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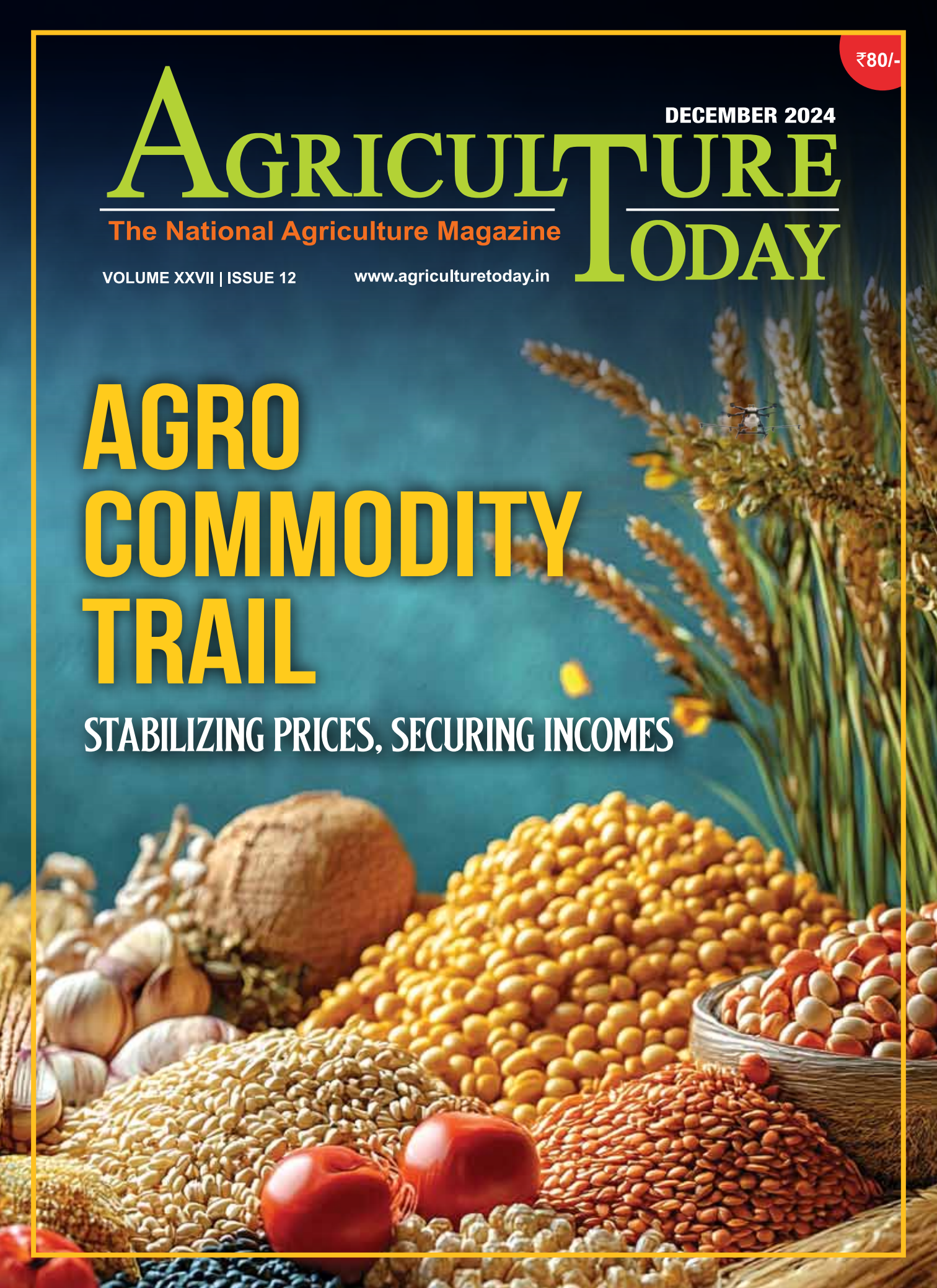
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PUSHING BARRIERS

India is the world's largest producer of many agricultural commodities. Over 80% of agricultural commodities are produced in India, and the country is ranked among the world's five largest producers. India is the second largest producer of wheat and rice, the world's major food staples. From its modest beginnings with annual exports of USD 0.6 billion in exports during 1987-88, agricultural exports today have reached a remarkable figure of USD 53.1 billion.

Our favourable climatic conditions, a strong work force dependent on agriculture for livelihood, supportive policies and emerging technologies have all contributed to the steady growth in agricultural commodities. We remain self-sufficient in many of them, allowing us considerable room for export and state wide procurement and distribution through PDS. However, this does not apply to all of the agricultural commodities.

Oilseeds and pulses continue to remain in red, and there is a considerable gap in production and demand. India, primarily being a vegetarian country, depends on pulses to meet its protein requirement. India is the world's largest producer and consumer of pulses, but there is a significant gap between demand and supply, and we meet 20% of our total demand from imports. At present, India meets nearly 60% of its edible oil demand through imports of 16.47 million tons of edible oils valued at Rs. 1.38 lakh cores every year. However, rest of demand is fulfilled through the domestic production of various oilseeds like Mustard, Groundnut, Sesame, and cotton oils.

This puts us in a precarious position, urging for an immediate intervention in scaling up our production in pulses and oilseeds. Traditionally, Indian agriculture has been unfairly biased towards cereals such as rice and wheat. It is time to strategically increase the area under pulses and oil seeds. Policy incentives and technological intervention can improve the situation.

The country also seriously need to rethink of the gaps existing in agriculture warehousing. Our production far exceeds our storage capacities. There is a massive gap of more than 50 per cent in the warehousing capacity against the total food production of 311 mt. This calls for inclusive and holistic development in the agriculture warehouse industry.

India's production prowess should not be crippled either by deficient infrastructure, policy fatigue or short-sighted vision. Technology should be harnessed to create innovative solutions that can help the farmers in creating storage solutions that will help them fetch better prices in the market and expand their horizons.



