



AN INITIATIVE BY
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1. AGRICULTURAL REFORMS: TOWARDS DOUBLING FARMER'S INCOME

- The government has been reorienting the agriculture sector by focusing on an income-centeredness which goes beyond achieving merely the targeted production.
- The income approach focuses on achieving high productivity, reducing cost of cultivation and remunerative price on the produce, with a view to earn higher profits from farming.
- Various schemes and adopting policy measures to synchronize with higher gains for the farmers:

1. For Higher Production Through Productivity Gains:

- **National Food Security Mission** – for cereals, pulses, oilseeds, nutrient-rich cereals, commercial crops.
- **Mission for Integrated Development of Horticulture** – for high growth rate of horticultural crops.
- **National Mission on Oilseeds and Oil Palm** – launched in 2014-15 for increasing production of oilseeds and Oil palm.

2. For Reduction in Cost of Cultivation:

- **Soil Health Card** – to ensure judicious and optimal use of fertilizer application thus saving the input cost for farmers.
- **Neem Coated Urea** – promoted to regulate the use of urea, enhance availability of nitrogen to the crop and reduce cost of superfluous fertilizer application.
- **Pradhan Mantri Krishi Sinchayee Yojana** – micro irrigation component with the motto of 'Har Khet Ko Paani' for providing end-to-end solutions in irrigation supply chain, comprising water sources, distribution network and farm level applications.

3. For Providing Assistance to Small and Marginal Farmers:

- **Pradhan Mantri Kisan Samman Nidhi** - to provide assistance to small and marginal farmer families with an amount of Rs.6000 per year.
- **Pradhan Mantri Kisan Maan Dhan Yojana** – provides a minimum pension of Rs.3000 per month to eligible small and marginal farmers on attaining the age of 60 years.
- It is voluntary and contributory pension scheme, with entry age of 18 to 40 years. Central government will contribute an equal amount in this contributory pension scheme.

4. To Ensure Remunerative Returns:

- **National Agriculture Market Scheme (e-NAM)** – revolutionize agri-markets by ensuring real-time better price discovery, bringing in transparency and competition to enable farmers to get improved remuneration for their produce, moving towards 'One Nation One Market'.

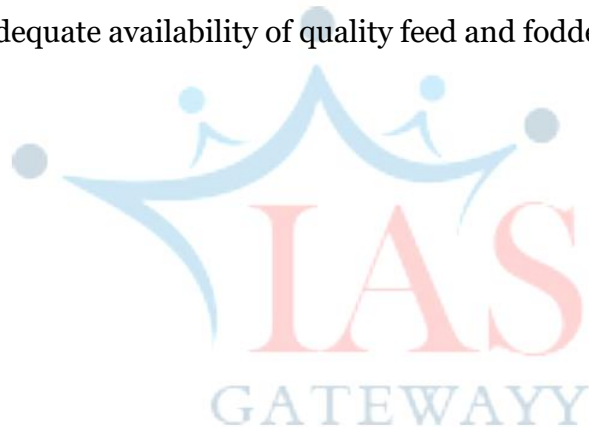
- **Farmer Producer Organizations** – it is on-boarded on e-NAM portal and they have started uploading their produce for trading from their premise.
- **The Model Agricultural Produce and Livestock Marketing Promotion and Facilitation Act, 2017** – to promote alternative competitive marketing channels for better pricing for farmers and to encourage private investment in developing efficient marketing infrastructure and value chain.
- The provisions under the Act include setting up of private markets, direct marketing, farmer-consumer markets, special commodity markets and declaring warehouses/silos/cold storage or such structures as markets sub yards.
- Existing 22,000 rural haats to be developed and upgraded into **Gramin Agricultural Markets (GrAMs)**. These GrAMs, electronically linked to e-NAM portal and exempted from regulations of Agriculture Produce Marketing Committees will provide farmers, the facility to make direct sale to consumers and bulk purchasers.
- Warehousing and post-harvest loans at concessional rate of interest to discourage distress sale by farmers and encourage them to store their produce in warehouses against negotiable receipts.
- MSP is notified by the government for certain crops periodically.
- Procurement of oilseeds, pulses and cotton are undertaken by central agencies at MSP under Price Support Scheme at the request of the state government concerned.
- **Market Intervention Scheme** for procurement of agriculture and horticulture products, which are perishable in nature and are not covered under PSS.

