statement 1 is correct.**
  - **Rainfall:** It also requires adequate rainfall that is **1000-1500 mm per annum. Hence, statement 2 is correct.**

2. Ans: C

Exp:

Crop Diversification:

- Crop diversification refers to the **addition of new crops or cropping systems to agricultural production** on a particular farm taking into account the different returns from value-added crops with complementary marketing opportunities. **Hence statement 1 is correct.**
  - **Cropping System:** It refers to the **crops, crop sequences and management techniques** used on a particular agricultural field over a period of years.
  - **Types:** Major cropping systems in India are sequential-cropping, monocropping, intercropping, relay Cropping, **mixed-cropping and alley cropping.**
- Many farmers also use the **mixed crop-livestock system** to increase their standards of living and income.
  - **Animal husbandry or Animal Agriculture** is the branch of science dealing with the practice of breeding, farming and care of farm animals (livestocks) such as cattle, dogs, sheep and horses by humans for advantages.
  - It refers to livestock raising and selective breeding. It is a branch of agriculture.
- **Crop Diversification is important to provide insect, weed, and disease control, build soil health**, and has many other benefits such as enhanced crop productivity, environmental and economic benefits. **Hence statement 2 is correct.**
  - Planting rotations that involve cover crops can produce a large root system which holds the soil together by producing a new source of fresh organic matter after roots decay.
  - This organic matter provides habitat suitable for earthworms which form tunnels in the soil for large soil pores, subsequently enhancing water infiltration. Organic matter also helps to form new soil aggregates, which is important because it holds the soil together and therefore prevents the risk of soil loss due to erosion during high intensity rainstorm events.

3. Ans: B

Exp:

Milk Production in India:

- India is **currently ranked as the largest milk producer.** Dairy is the single largest agricultural commodity contributing 5% of the national economy, witnessing 6.4% (CAGR) in the past 5 years. **Hence statement 1 is not correct.**
- The Indian dairy industry is expected to grow by 9-11% in FY22. Dairy is the single largest agricultural commodity contributing 5 percent of the national economy and employing more than 8 crore farmers directly.
- The top 5 milk-producing states are: **Uttar Pradesh** (16.3%, 30.52 MMT), **Rajasthan** (12.6%, 23.69 MMT), **Madhya Pradesh** (8.5%, 15.91 MMT), **Andhra Pradesh** (8%, 15.04 MMT) and **Gujarat** (7.7%, 14.49 MMT). **Hence statement 2 is correct.**

4. Ans: C

Exp:

- Millets or nutri-cereals, which include **Jowar, Bajra, and Ragi**, are rich in minerals and B-complex vitamins, as well as proteins and antioxidants, making them an ideal choice for improving the nutritional outcome of children.
- **Multidimensional benefits** associated with millets can address the issues related to **nutrition security, food systems security, and farmers' welfare.**
  - **Climate Resilient Crop :** As Millets are resistant to climatic stress, pests and diseases, this makes them a sustainable food source for combating hunger in changing world climate.

- Further, **millets are not water or input-intensive**, making them a sustainable strategy for addressing climate change and building resilient agri-food systems.
- **Hence, statement 1 is correct.**

- **Nutritional Security:** Millets are high in dietary fibre, nutri-cereals are a powerhouse of nutrients including iron, folate, calcium, zinc, magnesium, phosphorus, copper, vitamins and antioxidants.
- They are not only important for the healthy growth and development of children but have also been shown to reduce the risk of heart disease and diabetes in adults.
- Millets, being gluten free and low glycemic index food are good for diabetic persons and can help to combat cardiovascular diseases and nutritional deficiency. Hence, statement 2 is correct.