Anjana



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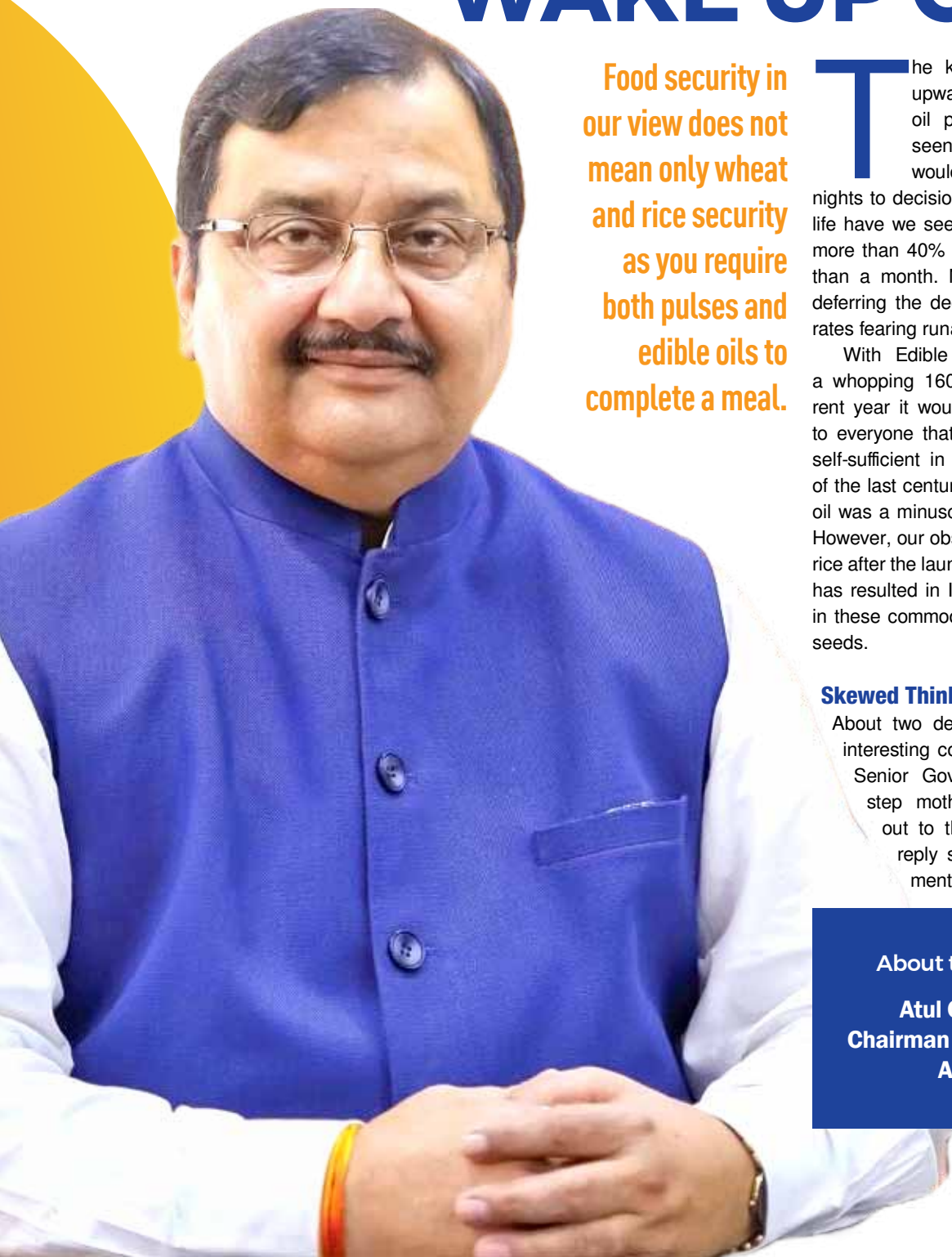


As I take on the mantle of CEO at Agriculture Today group, I reflect on the journey that has brought me here, it's inspiring to see how far the perception of agriculture has come. What was once seen merely as farming has now evolved into a dynamic and expansive sector with limitless potential. Growing up, I never imagined myself in this industry. However, as the son of Dr. M.J. Khan, a visionary leader, whose dedication and contributions to agriculture—both in India and globally—have been truly transformative, I began to understand the vast impact this field can have. The lessons and values instilled in me by my parents have guided my decision to step into this role.

It is my honour to take this new position at the Agriculture Today Group, and I am quite excited to bring a fresh perspective to the agricultural sector. My vision is clear, which is to infuse agriculture with innovation, technology, and a sense of excitement that will appeal to the next generation. It's time to show that agriculture is not just about farming—it's about creating sustainable solutions, embracing cutting-edge technology, and driving economic growth. At Agriculture Today, which is committed to transforming this sector into one that inspires, empowers, and motivates young minds. I invite the youth of India to join me in this movement, to elevate agriculture to new heights, and to understand why it remains the backbone of our economy.

Edible oil

WAKE UP CALL



Food security in our view does not mean only wheat and rice security as you require both pulses and edible oils to complete a meal.

The kind of unprecedented upward trajectory of edible oil prices which we have seen in the last few months would be giving sleepless nights to decision makers. Never in my life have we seen prices moving up by more than 40% in a short span of less than a month. No wonder RBI keeps deferring the decision to lower interest rates fearing runaway Food inflation.

With Edible Oil imports reaching a whopping 160 lakh mts during current year it would come as a surprise to everyone that India was reasonably self-sufficient in edible oils in Nineties of the last century. Our import of edible oil was a minuscule 3.0 lakh tons only. However, our obsession with wheat and rice after the launch of Green Revolution has resulted in India becoming surplus in these commodities at the cost of oil-seeds.

Skewed Thinking - Lost Decades

About two decades back I had an interesting conversation with a very Senior Govt. functionary on the step motherly treatment meted out to the oilseed sector. His reply summed up the fundamental reasons of thinking

About the AUTHOR

Atul Chaturvedi
Chairman -Asian Palm Oil Alliance

in the policy making circles of the time. He said the private sector has done such a wonderful job of maintaining the supply chain of edible oils that they feel the need for oilseed development thrust does not exist. Years of low commodity prices had lulled decision makers into complacency and this got reflected in deciding priorities.

This skewed thinking resulted in Indian dependence on imports growing to almost 60-65% of our consumption seriously compromising our edible oil security. The import bill has now ballooned to almost Rs.1.4 lakh crore and rising year after year. Food security in our view does not mean only wheat and rice security as you require both pulses and edible oils to complete a meal.

The fallacy of neglecting oilseed sector over the years hit us below the belt when Covid struck. With Indonesia banning palm oil exports to protect their domestic market, edible oil prices in India went through the roof.

Palm oil has historically been the most competitively priced oil and we import close to 90 lakh tons from Indonesia and Malaysia. However, with Indonesia mandating 40% blending of palm oil in biodiesel from 1st January 2025, and 50% from 2028, the days of low palm oil prices will be history. Their internal disposal of palm oil will rise big time and exports would become a casualty. This should ring alarm bell in Delhi as our biggest supplier may not be in a position to help maintain a smooth supply chain of edible oils for Indian consumers.

Is Atmanirbharta a Pipe dream ??

Ever since our Honourable Prime Minister gave the clarion call, the buzzword in policy making circles is Atmanirbharta. However, the action at the ground level has been rather lukewarm and does not reflect missionary zeal required to achieve game changing results.

