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(To be filled by candidate)

Name of Candidate : Dr. Sachin. B.G

NEXT IAS Roll No.: MT# 24 PTMR035 Date of Examination : 10/12/23

Exam Centre : Old Rajinder Nagar ☑ Bhopal ☐ Online ☐

Test Code: TC264 Program : Prelims to Prelims ☐ Prelims to Mains ☑

MTS CSE 2023-2024 (TEST-14)

GENERAL INSTRUCTIONS

This Question-cum Answer (QCA) Booklet contains 26 pages. Immediately on receipt of the booklet, please check that this QCA booklet does not have any misprint or torn or missing pages or items, etc. If so, get it replaced by a fresh QCA booklet.

Candidates must read the instructions on this page and the following pages carefully before attempting the paper.

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Question paper will be provided separately and can be taken by the candidates after conclusion of the exam.

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SUBJECT/PAPER
GENERAL STUDIES

Invigilator's Sign. : .....

[To be filled by the STUDENT]

Student's Queries for the Evaluator (if any write them below)

[To be filled by the EXAMINER]

Evaluator's response

(For filling by Examiners only)

Evaluator Code :

Q.No	Pg No.	Maximum Marks	Marks	Total
1	1			
2	3			
3	5			
4	7			
5	9			
6	11			
7	13			
8	15			
9	17			
10	19			
Grand Total				

Signature

MACRO COMMENTS

IMPORTANT INSTRUCTIONS

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2. Write your registration number and other particulars, in the space provided on the cover of QCA Booklet.
3. Write legibly and neatly. Do not write in bad/illegible handwritings.
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5. If you wish to cancel any work, draw your pen through it or write "Cancelled" across it, otherwise it may be evaluated.
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1. Constraints in the Agriculture sector in India have been a major hurdle in achieving sustained growth and development. Discuss the various challenges faced by the agriculture sector in India and suggest policy measures to address these challenges.

(Answer in 150 words) 10 marks

Agricultural sector employs 45-1. of workforce while contributing only 16-18-1. of GDP since many years (Economic Survey 22) without any transformation due to several constraints.

Various challenges faced by agriculture sector

A) Pre Production

1) Fragmentation of land and land degradation
   (Ex) 88-1. of small and marginal farmers

2) Water - 52-1. of agricultural land is rainfed
   - decline in water table → Water Stress

3) Poor seed replacement rate & higher cost of HYV seeds

4) Lack of formal agricultural credit & poor banking penetration

B) Production stage

1) Monocultural cropping without crop diversification
   (Ex) Rice - Wheat system dominates

2) Poor allied sector growth
   (ex) ~~Hor~~ Fishing, Silviculture, etc
3) Environmental degradation due to bad practices
   (ex) Eutrophication, salinization
4) Poor valuation of livestock

c) Post Production

1) Farmer's distress & poor income realisation
   (ex) Farmer suicide - 38/day
2) Poor forward & backward linkages - lack of cold chain storage, etc
3) Price volatility & global headwinds

Policy Measures to address these challenges

1) Genetic level research & development
   (ex) Disease resistant crop varieties
2) Efficient resource management
   (ex) Precision agriculture followed
3) Encouragement to organic farming & ZBNF
4) Removal of constraints related to marketing, exports, & logistics
5) Technology adoption (ex) IOT, Blockchain, etc
6) Human capital development - Agriculture extension services

Agriculture is the foundation on which edifice of sustainable growth & development can be achieved.

2. Evaluate the impact of irrigation on the environment and natural resources, and suggest measures to ensure the sustainability and equity of irrigation practices in agriculture.
(Answer in 150 words) 10 marks

India is identified as 'Water-stressed country' with its per capita water availability being only 1555 m^3 in 2011. Agriculture accounts for more than 80% of water consumption through irrigation.