5. Ans: D

Exp:

About Cotton:

- Kharif Crop which requires 6 to 8 months to mature.
- Drought – **resistant crop ideal for arid climates. Hence, statement 1 is correct.**
- Occupies 2.1% of the world's arable land, meets 27% of the world's textiles needs.
- Temperature: Between 21-30°C.
- Rainfall: Around 50-100cm.
- **Soil Type:** Well-drained black cotton soil (Regur Soil) **(E.g. Soil of Deccan Plateau). Hence, statement 2 is correct.**
- Products: fibre, oil and animal feed.
- Top Cotton Producing Countries: China > India > USA
- **Top Cotton Producing States** in India: **Gujarat** > Maharashtra > Telangana > Andhra Pradesh > Rajasthan. **Hence, statement 3 is correct.**

6. Ans: D

Exp:

- **Zero budget natural farming is** a method of chemical-free agriculture drawing from traditional Indian practices.
- It was originally promoted by agriculturist **Subhash Palekar**, who developed it in the mid-1990s as an alternative to the **Green Revolution's methods** that are driven by chemical fertilizers and pesticides and intensive irrigation.
- ZBNF is based on 4 pillars:
  - **Jeevamrutha:** It is a mixture of fresh cow dung and aged cow urine (both from India's indigenous cow breed), jaggery, pulse flour, water and soil; to be applied on farmland.
  - **Bijamrita:** It is a concoction of neem leaves & pulp, tobacco and green chilies prepared for insect and pest management, that can be used to treat seeds.
  - **Acchadana (Mulching):** It protects topsoil during cultivation and does not destroy it by tilling.
  - **Whapasa:** It is the condition where there are both air molecules and water molecules present in the soil. Thereby helping in reducing irrigation requirements. **Hence, option D is correct.**

7. Ans: C

Exp:

- **Precision agriculture (PA)** is an approach where inputs are utilised in precise amounts to get increased average yields, compared to traditional cultivation techniques such as agroforestry, intercropping, crop rotation, etc.
  - It is based on sustainable agriculture and healthy food production and it consists of profitability and increasing production, economic efficiency and the reduction of side effects on the environment.
- **Benefits:**
  - **Increases agriculture productivity.**
  - Prevents soil degradation.
  - Reduces chemical application in crop production.
  - Efficient use of water resources.
  - Disseminates modern farm practices to improve the quality, quantity and reduced cost of production.
  - Changes the socio-economic status of farmers.
- **Hence, option C is correct.**

8. Ans: D

Exp:

- **Natural Farming** can be defined as a "chemical- free farming and livestock based". Soundly grounded in agro-ecology, it is a diversified farming system that integrates crops, trees and livestock, allowing the optimum use of functional biodiversity.
- **Significance:**
  - **Minimized Cost Of Production:** It is considered as a **cost- effective farming practice** with scope for raising employment and rural development.
  - Ensures Better Health: As Natural Farming does not use any synthetic chemicals, health risks and

hazards are eliminated. The food has higher nutrition density and therefore offers better health benefits.

- **Reduced Water Consumption:** By working with diverse crops that help each other and cover the soil to **prevent unnecessary** water **loss through evaporation**, Natural Farming optimizes the amount of 'crop per drop'.
- Rejuvenates Soil Health: The most immediate impact of Natural Farming is on the biology of soil—on microbes and other living organisms such as earthworms. Soil health depends entirely on the living organisms in it.
- **Resilience:** NF impacts many farmers positively by imparting resilience to the crops against weather extremities.

- **Hence, option D is correct.**

9. Ans: C

Exp:

About Coffee:

- Coffee was introduced to India during the **late seventeenth century.**
- The story goes that an **Indian pilgrim to Mecca** smuggled seven beans back to India from Yemen in 1670 (it was illegal to take coffee seeds out of Arabia at the time) and planted them in the Chandragiri hills of Karnataka.
- **Coffee in India** is grown under a canopy of thick natural shade in ecologically sensitive regions of the **Western and Eastern Ghats.**
- **Climatic Conditions Required:**
  - Coffee plants require a **hot and humid climate** with temperatures ranging between 15°C and 28 °C and rainfall from 150 to 250 cm.
  - **Frost, snowfall, high temperature** above 30°C and strong sun shine is not good for coffee crops and is generally grown under shady trees.
  - **Dry weather is necessary** at the time of ripening of the berries.
  - **Stagnant water is harmful** and the crop is grown on hill slopes at elevations from 600 to 1,600 metres above sea level.
  - **Well drained, loams containing a good deal** of humus and minerals like iron and calcium are ideal for coffee cultivation.
- **Hence, option C is correct.**