5. For Risk Management and Sustainable Practices:

- **Pradhan Mantri Fasal Bima Yojana and Restructured Weather Based Crop Insurance Scheme (RWCIS)** – provides insurance cover at all stages of the crop cycle including post-harvest risks in specified instances and available to the farmers at very low rates of premium.
- Government provides total interest subvention upto 5 per cent on short term crop loans up to Rs. 3.00 lakh. Thus, loan is available to farmers at a reduced rate of 4 per cent per annum on prompt repayment.
- **Paramparagat Krishi Vikas Yojana** – to promote organic farming in the country. This will improve soil health and organic matter content and increase net income of the farmer so as to realize premium prices.
- **Mission Organic Farming in North-East** – for realizing the potential of organic farming in the North Eastern Region of the country.

6. Allied Activities:

- **‘Har Medh Par Ped’** – to encourage tree plantation on farm land along with crops/cropping system. Agro forestry will not only help in increasing soil organic carbon but also in creating additional source of income to farmers.
- **National Bamboo Mission** – value chain based holistic development of this sector as a supplement to farm income.
- Bee-keeping has been promoted under **Mission for Integrated Development of Horticulture (MIDH)** to increase the productivity of crops through pollination and increases the honey production as an additional income to the farmers.
- **Blue Revolution** – focusing on fisheries production, both inland and marine with multi-dimensional activities.
- **Rashtriya Gokul Mission** – for gene pool of indigenous cattle and buffaloes.
- **National Livestock Mission** – to ensure intensive development of livestock especially small livestock along with adequate availability of quality feed and fodder.



2. ROADMAP FOR AGRICULTURAL REFORMS

- The agriculture and allied sectors enjoy the centrality in any development planning process in India for its significance in engaging and employing the people, providing food and ensuring food security, raw material for sugar, textile, herbal and food processing industries.
- Low price realization, excessive intermediation in trade and low private investment in infrastructure development are some of the priority areas of reforms that need concerted efforts of all stakeholders. The vast gap in infrastructure is also a serious constraint which will require immediate attention.

A Paradigm Shift:

- The per capita availability of land, water and other finite natural resources will decline and water stress would augment due to climate change.
- The agricultural planning has to change to make it sustainably profitable with mainstreaming of agricultural reforms in production, agri-business, value chains, investments and governance.
- There is a need for a multi-sector and connectivity-based growth to ensure food and nutrition and income security, alleviate poverty, increase trade and also enhance the income of those who work in the farm and farm-related activities.

Research and Technology:

- The productivity of agricultural commodities in India is lower than any global benchmark. While reasons are less use of quality seeds and feeds, and improved technologies. The water stress in over half agricultural areas restricts multiple cropping leading to inefficient utilization of land resource. The farmer's income increases substantially with double cropping, much of the technology developed in public sector labs does not flow to farmers due to weak extension or inadequate delivery mechanism.
- Some of the crops like oilseeds and pulses where the desired genetic enhancement has not been possible with the conventional breeding, the development of varieties/hybrids involving GM technologies is essential. Simultaneously, the renewed focus on reducing application of chemical fertilizers need some plant types and plant root and microorganism symbiosis to mobilize the already available nutrients from the soil reserve.
- **The GM technology may also be useful for addressing various climate change induced stresses.** The activities in seed and seed research and the new formulations related to microorganisms consortia, bacterial consortia, bio-inoculants, bio-stimulants etc., which are typically not a chemical product and neither an insecticide but need license for commercialization.

- The future of agriculture in India lies in how much we are investing in Agri Research and Development today. The frontier areas like gene editing, genomics, artificial intelligence, Nano technology are ushering in 4th industrial revolution need special attention.

Water-Governance:

- **As close to 84 per cent of fresh water is used in Agriucture**, both demand and supply side management through reforms are crucial in India which is a water stressed country with annual water availability at 1544 m³ per capita and approaching towards scarcity (<1000 m³ per capita).
- The large gap between potential created and utilized has been a matter of concern as out of 112 million ha created irrigation potential only 89 million ha is utilized. A strong convergence amongst programmes and agencies based on comprehensive information of all water bodies and reservoirs is the remedy.
- Through **PMKSY provided overarching governance for convergence amongst the programmes of agriculture, water resources, land resources** and other departments dealing with water. The **Jal Shakthi Abhiyan** focus on **water conservation and its efficient use**.
- A major reforms in the micro-irrigation scheme is necessitated to transform it from individual farmer subsidy driven programme to area based public-private business model covering installation, repair and maintenance of the micro-irrigation systems. **States should encourage to push such models through the corpus of Rs.5000 crore established in NABARD for micro-irrigation.**
- **The water governance should focus on micro-irrigation and water budgeting based on a strong tariffs regime.** The related policy on free power to agriculture should also be reversed with a metering system as done in Gujarat.