- Investment for promoting Palm in India was announced with initial outlay of 11000 crores over five year period. This translates to around Rs 2200/ per year which is minuscule



One of the biggest problems facing oilseed sector has been woefully low productivity.

for a large nation like India.

- National mission on Oilseed has been put on fast track with an outlay of Rs 10103 crore over 7 (seven) year period. This translates to around Rs 1400 crore annually. Again the amount is so small that it cannot have any noticeable effect on oilseed cultivation. Honourable Finance Minister announced the start of Oilseed Mission during her Interim Budget speech, but the allocation does not reflect the seriousness required to address the issue of burgeoning edible oil import bill.
- Private sector sees the writing on the wall, and with their limited resources, are trying their level best to make a difference. Apex industry association, SEA, launched Mustard Mission aggressively and we are seeing massive jump in mustard production in our country. Few years back the production used to hover around 7.0 million tons, and now it is touching 12.0 million tons. To say mustard has been our saviour would not be out of place.

GM vs NON GM

One of the biggest problems facing oilseed sector has been woefully low productivity. Ironically, over the years NGOs and activists had stymied efforts to introduce GM Oilseeds which may have the

potential of increasing yields. It is to the credit of this Government that they have given an affidavit in Supreme Court that opposing GM in oilseeds is tantamount to being anti national. The Supreme Court has now directed the Govt to formulate policy on GM, and hopefully we can see some concrete action for improving productivity.

Champion Needed

Over the years I have had the privilege of interacting with Senior Govt functionaries of Agriculture, Food and Consumer affairs etc. All these ministries are manned by brilliant bureaucrats, and they have ensured a balanced approach in policy making. However, the mandates of each ministry is at variance with the other. For example, if agriculture pushes for higher prices of oilseeds and higher import duties on edible oil, Consumer affairs ministry is bound to oppose the same as they take care of the interests of the consumer.

To overcome this situation and have a holistic approach, it is imperative that the Govt appoints a very senior person as Champion to drive the National Mission on Oilseeds. The person nominated should have the eyes and ears of the Prime Minister which would ensure seamless decision making in the long-term interest of the nation.

Time for never ending debates is long over and concrete action under National Mission on oilseeds is the need of the hour to have game changing impact on oilseed production in our country. If we continue to dither, we will permanently remain at the mercy of exporting countries, and our bargaining capacity would be seriously compromised.

Agri Commodities Market

For Market Stabilization and Increased Farmer Income

Agricultural (Agri) commodities fulfil the survival needs of not only human beings but also of the domesticated animals. As per estimates of Food and Agriculture Organisation of the UN and International Grains Council, the Agri Commodity Market Global Value was approximately \$4.3 trillion in the year 2020, and the Trade volume was over 1.4 billion metric tons. Against this, the Agri-Commodity Market in India, was valued at approximately \$370 billion, and the volume was about 270 million metric tons. Within the Agri commodity industry, the grains segment consisting of wheat, paddy, corn

Besides better price discovery and risk management, future markets attract more participants from across the country and Futures market signifies “one nation one market” because the farmer is not dependent on mercy of local mandi or Adhtiya (middleman broker) for price discovery.

Consultancy Services during the period 2020-22, India suffers a food loss of about Rs. 1.53 trillion (USD 18.5 billion) every year. And part of it can be prevented and stakeholders could benefit from that. The Agricultural Policy of 2000 and subsequent reforms had encouraged commodity futures trading. And it was envisaged that these will lead to Integration with global commodity markets. The agricultural commodity trading market accounts for roughly a sixth of the total market and within that the commodity futures trading had seen robust growth, with average daily turnover reaching Rs.34,491 crore in 2019-20.

Factors Influencing Indian Agri Commodity Markets

- Production volume and variability, that leads to import dependence
- Demand stability and exponential demand growth in commodities like oilseed and global market linkages
- Price volatility due to exchange fluctuations/vagaries of nature that lead to loss
- Government policies and regulations.
- Liquidity and trading volumes
- Distress selling by farmers
- Transit and Storage loss

Risk Mitigation

The biggest issue facing the government of India is protecting smallholder farmers from adversities. Government, as also the private sector, is providing “safety net” for farmers. Such risk management tools fall into a category of crop (revenue) insurance where the contract is written by an insurance company. The other risk mitigation which is market driven is Commodity derivatives. Mr Arun Jaitley was

and others accounted for approximately \$130 billion, whereas oilseeds and spices were the next two with \$40 billion and \$20 billion value respectively. Pulses and Tea made the top five with \$15 billion, \$1.5 billion respectively.

On the back of increasing incomes, Indian consumption patterns are changing, and this translates into demand for high-value crops, organic produce, and processed foods. India’s agri commodity market is expected to grow at about 5% CAGR in next 5 years, translating into value of approximately US\$ 500 billion. Incidentally, as per the large-scale study conducted by NABARD



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the Finance Minister, he had realised that Commodity Derivative markets have the potential to mitigate risks of the stakeholders, especially farmers, if farmer participation can be ensured through increased awareness and education among farmers about futures markets which will drive participation. Besides better price discovery and risk management, future markets attract more participants from across the country and Futures market signifies “one nation one market” because the farmer is not dependent on mercy of local mandi or *Adhtiya* (middleman broker) for price discovery.

Further improvement in participation brings in new players, and enhanced liquidity in agricultural futures markets and they become more efficient and transparent. The futures markets also lead to creation of innovative financial instruments like eNWR (electronic Negotiable Warehouse Receipts) which not only enhances the formal warehousing, but also ensures formalisation of credit for small farmers and give them holding capacity and prevents distress selling.

Commodities where the Future market holds promise include:

- Soybean: Large consumption volumes leading to import despite large domestic production
- Mustard seeds: Large domestic production and demand, and seasonal price volatility.
- Cottonseed: Linked to global cotton prices, high liquidity.
- Spices that have high volatility, large export/domestic demand, seasonal price fluctuations
- Pulses: In a country where lot of people are vegetarians there is large demand, price volatility and import dependence
- Cotton: Large production volumes, global price benchmark.
- Rubber: Significant domestic demand, linked to global prices.
- Maize: Growing demand from poultry and ethanol industries.

Other Commodities where gov-

Derivatives don't add to the risks inherent in a modern financial system, they allow risk to be borne more efficiently.

ernment regulations and support play a large role like sugar, grains including wheat and rice can be kept out of futures markets till we get stability in incomes and become a “*vikasit*” nation, though internationally some of these are widely traded. Overall, agricultural commodity derivatives can significantly enhance Indian farmers' incomes by providing financial protection, improving market efficiency, and expanding economic opportunities.