10. Ans: A

Exp:

- **India is the world's top rice exporter, earning Rs. 65,000 crore in 2020** by selling 18 million tonnes of grain (organic rice), about a quarter of which is premium basmati. **Hence, statement 1 is correct.**
  - Among the 75 countries which buy Indian rice, **West Asian nations, the US and the U.K. are the biggest importers of basmati**, while the majority of **non-basmati goes to African countries** and neighbours Nepal and Bangladesh. **Hence, statement 2 is not correct.**
- Recently, according to the Coalition for GM Free India, the discovery of 500 tonnes of Genetically Modified (GM) rice in a consignment that India exported to the European Union countries in June 2021 has led to the "loss of reputation of India and its agricultural market''.
  - However, India pointed out that GM rice is not grown commercially in India, let alone exported.
  - India has approved commercial cultivation of only one GM crop, Bt cotton and no GM food crop (including GM Rice) has ever been approved for commercial cultivation in the country.
- Probably the best known variety of **GM rice is golden rice. Hence, statement 3 is not correct.**
  - Golden rice involves the insertion of genes from a plant -- both daffodils and maize have been used -- and a soil bacterium to create a grain that is enriched with Vitamin A.

11. Ans: D

Exp:

- Tea is a beverage made from the Camellia sinensis plant. It is the world's most consumed drink, after water.
- It is believed that tea originated in northeast India, north Myanmar and southwest China, but the exact place where the plant first grew is not known. There is evidence that tea was consumed in China 5,000 years ago.
- Climate: Tea is a **tropical and sub-tropical plant** and grows well in hot and humid climates. **Hence, statement 1 is correct.**
- Temperature: The **ideal temperature for its growth is 20°-30°C and temperatures above 35°C** and below 10°C are harmful for the bush. **Hence, statement 2 is correct.**
- Rainfall: It requires 150-300 cm annual rainfall which should be well distributed throughout the year.

- Soil: The most suitable soil for tea cultivation is slightly acidic soil (without calcium) with porous sub-soil which permits a free percolation of water. **Hence, statement 3 is correct.**

12. Ans: C

Exp:

- **Genetically Modified (GM)** crops are derived from plants whose genes are artificially modified, usually by inserting genetic material from another organism, in order to give it a new property, such as increased yield, tolerance to a herbicide, resistance to disease or drought, or to improve its nutritional value.
- Probably the best known variety of GM rice is golden rice.
  - Golden rice involves the insertion of genes from a plant -- both daffodils and maize have been used -- and a soil bacterium to create a grain that is enriched with Vitamin A.
- **India has approved commercial cultivation of only one GM crop, Bt cotton.**
  - **No GM food crop has ever been approved for commercial cultivation** in the country.
  - However, confined field trials have been allowed for at least 20 GM crops.
  - India has drafted policies to ban GM rice trials in the basmati belt.
  - Also, unauthorised HtBt Cotton and Bt Brinjal are already being grown commercially, with hundreds of growers blatantly defying the governmental ban.
- Hence, option C is correct.

13. Ans: A

Exp:

- **Rabi Crops** are sown around the Retreating Monsoon and Northeast monsoon season, which begins by October are called rabi or winter crops.
- A **warm climate is required for seed germination** and cold climate for the growth of Rabi crops. **Hence, statement 1 is correct.**
- The harvest for these crops happens typically during April and May, during the summer season.
- Rabi crops are not much affected by the rainfall. Hence, statement 2 is not correct.
  - **Kharif crops depend on the rainfall patterns.**
- **Major Rabi** crops are wheat, gram, peas, barley etc.
  - **Rice, maize, pulses such as urad, moong dal and millets** are among the key **kharif crops. Hence, statement 3 is not correct.**

14. Ans: A

Exp:

- Turmeric is a **flowering plant**, Curcuma longa of the **ginger family**, it is used as **condiment, dye, drug and cosmetic** in addition to its use in religious ceremonies.
- Its color comes mainly from **curcumin**, a bright **yellow phenolic compound.**
- India is a leading producer and exporter of turmeric in the world. India produces **80% of turmeric in the world**.
  - **Telangana** was the leading producer of turmeric in India during 2018. **Maharashtra** and **Tamil Nadu** were second and third in the ranking that year.
- It can be grown in diverse **tropical conditions** from **sea level to 1500 m above sea level**, at a temperature range of **20-35° C** with an annual **rainfall of 1500 mm or more**, under **rainfed or irrigated conditions.**
- **Hence, option A is correct.**

15. Ans: D

Exp:

Paddy Transplantation:

- The field where the seedlings are transplanted has to be **"puddled" or tilled in standing water. Hence, statement 1 is correct.**
  - For the first three weeks or so after transplanting, the plants are irrigated almost daily to maintain a water depth of 4-5 cm.
  - Farmers continue giving water every two-three days even for the next four-five weeks when the crop is in **tillering (stem development) stage.**
- The advantage of the Paddy Transplantation technique is that **water is a natural** herbicide that takes care of weeds in the paddy crop's early-growth period. **Hence, statement 2 is correct.**
- Paddy transplantation is **both labour- and water-intensive**. Due to this farmers are switching to Direct Seeding of Rice (DSR), which has several advantages over paddy transplantation. **Hence, statement 3 is correct.**

16. Ans: D

Exp:

- **Sorghum** is a versatile grain crop used for human consumption, fodder and bioenergy generation.
- The grain is popular across the world because it has a low glycaemic index, is gluten-free and nutritious. **Hence, statement 3 is correct.**

- The lower the glycemic index of a cereal, the lower is the relative rise in blood glucose level after two hours of consuming it.

- The variety of the crop found in India is called jowar. It is said to have its origin in the country and is one of its most important food and fodder crops.
  - Jowar has a dedicated All-India Coordinated Research Project since 1969.
- Sorghum plants are very hardy and can **withstand high temperature and drought conditions. Hence, statement 1 is correct.**
- It is well adapted to semiarid regions with a minimum annual precipitation of 350-400 mm. It is grown in areas that are too hot and dry for growing maize. In India, the main sorghum belt receives an annual rainfall ranging from 400-1000 mm.
- It can grow on a wide range of soils. **Medium to deep black soils** are predominantly suitable for growing sorghum. **Hence, statement 2 is correct.**

17. Ans: B

Exp:

- The **Indian Council of Agricultural Research (ICAR)** has developed an **anti-methanogenic feed supplement 'Harit Dhara' (HD)**, which can **cut down cattle methane emissions by 17-20%** and can also result in higher milk production.
- HD decreases the population of protozoa microbes in the rumen, responsible for hydrogen production and making it available to the archaea (structure similar to bacteria) for reduction of CO_2 to methane.
  - It has been made from tannin-rich plant-based sources. Tropical plants containing tannins, bitter and astringent chemical compounds, are known to suppress or remove protozoa from the rumen.
- Fermentation after using HD will help produce more propionic acid, which provides more energy for lactose (milk sugar) production and body weight gain.
  - This leads to economic benefits for farmers.
- Hence, option B is correct.

18. Ans: D

Exp:

- India is the **highest livestock owner** of the world. **Hence, statement 1 is correct.**
  - As per the **20th Livestock Census**, the **total Livestock population** is 535.78 million in the country showing an increase of 4.6% over Livestock Census-2012.
- A large number of farmers depend upon animal husbandry for their livelihood. It supports the livelihood of almost 55% of the rural population.
- As per the **Economic Survey-2021**, the **contribution of Livestock in total agriculture and allied sector** Gross Value Added (at Constant Prices) has increased from **24.32% (2014-15) to 28.63% (2018-19). Hence, statement 2 is not correct.**
- The National Livestock Mission (NLM) was launched in the 2014-15 financial year and seeks to ensure quantitative and qualitative improvement in livestock production systems and capacity building of all stakeholders.
  - The **scheme is being implemented as a sub scheme of White Revolution - Rashtriya Pashudhan Vikas Yojana** from April 2019. **Hence, statement 3 is correct.**