Reforms in Fertiliser Sector:

- The strong advocacy for **Zero-Budget Natural Farming (ZBNF)** has been noticed in recent past. The alternate sources of nutrition like microbial consortia, bio stimulant, bio compost, plant growth promoters, etc and their specifications should include in Fertiliser control order, 1985 to promote their trade and commercialization and compensate part of the chemical fertilizers through these alternate sources.
- The strategy to introduce NBS for all major nutrients should be evolved at the earliest. **DBT in fertilizers** has been a great success. The **Soil Health Card Scheme is one of its kind with 100 per cent penetration to every farm household.** The next level reform in SHC should include making soil health card the integrated soil health care system by including the data of crops, cropping system with calibrated fertilizer requirement for farmer's holding size.

Credit in Need to Needy:

- The **Sarangi Committee** recommendations on interest subvention are implemented by the government. The **interest subvention on the short-term crop loan up to 3 lakh** and Kisan Credit Card scheme have been made broad-based to include term credit and consumption needs, besides some risk cover against accidental death.
- The institutional credit is also not available to tenants or lessee cultivations. The lessee in general is not provided the institutional credit, relief, although the number and proportionate area under leasing is increasing over time.
- The states should reform their land leasing laws based on the **Model Act on Agricultural Land Leasing, 2016 prepared by NITI Aayog which will help mainstreaming the tenants under the fold of institutional agricultural credit**. The alternate system of banking in the form of banking correspondence should be strengthened in regions with low density of rural banks.
- The small and marginal farmers constitute 86 per cent of farm households and 45 per cent of area but sell only 12 to 33 per cent of their output. Cropping alone can never increase income of these farmers substantially.
- The value of farm output can be increased substantially by diversifying from field crops to fruits and vegetables. The directed diversification can only happen if farmers are given the full right to sell their produce to whomsoever they want.
- **A well-functioning system of contract farming** will go some distance towards providing a guaranteed price as well as necessary technical support to the farmer. Reforms in contract farming, tariff and tax regimes, credit is pivotal for achieving commercialisation of agriculture.
- The policies that facilitate the development of food processing industry will go a long way towards creating demand for high value commodities.

Manage Post-Harvest:

- The annual post-harvest losses are estimate at **Rs.92651 crore**. **Reforms in Essential Commodity Act** relating to stock holdings and storage could reduce the losses to great extent. Better synergy amongst agriculture, food processing, and commerce is also required.
- **The Agriculture Export Policy** will be strengthened with technological backstopping and critical reforms for attracting more investment in developing processable crop varieties and products.
- The government also evolve competing markets systems such as APMCs, and Integrated value chain models. The FPO/Joint Liability groups can be promoted to channelize the small growers into the value chain.

Minimise The Price Shocks:

- The MSP implementation induced changes in production pattern favouring for water guzzling crops in less precipitation areas causing stress on groundwater, led to regional bias in cropping pattern and incomes of farmers.
- The states should enact their APMC laws based on the **Model Agricultural and Livestock Marketing (APLM) Act, 2017 to facilitate out of mandi transactions**, exemption of market fee on perishables, electronic marketing etc.
- Contract farming under which the buyer can provide the farmer access to modern technology, quality inputs, other support and a guaranteed price is a prospective solution. The government launched the Model Act on Contract Farming to empower the farmers to decide their price and negotiate with the sponsor.

Make Indian Farmers Competitive:

- To make Indian farmers globally competitive for quality produce and price, the vibrancy of the private sector should be mainstreamed for investment. Since liberalization, the private sector helped in significant investments in some sectors. For example, poultry sector is grew into a well-organised industry.
- The commercial vegetable production is gradually picking up. **The revolution in ICT has enabled farmers and producer to learn and adopt better practices and access market information.**
- The 'state of the art' food testing labs could be established at all major seaports for testing of quality standards and to establish Indian brands in overseas markets. A consistent policy regime at least for some specified period will establish India as a good buyer and seller or agri-commodities helping the domestic producers a long way.