Impact of irrigation on environment & natural resources

1) Disproportional utilisation & inefficient utilisation of limited water resources

2) Excessive groundwater pumping & unavailability for future generations
(ex) More than 60% of groundwater used for irrigation

3) Environmental degradation with water wastage, contamination of water quality, damage to aquatic ecosystem & biodiversity in rivers, lakes, etc

4) ~~Opp~~ Excessive use of fertilisers in irrigation leading to conditions like eutrophication, etc

5) Climate change vulnerability - Unsustainable irrigation practices & poor water efficiency increase risk associated with climate change

Measures to ensure sustainability & equity of irrigation practices

A) **Policy Measures**

1) Water pricing & incentives
   - policies that promote judicious water use

2) Regulation & enforcement
   - wrt groundwater extraction, canal maintainance & water allocation

3) Integrated Water shed management
   - eg: National Watershed Management program

B) **Institutional**

1) Capacity building - training & technical assistance to farmers, water management authorities, etc

2) Strengthening Research & Development
   - (ex) Israel water efficiency based technologies

C) **Behavioural**

1) Demonstration of best practices
   - (ex) Mission Kakatiya of Andra

2) Peer learning & knowledge sharing

Therefore, Government schemes like PM Krishi sinchay yojana, Micro irrigation adoption are steps in right direction

3. What is the Silvopasture Agroforestry System? How can it be effectively utilized to improve local climate resilience in India? (Answer in 150 words) 10 marks

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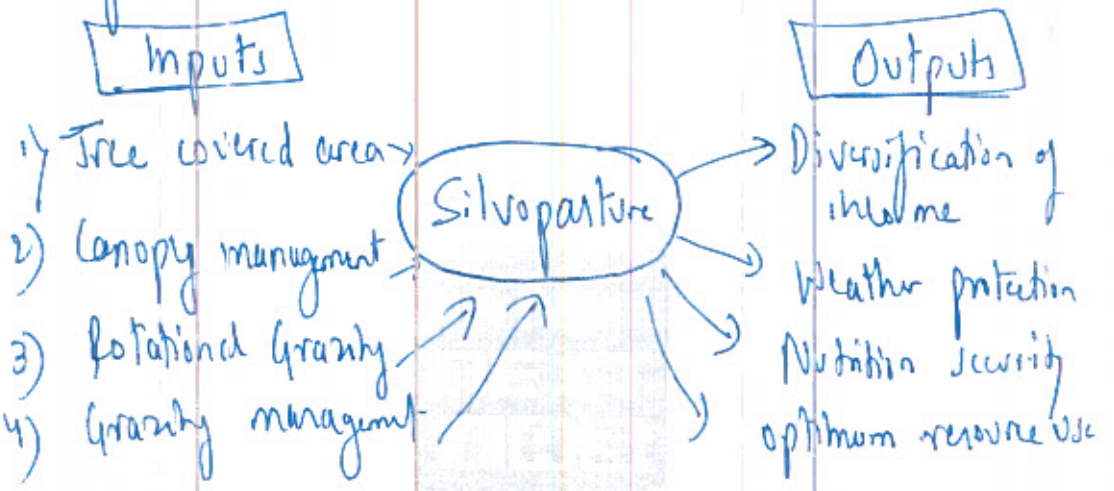
Silvopasture refers to a type of integrated farming where in livestock operations & tree cultivation happen on the same piece of land.



~~Silviculture~~ Silvopasture to improve local climate resilience in India

1) Crop diversification & Risk reduction
   - reduces dependence on single crop or activity
   - minimises risk associated with pests, diseases & climate variations

2) Resource optimisation
   - maximising resource efficiency & hence conservation of environment through responsible consumption

3) Soil fertility & Nutrient cycling

The animal waste & organic matter can be utilized as natural fertilizers with soil enrichment

4) Disease management

- Certain trees like Neem tree, etc can be intercropped & repel pests
- Livestock also consume insects & weeds

5) Environmental sustainability

- minimises use of synthetic fertilizers & pesticides
- reduces pollution risk to soil, water & air
- enhances biodiversity, habitat for beneficial organisms, etc
- Carbon sequestration

Challenges:

- Lack of Awareness & hesitancy
- Affordability issues
- Not covered under MSP
- Lack of policies implementation

Therefore, following recommendations of Ashok Dalwai committee, building farmer capacities is the need of the hour

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4. In the light of recent Government push for GM crops like DMH-11, critically analyze the advantages and concerns related to GM crops in India in ensuring food and nutritional security in India. (Answer in 150 words) 10 marks

Recently, Government has approved for trials of Dhara Mustard Hybrid 11 & other Genetically Modified (GM) crops like GM rubber, etc

Only GM Cotton is being allowed to be commercially cultivated in India

Advantages related to GM crops

1) Higher Yields
   - better food security
   - Doubling of farmers income
   - Address malnutrition