Growth Prospects

India's agri commodity derivatives market is poised for significant growth, driven by increasing farmer participation, and market efficiency improvements. Agricultural commodity derivatives have immense potential to enhance the income of Indian farmers. Growing investor interest can deepen market liquidity, benefiting farmers. Derivatives don't add to the risks inherent in a modern financial system, they allow risk to be borne more efficiently.

Governments should realise the benefits of futures markets for themselves, and mandate NAFED, NCCF, Marfed and FCI to use agri commodity derivatives. Their participation can contribute to establishing benchmark prices for agricultural commodities and can help stabilize markets, reduce volatility and such participation aligns with government initiatives promoting agricultural market reforms. Their presence

can enhance market liquidity. When these entities comply with SEBI regulations, a message goes out that Government is keen on ensuring transparency and accountability. Their participation contributes to establishing benchmark prices as they can hedge against price fluctuations, minimize losses and ensure stable procurement costs. Hedging against price and currency fluctuations, can save them significant amount of risk and money, and can provide Market Access and stable incomes to Farmers .

Derivatives can help farmers in improving bargaining power, manage price risks, ensuring stable incomes. For the nation, stable agricultural commodity prices ensure consistent food availability and security. They can incentivize farmers to adopt sustainable practices and reducing poverty as stable agricultural incomes will improve farmers' livelihoods.

Way Forward

The Government at Centre and State could help stakeholders derive benefits by the following steps

- Support the current regulatory frameworks, which is robust and proven
 - Establish clear guidelines for government agencies.
 - Provide training and capacity-building programs for the officials of these agencies with the help of commodities exchanges and the regulator, and develop in-house expertise.
 - Establish robust risk management frameworks by monitoring market trends and adjusting strategies
 - Encourage private sector participation and collaborate with other stakeholders to promote transparency, reducing market manipulation
- Farmers, processors, traders and exporters in the global agriculture commodity trade, need be given freedom to adapt innovative ways to use exchange-traded derivatives as risk management and price discovery tools to minimise risks and maximise profitability. Only then will India achieve the status of *Viksit Bharat*.

Credit Guarantee Scheme for eNWR-based Pledge Financing

A GAME-CHANGER FOR INDIAN AGRICULTURE

The Indian agricultural sector has long struggled with liquidity issues, price volatility, and distress sales, particularly post-harvest.

The newly proposed **Credit Guarantee Scheme for eNWR-based Pledge Financing (CGS-NPF)** aims to address these challenges by boosting post-harvest financing options for farmers and creating a more secure, transparent agricultural economy. This revolutionary initiative, recommended as a Central Sector Scheme by the Department of Food and Public Distribution (DFPD), will be operational from 2024-25 until the end of the 16th Finance Commission cycle, i.e., till 2030-31. The scheme is backed by a robust corpus of Rs 1,000 crore, designed to facilitate pledge financing against electronic negotiable warehouse receipts (eNWRs), ensuring

The eNWR system supports the Government's Digital India initiative with a focus on improving the ease of doing business within the warehousing sector, thereby enhancing transparency and efficiency.

farmers have easier access to much-needed credit. This scheme covers lending and warehousemen risks and is expected to improve trust in warehousemen to increase post-harvest finance through eNWRs.

To add a further boost to the scheme, Food Secretary Sanjeev Chopra announced that the new credit guarantee fund aims to address the credit risk and ensure a pick-up in loans against the pledge of eNWRs to Rs. 1,05,000 crore in the next 10 years from the current level. As per reports, the pledge post-harvest financing was only Rs. 3,962 crore in the total Rs. 13 lakh crore credit in 2023-24. The lower pledge financing was due to "reluctance on the part of bankers anticipating a credit risk. As of

today, the portion of post-harvest credit is minuscule as compared to the Rs. 12 lakh crores dedicated to pre-harvest finance which constitutes mostly of traders as the benefactors.

It should also be noted that in March 2024, the government launched an online digital gateway, the e-Kisan Upaj Nidhi (e-KUN) portal, which will allow farmers to store agricultural produce in WDRA-accredited warehouses and easily obtain post-harvest loans from banks within the portal itself. With such initiatives, the government's focus on improving access to post-harvest credit for farmers is quite evident.

A Strategic Step towards Doubling Farmers' Income

The **Dalwai Committee on Doubling Farmers' Income** recommended the creation of a credit guarantee fund to boost pledge loans for farmers. Further support came from the Reserve Bank of India (RBI) Governor, who emphasized the importance of creating a credit guarantee mechanism to facilitate smooth transfers of pledged goods. This laid the groundwork for the Credit Guarantee Scheme (CGS-NPF), which aims to provide a reliable and scalable solution for agricultural financing, directly benefiting farmers and stakeholders across the agribusiness supply chain.

Key Objectives

The CGS-NPF scheme has clear goals centred around improving financial accessibility for farmers, especially post-harvest. The key objectives of this scheme include:

About the AUTHOR

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- **Increasing Post-Harvest Finance:** Helping farmers avoid distress sales by ensuring easy access to credit.
- **Expanding Agricultural Lending:** Encouraging banks to extend pledge loans against eNWRs, benefiting both farmers and traders dealing in agricultural and horticultural produce.
- **Mitigating Risks:** Addressing credit risks and risks associated with warehouse management.
- **Reducing NPAs:** Aiming to decrease Non-Performing Assets (NPA) in the Kisan Credit Card (KCC) portfolio by helping farmers repay pre-harvest loans through pledge loans.
- **Supporting Digital Initiatives:** The scheme aligns with the Government of India's push for a digital economy, particularly in the agricultural sector.

Scheme Highlights

The CGS-NPF will play a crucial role in enhancing post-harvest agricultural credit preventing farmers from selling their produce at a loss. By providing easy financing through eNWRs, the scheme will directly improve the income stability of farmers.

- **Increased Confidence in Lending:** By leveraging eNWRs, the scheme aims to increase the trust of lenders, including Regional Rural Banks (RRBs), in offering post-harvest finance.
- **Digital Transformation:** The eNWR system supports the Government's Digital India initiative with a focus on improving the ease of doing business within the warehousing sector, thereby enhancing transparency and efficiency.
- **Protection against Price Volatility:** With loans secured against eNWRs, farmers can store their goods in WDRS-accredited warehouses, sell their produce when market conditions are favourable, and avoid distress selling due to urgent cash needs.



By creating a digital ecosystem for agricultural financing, eNWRs make it easier for farmers to access credit, trade their produce, and settle transactions efficiently.