Turning Small into Big:

- Enabling reforms for **the grouping of small and marginal farmers into Farmers Producer Organizations (FPOs)** is the game changer for those who own less land. Scaling up of membership, Equity mobilizations, capacity building and initial business of input supplies etc. should be supported with appropriate reforms.
- The modernization of income tax laws allowing exemption to FPOs income, approving direct marketing by FPOs to buyers and single state-wide license for trading of the inputs are some reforms needed immediately.
- The FPOs registered under Companies Act may also be made eligible for loans from the cooperative banks, etc.

Conclusion:

- The prime function of the Government agencies is to create an ecosystem for the larger acceptance for the reforms. This requires three things – **information, intelligence and interaction**. Right information gathered through the intelligent systems should be placed before stakeholders to make an informed decision.



3. INITIATIVES IN AGRICULTURE SECTOR

- The primary challenge for agriculture sector is to provide food to 1.3 billion populations in a sustained manner. Agriculture accounts for nearly 18 per cent of GDP and employs almost half of country's total workforce.
- It supports industry by providing raw materials and necessary inputs for production. On the other hand, it consumes fertilizers, pesticides for its own production. So there is a interdependence between agricultural and industry which is essential for the socio-economic development of the country.

Key Challenges Facing the Indian Agriculture Sector:

- Impediments such as **decreasing size of agricultural land holdings, poor transport infrastructure, poor storage facilities, lack of use of modern technology, lack of proper irrigation facilities and inadequate access to irrigation** which result in over dependence on monsoons, loss of soil fertility, inadequate access to agricultural credit and lack of marketing support hamper the agricultural productivity in India.
- Decreasing size of land holdings not only increases input cost but also irrigation becomes difficult in a small fragmentation of land.
- It becomes extremely difficult to store and subsequently transport agricultural produce from remote areas, owing to lack of cold storage and transportation facilities. This results in **gross wastage of the produce**.
- Since, the storage facility is inadequate farmers are compelled to sell low prices, resulting in loss of remunerative income for the farmer.
- **Access to agricultural credit is directly dependent on land holding titles**. Due to this, small and marginal farmers who do not hold formal land titles, are unable to access institutionalized credit.
- Government schemes for Enhancing the Socio-Economic Status of Agriculture:

1. Pradhan Mantri Kisan Pension Yojana:

- Small and marginal farmers will get a minimum fixed pension of Rs.3000 per month on attaining the age of 60 years. It is a voluntary and contributory pension scheme for small and marginal farmers. Entry age is 18-40 years. The central government will match the contribution from the subscribers.

2. Pradhan Mantri Krishi Sinchai Yojana:


- As half of the area under cultivation in the country is rainfed, there is need to expand the area having access to water. Agriculture consumes 60 per cent of available water resources.

- PMKSY was started to address the challenges of the Accelerated Irrigation Benefits Programme (AIBP) and look at water needs of agriculture in a holistic way.

IRRIGATION


Prime Minister Krishi Sinchai Yojana & Other Schemes

- ♦ Conserve soil and water through good Agricultural Practices.
- ♦ Harvest rain water through construction of check dams and ponds.
- ♦ Adopt crop diversification, seed production and nursery raising in water logged areas.
- ♦ Adopt drip and sprinkler irrigation system to save 30-37% water and enhance crop quality and productivity.




3. PM-KISAN:

- Under the scheme, government provides Rs.6000 to 14.5 crore farmers in a year.





Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)





Direct income support of ₹6,000 p.a for farmers, effective 01.12.2018




To benefit 12 cr small and marginal farmer families having cultivable land upto 2 ha

Direct transfer into the bank accounts in three equal instalments

First installment upto 31.03.2019, to be paid this year itself



₹ 75,000 cr in outlay for 2019-20 and ₹ 20,000 cr in RE 2018-19




4. Interest Subvention Scheme:

- Under this scheme, interest subvention for short term crop loans up to Rs. 3 Lakhs at a reduced interest rate of 7 per cent per annum.
- This scheme provides interest subvention of 2 per cent per annum to Banks on use of their own resources. Additional 3 per cent incentive is also given to the farmers for prompt repayment of the loan.


5. Soil Health Card

- To ensure that the farmer reaps good yields, focus on strengthening sowing-related activities is imperative. Soil Health Cards carry crop-specific recommendations for nutrients and fertilizers to help farmers improve their productivity.
- More than 13 crore Soil Health Cards has dispatched from 2015-2018.