19. Ans: D

Exp:

- most popular methods of containing the pest include the use of Genetically Modified (GM) crops and pesticides.
- Natural approaches, including breeding predators such as wasps, to be released into fields when necessary, as well as developing a "germ warfare" that isolates diseases to which the caterpillar (armyworm) is prone, are being explored by the scientists.
- **A quarantine system**, under which imports of grains and plants that can host such insects are inspected at shipping ports, airports and land border crossings is the first line of defence taken by the countries across the world. **Hence, option D is correct.**
  - The quarantine system in India is governed by the Plant Quarantine (Regulation of Import into India) Order of 2003, which is notified under the Destructive Insects and Pests Act of 1914.

20. Ans: C

Exp:

- Recently, researchers from various institutes under the Indian Council of Agricultural Research (ICAR) and Bidhan Chandra Krishi Viswavidyalaya found depleting trends in grain density of zinc and iron in rice and wheat cultivated in India.
  - The researchers collected seeds of rice (16 varieties) and wheat (18 varieties) from the gene bank maintained at the ICAR's Cultivar repositories.
- **Concentrations in Rice:** Zinc and iron concentrations in grains of rice cultivars released within the 1960s were 27.1 mg/kg and 59.8 mg/kg. This depleted to 20.6 mg/kg and 43.1 mg/kg, respectively within the 2000s.

- **Concentrations in Wheat:** The concentrations of zinc and iron were 33.3 mg/kg and 57.6 mg/kg in cultivars of the 1960s, dropped to 23.5 mg/kg and 46.4 mg/kg, respectively in cultivars released during the 2010s. Hence, statement 1 is correct.
- **Reason for the Decrease:**
  - Dilution effect' that is caused by **decreased nutrient concentration in response to higher grain yield.**
  - This means the rate of **yield increase is not compensated by the rate of nutrient take-up by the plants.** Also, the soils supporting plants could be low in plant-available nutrients. Hence, statement 2 is correct

21. Ans: A

Exp:

- Recently, the **world's first Genetically Modified (GM) rubber plant** developed by Rubber Research Institute was planted in Assam.
  - The rubber plant is the first of its kind developed exclusively for this region, and is expected to grow well under the climatic conditions of the mountainous northeastern region.
- **Genetic modification (GM) technology** allows the transfer of genes for specific traits between species using laboratory techniques.
  - The **GM rubber has additional copies of the gene MnSOD**, or **manganese-containing superoxide dismutase**, inserted in the plant, which is expected to tide over the severe cold conditions during winter in the northeast.
    - The MnSOD gene has the ability to **protect plants** from the adverse effects of **severe environmental stresses such as cold and drought. Hence, statement 2 is correct.**
  - Natural Rubber is an equatorial crop, but under special conditions, it is also grown in tropical and sub-tropical areas. Conditions required are:
  - **Temperature: Above 25°C with moist and humid climate. Hence, statement 1 is correct.**
  - Rainfall: More than 200 cm.
  - Soil Type: Rich well drained alluvial soil.
  - Cheap and adequate supply of skilled labour is needed for this plantation crop.
  - The British established the first rubber plantation in India in 1902 on the banks of the river Periyar in Kerala.
    - India is currently the sixth largest producer of NR in the world with one of the highest productivity (694,000 tonnes in 2017-18).
    - **Top Rubber Producing States: Kerala** > Tamil Nadu > Karnataka. **Hence, statement 3 is not correct.**

22. Ans: B

Exp:

- The **Indian Forest Act 1927** was amended in 2017 to **remove bamboo for the category of trees. Hence, statement 1 is correct.**
  - As a result, anyone can undertake cultivation and business in bamboo and its products without the need of a felling and transit permission.
- The **Tamil Nadu Agricultural University (TNAU) (and not CSIR)** has designed an 'oxygen park' within its premises at **Coimbatore (and not in Karnataka) with Beema Bamboo. Hence, statement 2 is not correct.**
- Beema or Bheema Bamboo is a superior clone, selected from Bambusa balcooa, a higher biomass yielding bamboo species. This bamboo clone has been developed by the conventional breeding method.
  - This **species is considered to be one of the fastest-growing plants.** It grows one-and-a-half feet per day under tropical conditions.
  - It is said to be the **best 'carbon sink'** to mitigate carbon dioxide **emissions. Hence, statement 3 is correct.**

23. Ans: B

Exp:

- Oilseed crops are the second most important determinant of the agricultural economy, next only to cereals within the segment of field crops.
  - The **Yellow revolution was launched in 1986-1987 to increase the production of edible oil**, especially mustard and sesame seeds **(and not Green revolution). Hence, statement 1 is not correct.**
  - It targeted nine oilseeds namely groundnut, mustard, soybean, safflower, sesame, sunflower, niger, linseed, and castor.
- India has a marked position in the world in the production of a large amount of oilseeds.
  - After China, **India is the second largest producer of groundnut** and is **third in position in the production of Rapeseed** after China and Canada. **Hence, statement 3 is correct.**
- The **Ministry of Agriculture & Farmers Welfare** has formulated **Kharif Strategy 2021** to achieve self-sufficiency in edible oils. **Hence, statement 2 is correct.**
  - Kharif Crops are sown from June to July and Harvesting is done in between September-October.

- Kharif Crops include Rice, maize, jowar, bajra, tur, moong, urad, cotton, jute, groundnut, soyabean etc.

24. Ans: D

Exp:

- Agroforestry is growing crops and trees together on the same field.
  - It promotes both spatial and temporal diversity. Hence, statement 1 is not correct.
- Mostly temporal diversity is achieved through crop rotation as it is sequential cropping. Hence, statement 2 is not correct.

25. Ans: A

Exp:

- Cropping Intensity refers to raising of a number of crops from the same field during one agricultural year. **Hence, statement 1 is correct.**
- It can be expressed through a formula.
  - **Cropping Intensity = Gross Cropped Area/Net Sown Area x 100.**
  - **Gross Cropped Area:** This represents the total area sown once and/or more than once in a particular year, i.e. the area is counted as many times as there are sowings in a year. This total area is also known as total cropped area or total area sown.
  - **Net Sown Area:** This represents the total area sown with crops and orchards. Area sown more than once in the same year are counted only once.
- According to ICAR, the present cropping intensity of 136% has registered an **increase of only 25% since independence. Hence, statement 2 is not correct.**
- Further, rainfed drylands constitute 65% of the total net sown area.

26. Ans: C

Exp:

Sugarcane Cultivation in India

- Sugarcane is a **tropical as well as a subtropical crop.** It grows well in hot and humid climates with a temperature of 21°C to 27°C and an annual rainfall between 75cm and 100cm. **Hence, statement 1 is correct.**
- In India, sugarcane is primarily grown and cultivated in Bihar, Karnataka, Maharashtra, Punjab and Uttar Pradesh.
  - Of these, **Uttar Pradesh is the largest sugarcane producer and accounts for nearly 40% of the cash crop grown in the country**, followed by Maharashtra and Karnataka, which account for 21% and 11% of the total domestic production. **Hence, statement 2 is correct.**

27. Ans: B

Exp:

- In the CSIR Floriculture Mission, available knowledge base in **Council of Scientific and Industrial Research (CSIR)** Institutes will be utilized and leveraged to help Indian farmers and industry..
- Along **with CSIR, other implementing agencies involved** are:
  - Indian Council of Agricultural Research (ICAR),
  - Khadi and Village Industries Commission (KVIC),
  - APEDA and TRIFED,
  - Fragrance and Flavour Development Centre (FFDC), Kannauj, and
  - Ministry of Commerce and Ministry of Micro, Small and Medium Enterprises (MSME). Hence, **statement 1 is not correct.**
- The mission will focus on **commercial floral crops,** seasonal/annual crops, wild ornaments and cultivation of **flower crops for honey bee rearing.** Thus, leading to growth of the **Apiculture sector. Hence, statement 2 is correct.**