   (ex) Average yield of GM cotton is 450 kg/ha while normal cotton was 190 kg/ha

2) Increased Nutritional Value
   - SDG 2 of Zero Hunger by 2030

3) Disease Resistant crops

   (ex) Bollworm resistant crops

4) Adaptation to Climate Change
   (ex) Drought resistant crops
5) Lesser Gestation period
   - More crop cycles
   - Time for soil to rejuvenate
6) Increased Shelf life
   - exports can be increased

Concerns related to GM Crops

1) Technical Risks
   - irreversible & uncontrollable once cultivated traits
   - Effect in whole food chain
2) Need for more irrigation, fertilizer, pesticides etc eventually
3) Unclear impact on environment
   - Toxins affecting non target organisms
   (Ex) Harmful effect on bees
4) Socioeconomic issues
   - Higher price of GM seeds
   - Use of technology like Genetic Use restriction technology to stop reusing of seeds
5) IPR issues

Strict following of Cartegena protocol and 'precautionary principle' is the way ahead.

5. What are the steps taken by the Government to promote the applications of Technology in Agriculture?
(Answer in 150 words) 10 marks

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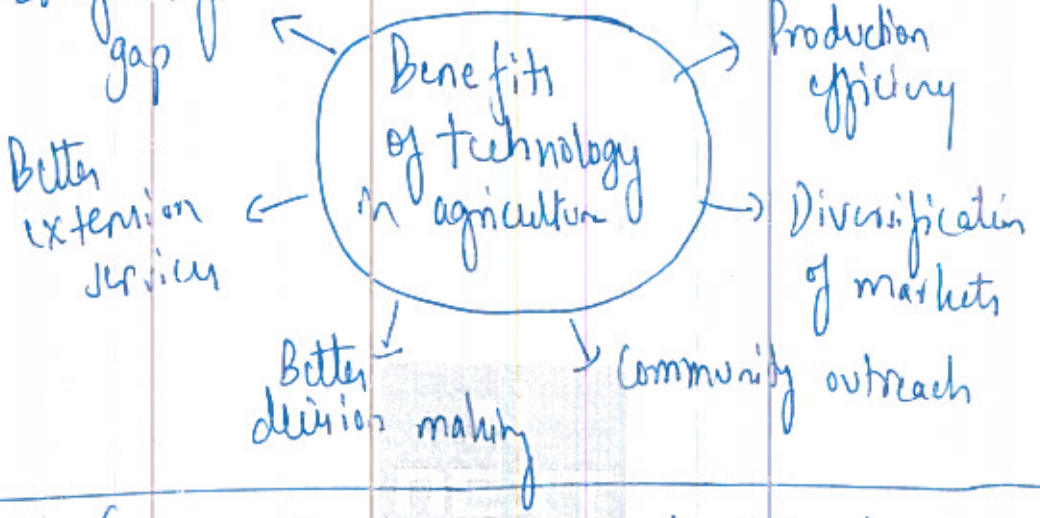
Technology has wide or transformational impact in agriculture sector



Government steps to promote technology in agriculture

1) E-tech in aid of farmers

- Kisan suvidha app - information related to inputs, beneficiary & payment status, insurance & government schemes, etc
- Digital Agriculture Mission 2021-2025
  - use of artificial intelligence, block chain, IOT, etc in agriculture
- e NAM - creation of one nation one market

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- Agristack – unified platform for farmers to facilitate end to end service

2) Precision agriculture
- Soil health card – involves analysis of soil composition before planting

3) Space technology
- use of remote sensing technologies like satellites or aerial imaging
  (ex) Civilian use of CARTOSAT

4) Genetic Engineering & Biotechnology
- Government has robust regulatory framework to study and allow for GM crops cultivation

5) Agriculture drones & robotics
Government through its protechnology policy helping with faster installation of drones & robotics for agricultural labour

Technological Constraints →
- Financial limitation
- Resource scarcity
- Education & training
- Sociocultural factors

Through Industry – Academia linkages, & Entrepreneurship schemes agricultural farmers must be promoted into 'Agripreneurs'

6. Discuss the different types of irrigation and irrigation systems used in agriculture, highlighting their advantages and disadvantages. (Answer in 250 words) 15 marks

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Indian agriculture has the highest irrigation based arable land in the world, indicating the high dependence of farmers on different types of irrigation systems