Soil Health Card

- National Soil Health Card scheme launched in February 2015
- Information on Soil Health through Digital medium
- Mobile app for Soil Health Card
- 13 Crore Cards issued
- Administered by Ministry of Agriculture, developed by NIC



E-Nam

- 585 Markets in 16 States already integrated
- 93 Lakh Farmers Registered
- 84,000 Traders Registered
- Administered by Ministry of Agriculture developed by NIC



Marketing the Farmer's Produce (e-NAM):

- National Agriculture Market scheme has integrated 585 markets across 16 states and 2 union territories.
- Its help to cutting the middlemen in agriculture trading to facilitate farmer get his due. 22,000 Rural Haats will run into Gramin Agriculture Market which will benefit 86 per cent small farmers.

Pradhan Mantri Fasal Bima Yojana (PMFBY):

- It offers crop insurance at a very negligible cost to the farmers. The farmers are fully secured against any crop loss on account of natural calamities.

- ➔ Coverage for all seasons, all crops and all natural non preventable risks –Pre-sowing to post harvest.
- ➔ One Nation, One Season, One Rate.
- ➔ Low premium rates full protection [1.5% Rabi – 2% Kharif & 5% for Annual commercial Crops, Horticultural Crops].
- ➔ Maximum Government Subsidy on premium amount.
- ➔ Common web platform interface for Farmers, Central Government, State governments, Banks, Insurance Companies and Common Service Centres (CSC).
- ➔ Technology driven assessment.
- ➔ Claims directly credited to farmers bank accounts.
- ➔ State Government enjoys the freedom to notify crops/area under insurance, formation of clusters of districts and do selection of insurance companies.

Kisan Credit Card:

- To encourage digital payments and also to provide adequate credit facility for purchasing necessary inputs for agricultural and other requirements, KCC scheme was launched.
- **National Mission for Sustainable Agriculture:**
- It was launched **in 2014-15 with the primary objective of holistic improvement of agriculture by making it more productive, sustainable, remunerative and climate resilient** through the process of implementation of location specific integrated/composting farming systems; soil and moisture conservation measures; comprehensive soil health management, efficient water management practices and mainstreaming rainfed technologies.
- **Rainfed Area Development Programme** is an important component under NMSA and focuses on Integrated Farming System for enhancing productivity and minimizing risks associated with climatic variability by integrating crops with activities of horticulture, livestock, fishery, vermin-organic composting etc.



4. BEST FARMING TECHNIQUES IN INDIAN SCENARIO

- During the last 40 years, India's food grain production has increased more than twice from 123 million tonnes to 284 million tones. Virtually all of the increase in the production resulted from yield grains rather than expansion of cultivated area.
- Nevertheless, future increases in the production of cereals and non-cereal agricultural commodities will have to be essentially achieved through increase in productivity, as the possibilities of expansion of area and livestock population are minimal.
- Best management practices are essential to increase agricultural productivity and livelihood of farmers who make the major chunk of our country.

Conservation Agriculture:

- It is defined as a sustainable agriculture production system comprising a set of farming practices adapted to the requirements of crops and local conditions of each region, whose farming and soil management techniques protect the soil from erosion and degradation, improve its quality and biodiversity, and contribute to the preservation of the natural resources, water and air, while optimizing yields.
- The Conservation Agriculture shouldered by three major pillaring principles:
 1. Minimum soil disturbance
 2. Maintenance of permanent soil covers
 3. Cropping system diversity and crop rotations.
- Conservation agriculture has a good scope in the geographically important region where rice-wheat dominated areas in western UP and Haryana, huge amount of crop residues are generated but due to a low population of dairy animals their disposal is a problem causing pollution.

Integrated farming systems (IFS):

- The Integrated Farming Systems approach is considered as important and relevant, especially for the small and marginal farmers as location-specific IFS will be more resilient and adaptive to climate variability. **Integration of livestock rearing with crop production gives higher economic returns.** In general, in regions with **rainfall of 500 to 700 mm**, the farming systems should be based on **livestock with promotion of low-water requiring grasses**, trees and bushes to meet fodder, fuel and timber requirements of the farmers.
- In **700 to 1100 mm rainfall regions**, crops, **horticulture and livestock-based farming systems can be adopted depending on the soil type and the marketability factors.** Runoff harvesting is a major component in this region in the watershed-based farming system.