28. Ans: C

Exp

- Gluten is a family of storage proteins — formally known as prolamins — that are naturally found in certain cereal grains, such as wheat, barley etc. **Hence, statement 1 is correct.**
  - The two main proteins in gluten are glutenin and gliadin.
- Gluten offers a variety of functional culinary benefits and is responsible for the soft, chewy texture that is characteristic of many gluten-containing, grain based foods.
- When heated, gluten proteins form an elastic network that can stretch and trap gas, allowing for optimal leavening or rising and maintenance of moisture in breads, pasta, and other similar products.
- **Celiac disease**, also spelled as coeliac disease, is the most **severe form of gluten intolerance. Hence, statement 2 is correct.**

29. Ans: C

Exp:

- Millets, **often referred to as Superfood**, are nutritionally rich crops having high protein, fibre, vitamins and minerals like iron content. They are also rich in **calcium** and magnesium.

- Ragi is known to have the highest calcium content among all the food grains.

- They are also **harder and drought-resistant crops**, which has to do with their short growing season (70-100 days, as against 120-150 days for paddy/wheat) and lower water requirement (350-500 mm versus 600-1,200 mm). **Hence, statement 1 and 3 are correct.**
- The three major millet crops currently grown in India are jowar (sorghum), bajra (pearl millet) and ragi (finger millet).
  - Along with that, India grows a rich array of bio-genetically diverse and **indigenous varieties of "small millets"** like **kodo, kutki**, chenna and **sanwa. Hence, statement 2 is not correct.**
- Major producers include Rajasthan, Andhra Pradesh, Telangana, Karnataka, Tamil Nadu, Maharashtra, Gujarat and Haryana.

30. Ans: C

Exp:

- Around 500 farmers across villages in Doda district in Jammu had their incomes quadrupled after **shifting from maize to lavender cultivation** which is **being called purple revolution**. It was possible due to initiatives taken under **Aroma Mission. Hence, statement 1 is correct.**
- **Council of Scientific and Industrial Research (CSIR)** and Indian Institute of Integrative Medicine, Jammu (IIIM Jammu), the two bodies are mainly responsible for making purple revolution under the Aroma Mission a success. **Hence, statement 2 is correct.**

31. Ans.: B

Exp.:

- There are **five major types of silk of commercial importance**, obtained from different species of silkworms. These are Mulberry, Oak Tasar & Tropical Tasar, Muga and Eri.
- India has the unique distinction of producing **all these commercial varieties of silk. Hence, statement 1 is not correct and statement 2 is correct.**

32. Ans: C

Exp:

- Recently, the Central Government admitted that no actual assessment of farm income has been carried out since 2013. One of the objectives of the Operation Greens is to double the income of farmers by the end of 2022.
- **"Operation Greens"** was announced on the lines of "Operation Flood", to promote Farmer Producers Organizations, agri-logistics, processing facilities for integrated development of Tomato-Onion-Potato (TOP) value chain. Hence, option C is correct.
- Development of the TOP value chain will ensure that a higher share of consumer's rupee goes to farmers and stabilize their prices. The scheme is being implemented by the Ministry of Food Processing Industries.

33. Ans: C

Exp:

- **Genetic Modification of Crops** is conventional plant breeding **involving crossing of species of the same genus** to provide the offspring with the desired traits of both parents. **Hence, statement 1 is correct.**
  - Genus is a class of items such as a group of animals or plants with similar traits, qualities or features.
- **Bt cotton is the only Genetically Modified (GM) crop that is allowed in India.** It has alien genes from the soil bacterium Bacillus thuringiensis (Bt) that allows the crop to develop a protein toxic to the common pest pink bollworm. **Hence, statement 2 is not correct.**
  - Herbicide Tolerant Bt (Ht Bt) cotton, on the other hand is derived with the insertion of an additional gene, from another soil bacterium, which allows the plant to resist the common herbicide glyphosate.
- In Bt brinjal, a gene allows the plant to resist attacks of fruit and shoot borers.
- In DMH-11 mustard, genetic modification allows cross-pollination in a crop that self-pollinates in nature.
- In India, the **Genetic Engineering Appraisal Committee (GEAC) is the apex body** that allows for commercial release of GM crops. **Hence, statement 3 is not correct.**