Key Features and Impact

The CGS-NPF scheme's features are designed to provide comprehensive support for both small and large stakeholders in the agricultural ecosystem:

- **Loan Limits and Coverage:**
 - **Small and Marginal Farmers:** Loans up to ₹75 lakh with a coverage of 80-85%.
 - **MSMEs, FPOs, and Traders:** Loans up to ₹2 crore with a coverage of 75%.
- **Interest Rates:** The interest rate is capped at a maximum of 3% per annum above the Marginal Cost Lending Rate (MCLR), with an additional 1% over the lending rate for cooperatives.
- **Collateral Requirements:** Loans are provided against the commodities stored in eNWRs, with no additional collateral required.
- **Targeted Beneficiaries:** The scheme places a strong emphasis

on Small and Marginal Farmers, as well as women farmers, SC/ST communities, and Persons with Disabilities (PwD), offering minimal guarantee fees for these groups. MSMEs, FPOs, and small traders will also benefit from this initiative.

- **Reduction in KCC NPAs:** By enabling farmers to pledge stored produce and access funds to repay pre-harvest loans, the scheme aims to significantly reduce NPAs in the KCC portfolio.

Macro-Economic Impact

Beyond individual beneficiaries, the CGS-NPF scheme is set to bring about several macroeconomic benefits:

- **Improved Liquidity:** By increasing access to credit and facilitating better storage and warehousing practices, the scheme will enhance liquidity in rural areas.
- **Standardization of Warehousing:** The scheme promotes the upgradation and standardization of warehousing, leading to better storage conditions and reduced post-harvest losses.
- **Improved Commodity Trading:** By improving warehouse standards and reducing risks in financing, the scheme will lead to more organized and efficient agri-commodity trading in India.
- **Scientific Storage:** The promotion of scientific storage of agricultural

commodities, which is a WDRA mandate for registration, will reduce wastage and enhance the shelf life of stored produce.

Benefits for Stakeholders

Farmers

- **Access to Affordable Credit:** Farmers will find it easier to secure loans with lower interest rates, improving their access to timely finance.
- **Avoiding Distress Sale:** By pledging their produce in accredited warehouses and receiving loans against it, farmers can avoid selling their crops in distress, leading to better price realization.
- **Improved Incomes:** With access to finance and the ability to sell at remunerative prices, farmers' incomes are expected to rise.

Government

- **Price Monitoring and Control:** The scheme will help the government centrally monitor agricultural prices more effectively, controlling food inflation and stabilizing market prices.
- **Doubling Farmers' Income:** By enhancing access to finance and creating a more efficient agricultural value chain, the scheme aligns with the government's goal of doubling farmers' incomes.

Banks

- **Safe Lending Portfolio:** By offering loans against digital warehouse receipts which are regulated by WDRA, banks can reduce the risks associated with agricultural lending.
- **Reduction in Fraud:** The digital nature of eNWRs and the regulatory oversight from the Warehousing Development and Regulatory Authority (WDRA) will help reduce the risk of fraud in lending.

Promoting eNWR as an Instrument of Financing

eNWRs are digital receipts issued by WDRA-registered warehouses, and they are poised to become a critical instrument for agricultural financing. These electronic receipts can be used



for financing, trading, and settlement, functioning similarly to dematerialized shares in a stock market. Their integration with a central repository platform simplifies the lending process and increases transparency.

By creating a digital ecosystem for agricultural financing, eNWRs make it easier for farmers to access credit, trade their produce, and settle transactions efficiently. This streamlining of operations promises to reduce costs and increase efficiency across the entire agricultural value chain.

Recommendations for a Secure Future for Agriculture

For an effective and impactful implementation of this scheme, it is recommended to reduce the guarantee premium. eNWR can claim this benefit since it is a relatively secure product in comparison to liquid collateral. Simultaneously, increasing farmer participation is a necessity for the success of this scheme which can be addressed by having WDRA-registered warehouses at the farm gate. Subsidies in warehouse rentals for farmers up to a limit of 15 lakhs worth of commodities stored in these warehouses could give further impetus to the scheme and bypass deterrents like long distances between warehouses

and production centres, and affordability of storage spaces.

We can already see that many FPOs have to come forward with effective market linkages which have provided respite to depositors from storage charges and pledge interest with an aggressive PPP model of procurement by large commodity players at assured prices. This needs to be replicated across the nation.

The Credit Guarantee Scheme for eNWR-based Pledge Financing (CGS-NPF) represents a transformative shift in India's agricultural financing landscape. By improving farmers' access to affordable credit, reducing risks for lenders, and fostering digital innovation in the warehousing sector, the scheme has the potential to drive a sustainable and profitable agricultural economy. Over the next decade, this initiative could significantly reduce post-harvest losses, lower the burden of debt on farmers, and foster a more secure, transparent agricultural sector — all critical steps toward realizing the goal of doubling farmers' incomes.

In essence, the CGS-NPF is not just a financial tool, but a catalyst for structural change in India's agriculture, empowering farmers and stakeholders to navigate the challenges of modern agriculture with greater confidence and resilience.

SOURCING RESPONSIBLY AND SUSTAINABLY

Built upon the foundation of Heritage, Innovation, and Sustainability, Arvind Limited is a global leader in apparel manufacturing. The world's leading multi-fibre fashion solutions provider, they produce about 130 million meters of woven fabric annually. An important producer of cotton fabrics, the company has been sustainably sourcing cotton globally. Jagan Gopinath, VP & Head of Cotton Sourcing, Arvind Limited in conversation with Anjana Nair, Group Editor, Agriculture Today, discusses about the cotton procurement scenario. He delves into the current scenario and the challenges involved. Mr. Gopinath is also the Associate Director, representing Indian industry, in the Board of Directors of International Cotton Association (ICA) headquartered in Liverpool.

Where does Arvind Limited source Cotton?

Arvind Limited undertakes sourcing of Cotton mainly from India. We also source from USA, Australia, Brazil, Israel, Egypt and a few countries in Africa. We ensure that we do not source Cotton from those origins that do not maintain highest ethical standards related to child labour and have questionable records on safe and fair working conditions for the labour involved.

Why Arvind Limited undertakes sourcing of Cotton from multiple geographies?

Arvind Limited is a B2B manufacturing firm that produces Fabric on a 'Made to Order' basis from its customers, that also include international brands and retailers. Some of our customers might specifically demand that fabric be produced from Giza Cotton, which is grown in Egypt, or from SJV Pima Cotton, which is grown in San Joa-



quin valley in United States.

Apart from the above, we also source Cotton from vendors from those overseas origins that can supply Contamination Free Cotton. Compared to Indian growers, who mostly undertakes manual harvesting of Seed Cotton, growers in other origins such as USA, Australia etc., harvests their Cotton mechanically which results in production of mostly Contamination Free Cotton from those origins.

What are the major factors influencing Cotton sourcing for a Textile Mill?