Different types of irrigation systems with their advantages & disadvantages

1) Well and tube well →

found in places where ground water is available where water is stored in wells

Merits	Demerits
i) Simplest & cheapest ii) Several nutrients found add fertility iii) Reliable during drought	i) Only limited area coverage ii) Ground water level falls iii) Silting issue

2) Canal Irrigation

effective source of irrigation in areas with plain topography & extensive watershed areas

2 types
- Inundation canals
- Perennial canals

Merits	Demerits
i) Perennial water supply	i) Overflow during rainy
ii) Increase farm production	ii) Flooding
iii) Bring in more land into agriculture	iii) Suitable for plain areas only

3) Tank Irrigation

refers to small ~~amount~~ bund of earth or stones built across a stream

Merits	Demerits
i) Naturally present	i) Lifting of water is strenous
ii) Fishing can also be carried	ii) Need power & costly
iii) low cost of construction	

4) Drip Irrigation

means water is supplied near the plant root through drippers at a low rate

Merits	Demerits
i) Most efficient system of all	i) Initial cost of setup is high
ii) Minimises fertilizer & nutrient loss	ii) Clogging issues

iii) Recycled non potable water can be used

iii) Need constant maintainance

5) Sprinkler irrigation

↳ water is sprayed into the air & allowed to fall on the ground surface resembling rainfall

Merits	Demerits
i) Suitable to all types of soil	i) Higher initial cost
ii) Increases yield	ii) Efficiency is relatively poor
iii) Water saving	iii) Need for Power supply

There are many other types of irrigation like traditional irrigation systems, etc

The choice of irrigation system must be based on type of soil moisture, quality of water, frequency of irrigation required, etc.

However, Water use efficiency is the main concern and schemes like PM Krishi sinchay yojana, Per drop more crop, etc are steps in right direction

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7. AI and Machine learning have revolutionised a number of industries, how can these technologies be deployed to improve Agricultural production and Productivity?
(Answer in 250 words) 15 marks

Artificial intelligence (AI) refers to the field of computer science that focuses on creating intelligent machines capable of performing tasks mimicking human intelligence.

While machine learning is branch of artificial intelligence that focuses on developing models that enables computers to learn & make predictions or decisions without being explicitly programmed.

AI & ML to improve agricultural production & productivity

A) **Pre Production**

1) Large volumes of agricultural data can be processed to provide decision making support

2) Weather forecasting

3) Agricultural extension service - provide answers to variety of farmers queries

4) Data driven choices on what crops to plant and advices on agronomy services

5) Crop disease identification & pest management

Production phase

1) Resource optimization based on identifying patterns, trends & correlations

2) Yield prediction - based on analysis of weather, crop health, etc to optimise farming practices

3) Precision agriculture - Applying AI & ML technologies to manage agricultural processes with precision
   (ex) Automated irrigation, Crop monitoring

4) Livestock management

Post Production

1) Better price discovery, transparency & competition

2) Supply chain management - facilitate end to end services across agriculture food value

Chain

However **Challenges exist**

1) Data privacy & security issues
2) Possibility of biases & social engineering through AI
3) Regulatory & legal challenges - Also
   (ex) No comprehensive legal provisions available
4) Digital illiteracy & infrastructural bottlenecks

Government measures in implementing AI & ML

1) Government of India & IBM collaboration - Reshamandi - supply chain management for silk products
2) Microsoft & Karnataka agricultural department
   ↳ Agricultural commodity price forecasting model
3) National Digital Agriculture Mission
   ↳ facilitates & expediates AI based initiatives
4) Agristack - unified platform for farmers to facilitate end to end services

Therefore, India must fully realise its potential wrt technologies to bring forth both nutritional security & food security

8. Analyze the impact of liberalization and globalization on Indian agriculture and the challenges faced by farmers in the globalized economy.