34. Ans: C

Exp:

- Geo-textiles are synthetic including polyester and polypropylene or man-made materials that have **varying degrees of permeability.**
  - Permeability means their surfaces have very small openings that allow liquid or gases to pass through.
- **Characteristics of Geo Textile Fabrics:**
  - It has the ability to separate, filter, reinforce, protect and drain when used in association with soils.
  - It drains areas where water pools while keeping soil in place.

- It serves as effective filters, catching some materials to prevent drains from clogging. **Hence, statement 1 is correct.**
- It reinforces earthen structures like drains by holding layers in place.
- protects against erosion in places like roads and beaches. **Hence, statement 2 is correct.**

- These functions make Geo Textile fabrics useful in many industries, especially construction and civil engineering.

35. Ans.: B

Exp.:

- The **Food Safety and Standards Authority of India (FSSAI)** in a recent order has **set 1% threshold** for Genetically Modified Organisms (GMO) in food crops imported into India. Earlier in August 2020, FSSAI had issued the order that 24 food crops the country imports would need a 'non-GM-origin-cum-GM-free certificate' issued by a competent authority. **Hence, statement 1 is not correct.**
- The task of regulating GMO levels in imported consumables was initially with the Genetic Engineering Appraisal Committee (GEAC). Its role was diluted with the enactment of the Food Safety and Standards Act, **2006 and FSSAI was asked to take over approvals of imported goods. Hence, statement 2 is not correct.**
- In India, the Genetic Engineering Appraisal Committee (GEAC) is the apex body that allows for commercial release of GM crops. **Hence, statement 3 is correct.**

36. Ans: C

Exp:

- **Chengazhikodan Nendran Banana**, also known as Chengazhikode Banana, is among the **most popular traditional fruits cultivated in Thrissur district, Kerala. Hence, statement 1 is correct.**
  - This variety of Nendran Banana is famed for its characteristic taste, bunch shape and fruit colour.
  - The crop is mainly cultivated in organic mode and the crop duration is 13-14 months.
- The Chengalikodan Nendran banana grown in Kerala got **Geographical indication (GI) Tag in 2014. Hence, statement 2 is correct.**
- Recently, scientists at the **Council of Scientific & Industrial Research (CSIR)-National Institute for Interdisciplinary Science and Technology (NIIST)** at Pappanamcode in Kerala have **come up with a new product, Banana Grit or Granules**, developed from raw **Nendran bananas. Hence, statement 3 is not correct.**
  - CSIR is the largest research and development (R&D) organisation in India.

37. Ans: D

Exp:

- Saffron is a plant whose dried stigmas (thread-like parts of the flower) are used to make saffron spice.
  - Saffron cultivation is believed to have been introduced in Kashmir by Central Asian immigrants around the 1st Century BCE.
  - It has been associated with traditional Kashmiri cuisine and represents the rich cultural heritage of the region.
- **Conditions for Growing Saffron:**
  - **Altitude:** Saffron grows well at an altitude of 2000 meters above sea level. It **needs a photoperiod (sunlight) of 12 hours.**
  - **Soil:** It grows in many different soil types but **thrives best in calcareous (soil that has calcium carbonate in abundance)**, humus-rich and well-drained soil with a pH between 6 and 8.
  - **Climate:** For saffron cultivation, we need an **explicit climatological summer and winter with** temperatures ranging from no more than 35 or 40 degree Celsius in summer to about –15 or –20 degree Celsius in winter.
  - **Rainfall:** It also requires adequate rainfall that is 1000-1500 mm per annum.
- **Hence, option D is correct.**