The top most priority for a mill is to ensure that the right quality Cotton is available at all times for meeting the spinning requirements, and that the spinning units should not be starved of Cotton.

The second most important priority is to ensure that the mill does not get exposed to adverse price risks associated with the volatility in Cotton prices in the global market. Cotton is a Futures and Options traded commod-

ity in Inter Continental Exchange (ICE) in United States and in ZCE exchange in China. There are various categories of market participants in F&O markets such as Producer/Merchant/Processor/User category, Swap dealers and Managed Money Funds. Swap dealers and Managed Money Funds primarily consider Cotton as an asset class for investment and their investment behavior significantly influences the pricing of Cotton, globally. Thus, the volatility in Cotton pricing is contributed not just by fundamental factors such as Cotton Supply and Cotton Demand, but also by several macro-economic variables such as GDP growth, inflation, interest rate trajectory set by the global Central banks, currency movements etc.

The third (but not the least important) priority is setting up of responsible and sustainable Supply Chains to source various categories of Sustainable Cottons such as BCI (now called BC), Regen and various categories of Organic.

What is Sustainable Cotton Sourcing?

Though there are multiple definitions about Sustainable Cotton and multiple Sustainable standards that are prevalent, as a practitioner, I will define Sustainable Cotton Sourcing as Cotton Sourcing that is carried out in an environmentally sustainable and socially responsible manner. In Arvind, we call it as a 'Fundamentally Right' approach, wherein we believe that business firms must embody responsibility and purpose beyond financial gains. Our structured efforts on promoting sustainable cotton farming, which includes Regenerative, Organic, In-Conversion Organic and Better Cotton (BC) initiatives, have resulted in multi fold growth in the number of farmers as well as the area under sustainable agriculture. In addition to Sustainable Cotton, Arvind also enhanced Sustainability quotient of its fibre mix by innovatively incorporating alternate natural fibres such as Hemp, Flax, Bamboo as well as fibres derived from recycled pre-consumer waste.



Cotton Futures market, with adequate liquidity, is a prerequisite for the value chain participants, to hedge the price risks

Does Arvind Limited engage with farmers in Cotton sourcing?

Majority of the Cotton that we consume is sourced in the lint form, packaged in bales, from ginners or traders or from government agencies such as Cotton Corporation of India. However, we do engage with farmers in the Sustainable farm projects that are undertaken in a collaborative manner with local level partners and stakeholders in multiple states such as Gujarat, Maharashtra and Madhya Pradesh. The projects are getting scaled up, leading to growth in the volume of Kapas sourced from the farmers associated with those projects.

The Organic farm project in Maharashtra is a classic example of Arvind's collaborative approach, where we assist the Organic growers source Non-GM

seeds for sowing and provide training with an intent to eliminate the usage of chemical pesticides and fertilizers and for improving the harvesting and post-harvest practices of farmers. Arvind also ensures transparency in ascertaining the quality of the Kapas that is brought by the farmers for delivery to the ginnery gate and we pay the farmers market price plus an agreed upon premium for growing Cotton Organically.

How is Quality maintained in Cotton sourcing?

Cotton quality has two dimensions – the first dimension is the inherent quality of Cotton as measured by attributes such as Staple Length, Strength, Micronaire, Color grade etc. The second dimension is the level of contaminants in the Cotton fibre – such as Polypropylene fibres or plastic shreds entangled in Cotton fibre, which gets added to Cotton during harvesting or during storage and transport. India scores highly on the first dimension and fares relatively lower on the second dimension. The private sector has a big role to play, in coordination with Public sector in increasing the level of awareness of the farmers about the contamination levels and its deleterious impact on the value chain.

To answer specifically to your question, the quality standards are maintained in Cotton sourcing through rigorous process of inspection of Kapas

at the ginnery level, pre-purchase sampling by drawing samples from ginnery and testing them – before dispatch to the spinning unit, and sampling and quality testing of delivered lots at the spinning mill. In the Cotton industry, traditionally, the quality is ascertained by comparing HVI (High Volume Instrument) test results (that are very objective) with the subjective observations recorded by the team of quality experts referred to as Cotton Classers. This mix of subjective and objective measures gives the Spinning unit a clearer understanding of the quality of the sourced Cotton fibre.

How has the association with BCI helped Cotton Industry?

Arvind was one of the first Implementation Partners (IP) of BCI in India, with the first project set up in 2010 in Maharashtra. A critical component of Better Cotton Standard system is the Better Cotton Principles and Criteria (P&C), with the six guiding principles. These six principles cover dimensions such as Management, Natural Resources, Crop Protection, Fibre Quality, Decent Work and Sustainable Livelihoods. In our experience, BC principles does help the farming communities to grow Cotton in a manner that benefits them socially, environmentally and economically. As explained earlier, apart from BC, there are other standards such as Regen and Organic with their own unique focus that is different from that of BC, but all these standards overall fits in with the ESG (Environmental, Social, Governance) frameworks that leading textile firms such as Arvind are pursuing. It also aligns with the sustainability agendas pursued by the global brands and retailers and will help the Indian textile industry in evolving as a preferred supplier of superior textile products to the global market.

What are your suggestions/ policy recommendations in improving the Cotton growing and marketing from India?

Indian research and extension eco-system have to focus on producing high

tête-à-tête with Anjana



“Indian research and extension eco-system has to focus on enhancing the infrastructure to produce high quality seeds, through collaborations with private sector partners”.

quality seeds, through collaborations with private sector partners. Over the last couple of seasons, we have observed Indian crop getting susceptible to Pink Boll Worm (PBW) infestation and White Fly (WF) attacks. This results in variations in farm yield leading to variation in farm incomes and variation in the availability of the right quality and quantity of Indian Cotton to the textile industry. There are interesting debates that have occurred on this topic, with a school of academic researchers strongly asserting that India is the only major country (among the various Bt Cotton growing origins) to introduce Bt technology into its hybrids where as the other major origins had introduced the Bt technology into its varieties. If you probe the reasons behind introduction of Bt in India into the hybrids, one will have to also discuss about the Seed laws in India, which I believe is beyond the scope of the current discussion. Unless and

until the high quality seeds (contributing to higher yield, quality attributes of Cotton and resistance to PBW and WF) are developed, Indian farmers and Indian industry will keep getting exposed to variabilities, which is not in the interest of both the stakeholders.