(Answer in 250 words) 15 marks

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India transitioned from Close market economy to open market economy through the implementation of LPG Reforms in 1991. These LPG reforms had wide impact on all the sectors including agricultural sector

Positive Impacts of LPG on Indian agriculture

1) Raising the production of Foodgrains

Total foodgrain production	
175 mn tonnes	1990-91
330 mn tonnes	2022-23

2) Increasing trend in horticultural output

Variety of horticultural crops like fruits, vegetables, spices, medicinal plants etc increased

ex: India - largest producer of fruits
- 2nd largest producer of vegetables

3) Diversification of agriculture

Agricultural products and diversity of crop varieties catering to food processing industries & other manufacturing sector

(ex) Contract farming with Lays for Potato

4) Agricultural exports

There has been increasing trend in volume of agricultural exports

5) Food Processing

Economic liberalisation & globalisation has made ample development & expansion of food processing industries (Ex) Food Mega parks

Negative Impacts of LPG on Indian agriculture

1) Reduction in public investment in agriculture

(Ex) Research & extension services

2) ₹ Cuts in various kinds of subsidies to farmers and overall decline in per capita expenditure on farmers

3) Decline in public infrastructure & energy investments including irrigation

4) Import of cheaper agricultural products into the country - tough competition for domestic farmers

(Ex) Cotton price decline

5) ~~Price~~ pt Various forms of restrictions by other countries & multilateral institutions

(Ex) Sanitary & Phytosanitary restrictions of WTO

Challenges of globalisation on farmers

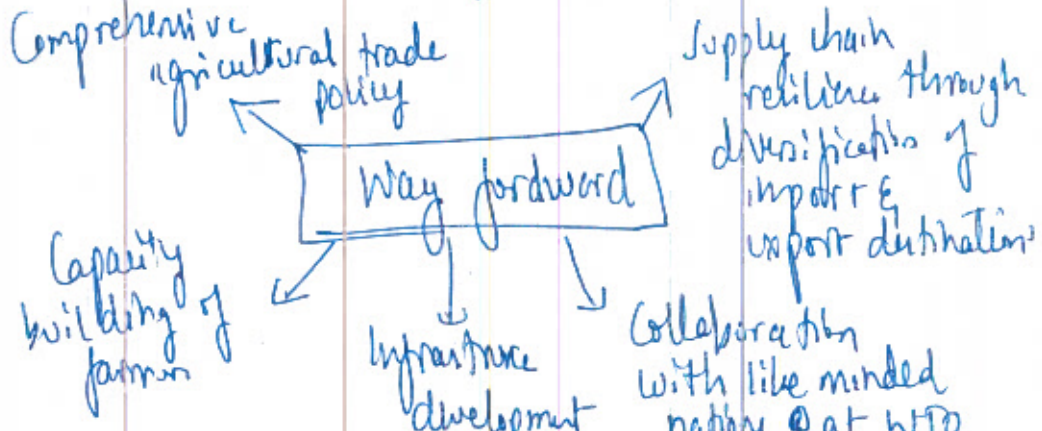
1) Emerging technologies like AI, ML, bioengineering, etc push or marginalise small & marginal farmers

2) Price fluctuations in accordance with global headwinds (Ex) Decrease in sugarcane price due to Brazil's high production

3) Weaponisation of supply chain
(Ex) Challenges in acquiring fertilizers during Russia - Ukraine conflict

4) Replacement of Indian cheap labor with better mechanization & automation of western nations
↓
lower wage income for farmers

5) Exploitation of Indian farmers by large scale MNCs due to information asymmetry



Since globalisation is irreversible in general, Indian farmers capacity must be enhanced to compete globally

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9. What are the major factors responsible for making the rice-wheat system a success? In spite of this success, how has this system become a bane in India?

(Answer in 250 words) 15 marks

Rice - Wheat system of cropping helped India's transition from 'begging bowl' country with import dependency on foreign aid into Net agricultural export nation

Factors responsible for making rice-wheat system a success

1) Green Revolution - provided package of policies & technology that produced quick result in increasing food grain production especially of Rice & wheat
   (ex) India is largest exporter of rice in world

2) State Guarantee for production
   Open procurement of surplus of wheat & rice under Minimum Support Price policy ensured farmers with stable income

3) (ex) Fertilizer & input subsidies
   Public investment in infrastructure like

irrigation system, fertilizers, seeds, etc supported farmers

4) Food preferences - Rice & Wheat form core food preferences in India.