- In areas where **the rainfall is more than 1100 mm IFS module integrating paddy with fisheries is ideal.**
- Under irrigated areas the following IFS modules are most suitable to maintain soil fertility.
 1. Intensification and diversification of crop component of farming system.
 2. Diversification of other components of farming system for higher income.

Precise Nutrient Management and Soil Health Cards:

- Site- specific Nutrient Management relies on principles of **5Rs, the right time, the right amount, the right place, the right source, and the right manner.** The Site-Specific Nutrient Management approach emphasizes ‘feeding’ crop with nutrients as and when needed.
- The following nutrient management strategies are the most efficient methods to enhance nutrient use efficiency in the field crops.
 1. **Use of neem coated prilled urea and zinc sulphate** – coated urea is beneficial in increasing grain yield, yield attributes, agronomic efficiency and apparent nitrogen recovery of field crops.
 2. **Production of 100 per cent neem coated urea for improvement in soil** health and reduction in the attack of pests and diseases. This leads to decrease in use of plant protection chemicals.
 3. **Use of biofertilizers** along with rock phosphate provide higher productivity of field crops.
 4. **Application of NPK fertilizers** is adjusted to the location and time as per the needs of the crop based on Soil Health Card.
 5. **Leaf Colour Chart**, Chlorophyll meters and Green Seeker based nitrogen management which ensures that nitrogen is applied at the right time.
 6. **Integrated with other Integrated Crop Management (ICM)** practices such as the use of quality seeds, optimum plant population and efficient water management.
 7. **Fertigation is the most efficient method of fertilizer application** as it ensures uniform application of water and fertilizers directly to the plant roots.
 8. **Use of software-based skills** like – Nutrient Experts, Crop Manager, Geographical Information System (GIS) and GPS in monitoring and application of nutrients.

Efficient Water Management:

Pradhan Mantri Krishi Sinchai Yojana:

- As half of the area under cultivation in the country is rainfed, there is need to expand the area having access to water. Agriculture consumes 60 per cent of available water resources.
- PMKSY was started to address the challenges of the Accelerated Irrigation Benefits Programme (AIBP) and look at water needs of agriculture in a holistic way.

- **The pressurized micro irrigation systems not only save water in food grain production but also contribute to higher productivity,** cost effectiveness, higher water productivity and energy use efficiency compared to conventional irrigation methods.

Organic Farming:

- Organic farming in India has been reinvented and getting more popular with each passing day. The main objectives of organic farming or paramparagat kheti are:
 1. To promote the use of natural resources based on integrated, sustainable and climate friendly farming practices.
 2. Reducing the dependence of farmers on external inputs, promotion of soil fertility, natural resource protection and nutrient cycling.
 3. Reducing the cost of agricultural production of farmers so that per unit income can be increased.
 4. Protecting the environment from hazardous inorganic chemicals by adopting conventional techniques and farm-friendly technologies which are cost effective.

Crop Diversification:

- Crop diversification proved to be paramount importance in **mitigating the environmental problems arising on account of monoculture.** Inclusion of legumes in cropping systems has been found to be effective in reducing the nitrate leaching in lower profiles.
- There is need to diversify crop cultivation with pulses, oilseeds, fibre crops along with high value crops like fruits, vegetables as per agro-climatic conditions and resourcefulness of the farmers for efficient management of natural resources and higher productivity and profitability. The adoption of suitable agro-forestry options would certainly enhance the productivity of the farm along with soil health and farm income.

Resource Conservation Technologies (RCTs):

- It refers to those practices that conserve resources and ensure their optimal utilization and enhance input use efficiency.
- These techniques include zero or minimum tillage, permanent or semi-permanent residue cover, new varieties that use nitrogen more efficiently, laser land leveling that save irrigation water, system of Rice Intensification (SRI), Direct Seed Rice and brown manuring helpful in suppressing weeds and increasing the yields.

Integrated Crop Management (ICM):

- It suggests the use of Good Agricultural Practices such as Integrated Nutrient Management, Integrated Weed Management, Integrated Disease Management and Integrated Pest Management, etc. for raising a good crop.

- It combines the best of traditional methods with appropriate modern technology for balancing the economic production of crops with positive environmental management. Thus, ICM is an alternative system of crop production, which conserves and enhances natural resources.