The second suggestion is related to the need for a well - developed Futures exchange in India, that will help the participants across the value chain, to hedge their price risks. India does have MCX for hedging price risk of lint; unfortunately, due to general lack of awareness in the Indian textile industry on hedging, risk management and margin appropriation possibilities, the futures trading of Cotton in India has not really taken off. Considering the rate at which the Indian textile industry is growing and the stagnating yield levels of Cotton in India, there is higher probability that Indian textile industry will keep getting exposed to episodes of significant price volatility. Cotton Futures market, with adequate liquidity, is a pre-requisite for the value chain participants, to hedge the price risks. Various Textile bodies in India, will have to collaborate with public sector stakeholders and commodity exchanges such as MCX and NCDEX to raise the level of awareness of the industry about the need for hedging. Brainstorming is also needed at an industry level for attracting financial investors to invest capital in commodity exchanges, because that is the only way to enhance liquidity in commodity futures markets.

****The views expressed in this article are that of the author and does not represent the official views of Arvind Limited*.***

ADDRESSING OILSEED PRODUCTIVITY

Over the past decades, per capita consumption of edible oil in India has seen a dramatic rise, reaching 19.7 kg/year. Unfortunately the country's oil seed production no longer can meet this demand and we have for some time now has been depending on imports to meet our requirement. In 2022-23, India imported 16.5 million tonnes (MT) of edible oils, with domestic production fulfilling only 65% of the country's requirements. This situation presents a substantial challenge to the country's goal of achieving self-sufficiency in edible oils.

Although India has demonstrated considerable mettle as an important agricultural producer, we have been struggling with low productivity. Average productivity of the nine major oilseeds in India is 1300 kgs per hectare. For soybean, it is around 1100 kgs per hectare as compared to average 3000 kgs in other soybean growing countries. For rapeseed mustard, the average productivity in India is 1300 kg, while the world average is 2500 kgs per hectare.

Besides this the skewed cropping

Year	Area Under Cultivation In Million Hectares	Production In Million Tonnes	Yield In Kg/Ha.
2010-2011	27.22	32.48	1193
2011-2012	26.31	29.80	1133
2012-2013	26.48	30.94	1168
2013-2014	28.05	32.75	1168
2014-2015	25.60	27.51	1075
2015-2016	26.09	25.25	968
2016-2017	26.18	31.28	1195
2017-2018	24.51	31.46	1284
2018-2019	24.79	31.52	1271
2019-2020	27.14	33.22	1224
2020-2021	28.83	35.95	1247
2021-2022	28.95	37.96	1312
2022-2023	30.20	41.35	1371
2023-2024	30.10	39.60	1316

Based on 4th Advance Estimates

Source: Directorate of Economics and Statistics, Department of Agriculture Cooperation and Farmer Welfare

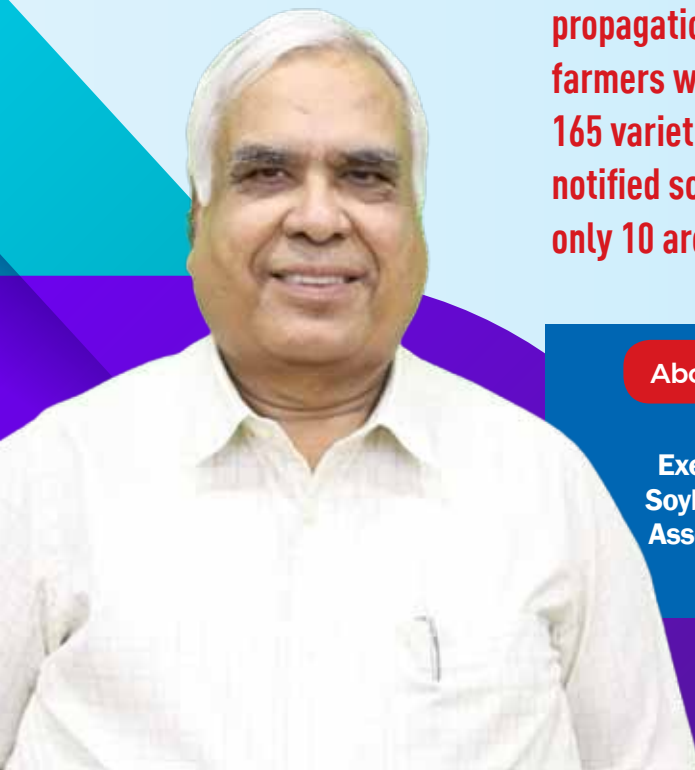
Although we have been successful in developing many new varieties, their propagation among the farmers was low. More than 165 varieties have been notified so far, out of which only 10 are in seed chain.

pattern followed is also a major cause of concern. Punjab and Haryana grow paddy and rice year on year which has led to soil degradation. Crop diversification with oilseeds can not only address this problem but also help in augmenting our production. To be self-sufficient, we need at least 70 million tons of oilseed production and another 4 million tons of palm oil.

Oil Seed Production Scenario

Among nine major oilseeds, soybean leads with 34% of the total oilseed production, followed by rapeseed & mustard (31%) and groundnut (27%), contributing to more than 92% of total oilseeds production. This underlines the dominance of soybean, rapeseed-mustard, and groundnut in India's oilseed production.

The major contribution to domestic edible oil production comes from rapeseed- mustard oil (45%), groundnut oil (25%) and soybean oil (25%). The minor



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edible oilseeds (sesame, sunflower, safflower, and nigerseed) contribute about 5% of the total domestic oil production.

Reasons for Low Average Productivity

- Poor adoption of technology by farmers, either because of lack of knowledge or because of casual approach.
- Too much seed use, wrong use of pesticides and fertilizers, no seed treatment.
- Low SRR, Repeated use of farmers' seeds, no varietal diversification
- Short duration varieties
- Poor availability of quality inputs at the right time and at right price
- Improper soil, nutrient, weed, pest and disease management
- Drought or excess rainfall
- Wide variation in temperatures and rainfall

Seed – The Biggest Challenge

Seeds forms the biggest challenge in our crusade against declining productivity. Lack of good quality seed is the biggest challenge as the seed requirement is high. Because of these reasons, the seed replacement rate is lower.

Varietal diversification is another area where the research system of the country needs to put more effort. Although we have been successful in developing many new varieties, their propagation among the farmers was low. More than 165 varieties have been notified so far, out of which only 10 are in seed chain. Our farmers still prefer 30-year-old variety.

Preferential treatment by the seed companies towards certain oil seeds has masked the true potential of other species. For instance, soyabean is a very important oil seed. However, many big seed companies avoid investing in the crop.

Research Initiatives for Increasing productivity

- Investing in potential crops like soyabean. Soybean is one of the most difficult seeds to handle because



Lack of good quality seed is the biggest challenge as the seed requirement is high.

of its low germination percentage, seed damage etc. Research efforts, therefore are required to overcome the challenges like thin seed coat, embryo on the surface, damage by handling etc.