5) Better Export opportunities - Sustained high demand for Indian rice & wheat products also encourages Indian farmers to grow rice & wheat (ex) Basmati rice demand

Rice Wheat system as base

1) Reduced productivity & crop yields over time

(ex) Indian crop yield ~ 1/2 of china's

2) Soil degradation

Due to intensive monocropping of 2-3 crop cycles per year → exhaustion of soil nutrients - both major & minor

3) Growing dependence on HYV (High Yield variety) seeds, pesticides & chemical fertilizers

4) Ecological effects - Depletion of groundwat -er resources, Air pollution due to

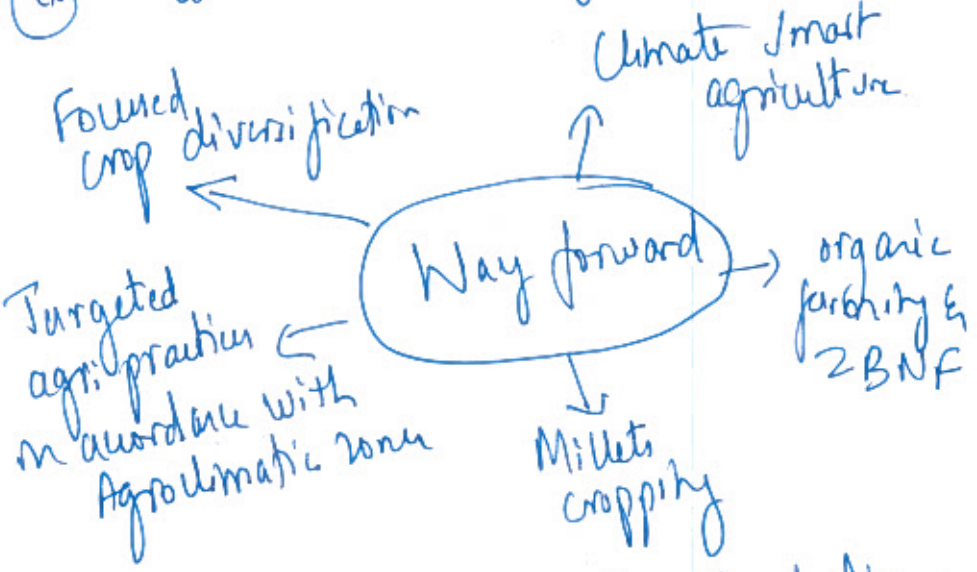
stubble burning, Soil salinity due to excessive fertilizer usage, etc

5) Increase vulnerability to pest & disease attacks due to growing of same crops year after year

6) Fiscal challenges - Rice & wheat procurement by GOI is constantly increasing resulting in fiscal deficit

7) Health effects - Increase in incidence of lifestyle diseases like DM Type 2, cancer etc

(ex) Cancer trains in Punjab



It's imperative for India to move to next stage of 'Evergreen revolution' with crop diversification & sustainable agriculture on its core

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10. Assess the role of the National Horticulture Mission (NHM) in boosting the production, productivity and income of horticulture farms. How far has it succeeded in increasing the income of farmers?
(Answer in 250 words) 15 marks

National Horticulture Mission (NHM) was launched by GOI to explore the full potential of horticultural cropping in India. It was later subsumed under Mission for Integrated development of Horticulture scheme

Role of NHM in boosting production, productivity & income of farms

1) Modernization of Agricultural practices
   - supported use of modern technical equipments, eco friendly pesticides, etc
2) Adoption of new horticultural practices
   - (eg) High density planting system
     - increases productivity of mango, banana, papaya, etc
3) National Horticulture Board
   - Streamline the rules & norms to increase the production by monitoring

production quality, adequate advice, etc

4) Coordination with various integrated boards for horticultural governance

(ix) Coconut development Board – Objective to develop coconut & related products

5) Training for Entrepreneurs & farmers
- trained in basic skills of grafting, planting, harvesting, etc

6) Establishing connections to markets, transportation, collection centres, warehouses, cold chain, ripening chambers, etc

NHM & Increase in farmers income

1) Provided alternative source of income
- with diversification from conventional crops to high value crops

2) Reduce unemployment in rural areas with opening of new market opportunities for horticulture crops

3) Stability of income
   - due to fixation of prices of horticulture crops by boards

4) Government support through financial credit assistance & subsidies reduced the cost of farming

5) Creation of Farmer Producer organisation elevate the status of farmers with better bargaining power

However, challenges with regard to better income realisation remains

- Price fluctuations in globalised economy
- Lack of storage & transportation facilities
- Improper food processing infrastructure
- Bilateral & multilateral agreement based challenges

Inspite of challenges, NHM has played prominent role in India being the 2nd largest producer of fruits & vegetables with ample scope in exporting processed horticultural food products.

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Space for Rough Work

Space for Rough Work