Small-Farm Mechanisation:

- Large areas remain fallow or planted late due to poor access to farm machinery which results in low crop productivity.
- Therefore, improved access to the farm machinery for sowing, harvesting and other operations is an important adaptation strategy to deal with climatic variability such as late onset of monsoons, mid-season and terminal droughts and contributes to timely sowing of post-rainy crops.
- **The National Innovations on Climate Resilient Agriculture (NICRA) to setup one custom-hiring centre at the 130 climate climatically vulnerable villages** across the country. It promotes mechanization of agricultural operations on small farms.

Climate Smart Cropping:

- In the changing climate scenario, developing cultivars resistant to climate change may become important adaptive mechanism for maximizing resource-use efficiency.
- Changing of planting dates to minimize the effect of temperature increase and reducing spikelet sterility can be used to enhance yield stability by avoiding the flowering period to coincide with the hottest period.

Protected Cultivation:

- Protected cultivation or greenhouse cultivation is the contemporary approach to produce, mainly, horticultural crops qualitatively and quantitatively and has spread extensively over the world.
- It is also known as **Controlled Environment Agriculture (CEA) and is highly productive, encourages water and land conservation as well as protects the environment.** The technology involves cultivation of horticultural crops in a controlled environment wherein factors like the temperature, humidity, light, soil, water, fertilizers etc. are manipulated to attain the maximum produce as well as allow a regular supply of them even during off-season. Its main purpose is to create favourable environment for sustained growth even in adverse climatic conditions. This kind of crop production system could be adopted as a profitable agro-enterprise, especially in peri-urban areas.
- At present, there is a large gap between the demand and production of these crops to meet both quantitative and qualitative needs of domestic and export markets which are difficult to be bridged with the traditional cultivation practices.

5. PUBLIC-PRIVATE PARTNERSHIP IN AGRICULTURE SECTOR

- A public-private partnership (PPP) is a long-term cooperative arrangement between two or more public and private sectors.

Dimensions of PPP in Indian Agriculture:

- India is one of the fastest growing economies with a annual growth rate of over 8 per cent. Annual average growth rate of Indian Agriculture around 2.7 per cent during past years, making it the slowest growing sector.
- The challenges faced by agriculture sector underlines an urgent need for innovations brought via partnerships between private and public sectors.
- Maharashtra the first state to take this innovative path, rolled out its Maharashtra Public Private Partnership for Integrated Agricultural Development (PPPIAD) project to develop integrated value chains for selected crops through PPP and co-investment.
- However, successful partnerships between public and private sectors are challenged by issues like high transaction costs of operationalising and coordinating the partnership, different objectives of each sector, negative perceptions and mutual mistrust as well as uncertainty about actual benefit and outcome from PPP.

PPPs in Market and Infrastructure Development:

- The Model APMC Act encourages direct marketing to enable the farmers get the best price for their produce and create partnerships with banks, finance and logistics companies for lowest cost financing and marketing.
- This attracts private investment in creation of much needed marketing infrastructure, create competition and ensure better service to the farmers.
- To overcome the shortcomings and challenges in the storage of food grains, the government through FCI, adopted a phased implementation plan to build modern steel grain silos with a capacity of 10 million metric tons by 2020 through PPPs.
- The area under micro-irrigation as of now is only 5 per cent of the total cultivate land in India. PPP can facilitate the use of micro-irrigation resulting in enhanced irrigation efficiency. Integrated micro-irrigation networks are being developed through PPPs.

Impact of PPP Models in Agriculture:

- The impact of PPP has been realized through positive changes in marketing aspects of farm produce, reduction of risks and uncertainties, social mobilization, capacity building of farm families and economic empowerment of farmers.
- ✓ Knowledge Management
- ✓ High-End Technologies Development

- ✓ Building Farmer's Resilience to Environmental Shocks and Minimizing Risks and Uncertainties
- ✓ Farm Mechanization
- ✓ **Social Mobilisation** – developmental departments develop partnership to create a better social linkage through SHGs, Farmer Interest Groups, commodity groups, farmer's clubs, farmers cooperative societies.
- ✓ Productivity Enhancement
- ✓ Economic Empowerment of Women
- ✓ Investing in Smarter Value Chains like government developing pilot PPP projects to streamline post-harvest supply chains of major perishable agriculture and **horticulture commodities through a 'hub and spoke' model**, consisting of farm collection points and primary processing centres.

Limitations of PPP Models in Agriculture:

- Resource poor farmers lack capacity to raise their own capital to finance agro-processing infrastructure. The private extension services focus on resourceful areas, resource-endowed farmers and limited to profitable crops and areas.
- Private sector seed companies concentrate on hybrids where returns are high and assured. Thus PPP model lacking to benefit of farmers especially for cultivating parental lines of hybrid seed.

Challenges of PPP Approach:

- The PPP has been recent initiative and needed reasonable time to assess the effects and impacts.
- A major part of PPP in India has actually taken place during the last 10 years.
- **Each PPP approach is unique and no two PPP contracts are the same.** So it is difficult to standardize a PPP format.
- **The lack of transparency** is one of the most discussed problems related to PPP.
- **The long time taken for creation of PPP arrangement and number of formalities required to follow happen** to be another issue in implementation of PPP approach.
- **Undue political favors in many cases are gained** by the private party from their public sector counterpart.

Conclusion:

- The PPP project has to mainly pass through four main phases viz. project preparation, project procurement, project development and operations. Each of these stages require a careful handling, planning and clear-cut demarcating lines of work.

- The government has been emphasizing to create a facilitating environment for investments in infrastructure building following PPP approach.
- India has set the goal of doubling farmer's income by 2022-23 that requires significant investment. Thus, a more concerted emphasis is warranted to engage the private sector in agriculture through PPPs.



6. EMPOWERING WOMEN FARMERS

- Domestically, women play an important role in the management and rearing of livestock and other activities like fodder collection, post-harvest activities and farm cleaning activities.
- According to 2011 census, **total female workers in** agricultural activities stood at **65 per cent**, with 30.3 per cent of total cultivators and 42.6 per cent of total agricultural labourers being women.
- Agriculture census, established that female operational holdings in agriculture **increased to 13.78 per cent in 2015 from 12.78 per cent in 2011**. This shows that women participation in the organized agricultural sector is increasing and therefore, support and thrust is necessary from the government.
- In the rural areas, **education and awareness is the fundamental concern** that has to be primarily addressed in order to ensure successful implementation of any government policy or scheme.
- The glaring dependency of women on the primary sector impels need for creating welfare measures.
- There have been myriad efforts for instance, the foregrounding, recognizing and mainstreaming of women's role in agriculture as encapsulated within ' **The National Policy of Farmers**' 2007. It underlines the importance of incorporating 'gender issues' within the agricultural development agenda.
- The women farmer friendly handbook enumerates the special provisions that empower women in multifarious ways, some of them are:
 1. Support for women Food Security Groups
 2. Procurement of Agricultural Machinery and Equipments
 3. Representation of women Farmers
 4. Promoting Women Groups
 5. Integrated scheme for Agricultural Marketing
 6. Agricultural Insurance

Government Initiative towards empowerment of Women Farmer's:

- **Mobilization of Self-Help Groups** with a view to increase the income generation of female participants in agriculture and animal husbandry.
- **Softwares and interfaces to facility mass media communication** and carries out outreach programmes for educating and empowering rural women.
- **A gender knowledge portal**, displaying all the relevant data and information related to women farmers has also been created.

- **Krishi Vigyan Kendras** have successfully trained about 3 lakh women agriculturists and besides this, one female scientist in every Kendra has been made mandatory in 668 KVKs across the country.
- There is also a provision under the National Food Security Mission (NFSM) **that provides training based on cropping system to farmers including the SC,ST and women farmers** to generate awareness on augmented technology for increasing crop production and yield.
- Acknowledging the prevailing gender disparity in terms of wages, the Agricultural Ministry has come up with several **measures like mainstream agricultural sector like focusing on women Self-Help Groups in order to connect women to micro-credit via capacity building activities**, ensuring adequate representation of women in decision and policy making bodies, etc.

Way Forward:

- Empowerment for women in an all-round manner can only come about when women are educated about their health, social well-being, financial standing and political partaking.
- Economic survey acknowledges ‘feminization’ of agriculture sector, with increasing number of women in multiple roles as cultivators, entrepreneurs, and labourers.
- The survey rightly suggests for adopting “gender specific interventions” in agriculture to increase productivity and enhancing agricultural value chain.
- Great emphasis is being laid on making women self-sufficient and their skill-development by means of various training and demonstration programmes organized consistently from time to time.