- Develop varieties which are resistant to excess water or drought
- New varieties resistant to major pests and diseases
- Develop water drainage system for different land capability ranges
- Develop implements that do no damage seeds during harvesting

Action Points for Increasing Productivity

- Daily dissemination of local weather data to farmers at district level with real time technical advice on agronomy, plant pathology and IPM/IDM.
- Augment certified seed availability to ensure use of certified seeds every three years and also change the variety, if possible.
- Ensure effective weed, pest and disease management.
- Effective transfer of latest crop production technologies through extensive farmer training programmes and Front Line Demonstrations.
- Adopt Farm Mechanization, wher-

ever possible.

- Efficient Soil and Water management through micro irrigation.
- Accurate and intensified weather forecasting coupled with correct and timely advisory system at grass root level will definitely help in improving the productivity.
- Provide community based infrastructure and facilities to farmers for better utilisation of resources

Policy Initiatives

- Micro irrigation for rain-fed crops can do wonders. NMEO should have provision for financial support for installation of such systems on a wide scale.
- A Master Data of soil health, district wise should be prepared. The current Soil Health Card Scheme can be suitably integrated with the Master Data.
- Establish a Commercial Intelligence Department for agro commodities, with experts

Need for Action

India's heavy dependence on edible oil imports necessitates a multifaceted strategy to achieve self-sufficiency and alleviate the strain on the trade balance and financial resources. There is a need for concerted effort to increase our production numbers in oil seeds. Many reports with recommendations remain on paper, for lack of implementation. Every report prepared by expert groups or scientists should be taken to its logical conclusion.

Industry should invest in productivity enhancement and work with farmers in their area of catchment, in the same manner as is done by the sugar industry. To encourage industry, direct expenses on agriculture development may be given higher weightage for the purpose of income tax.

Private sector can play a crucial role in edible oil sector development. They should be actively involved in the efforts for self sufficiency in edible oils, with financial support under NMEO, through recognised industry associations.

TACKLING AGRICULTURAL PRODUCTION CHALLENGES

India is one of the major players in the agriculture sector worldwide and it is the primary source of livelihood for about 58% of India's population. India has the world's largest cattle herd (buffaloes), largest area planted to wheat, rice, and cotton, and is the largest producer of milk, pulses, and spices in the world. It is the second-largest producer of fruit, vegetables, tea, farmed fish, cotton, sugarcane, wheat, rice, cotton, and sugar. Agriculture sector in India holds the record for second-largest agricultural land in the world generating employment for about half of the country's population. Thus, farmers become an integral part of the sector to provide us with means of sustenance.

India is expected to achieve the ambitious goal of doubling farm income. The agriculture sector in India is expected to generate better momentum in the next few years due to increased investment in agricultural infrastructure such as irrigation facilities, warehousing and cold storage. Furthermore, the growing use of genetically modified crops will likely improve the yield for Indian farmers.

However, this sector has faced 3 severe disruptions in last couple of years. It started with Covid, followed by geopolitical factors - mainly Russia Ukraine war & now Israel Hamas war and finally Climate Change. While the impact of first 2 are fading away, Climate change will have long lasting impacts in this sector.

Climate Change

Agriculture is a major source of GHGs which contribute to the greenhouse effect and climate change. However, the changing climate is having far reaching impacts on agricultural production, which are likely to challenge food security in the



Crop-level adaptation to climate change is expected to be key in minimising future yield losses and may involve changing crop cultivars, sowing time, cultivation techniques, and/or irrigation practices.

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future. The principal barrier to food security is currently food access. Sufficient food is produced globally to feed the current world population, yet more than 10% are undernourished.

Climate change is likely to contribute substantially to food insecurity in the future, by increasing food prices, and reducing food production. Food may become more expensive as climate change mitigation efforts increase energy prices. Water required for food production may become more scarce due to increased crop water use and drought. Competition for land may increase as certain areas become climatically unsuitable for production. In addition, extreme weather events, associated with climate change may cause sudden reductions in agricultural productivity, leading to rapid price increases.

Crop-level adaptation to climate change is expected to be key in minimising future yield losses and may involve changing crop cultivars, sowing time, cultivation techniques, and/or irrigation practices. In short, Redefining Ag & climate smart Ag would be the answer to this problem.

Challenges faced due to Climate Change

Apart from the reduction in the yield, there are other challenges faced by Indian Ag in the last few years due to climate change.

- **Erratic weather pattern:** Increasing temperatures, erratic rainfall, and extreme weather events adversely affect crop productivity and farmer income.
- **Soil Degradation:** Overuse of chemical fertilizers and pesticides has led to soil health deterioration, impacting long-term sustainability.
- **Water Scarcity:** Agriculture is highly dependent on monsoons, and water shortages due to over-extraction and uneven distribution affect yields.
- **Market Access:** Farmers often struggle with market access, resulting in inadequate prices for their produce and vulnerability to exploitation by middlemen.



Private sector especially Agri startups have a larger role to play to improve the livelihoods of farmers and farm communities by creating the right ecosystem.

In order to overcome challenges faced by these sectors, Technological Innovations & sustainability has to go hand in hand. The use of technology in agriculture is increasing, with innovations such as:

- **Precision Farming:** Utilizing sensors and data analytics to optimize farming practices.
- **Biotechnology:** Development of genetically modified crops for higher yield and pest resistance.
- **Digital Platforms:** Mobile apps and online markets aiding farmers in selling produce directly to consumers and accessing crucial information.

Time to reimagine the way we are doing agriculture

- Focus to be shifted towards climate smart agriculture which includes short duration & drought / heat resistant varieties and growing emphasis on sustainable farming practices, including organic farming, agroforestry, and integrated pest management.
- Policies and programs promoting sustainable agricultural practices are being implemented to address environmental concerns.

Also, The Indian government has launched numerous schemes to support farmers, such as:

- **PM-KISAN:** Direct income support to farmers.
- **Fasal Bima Yojana:** Crop insurance scheme.
- **Soil Health Card Scheme:** Promoting soil health through regular assessments.

Private sector especially Agri startups have a larger role to play to improve the livelihoods of farmers and farm communities by creating the right ecosystem.

Future Prospects

While agriculture's share in India's economy has progressively declined to less than 15% due to the high growth rates of the industrial and services sectors, the sector's importance in India's economic and social fabric goes well beyond this indicator. First, nearly three-quarters of India's families depend on rural incomes. Second, the majority of India's poor (some 770 million people or about 70 percent) are found in rural areas. And third, India's food security depends on producing cereal crops, as well as increasing its production of fruits, vegetables and milk to meet the demands of a growing population with rising incomes. To do so, a productive, competitive, diversified and sustainable agricultural sector will need to emerge at an accelerated pace.

With the rising population, the demand for food is expected to grow, necessitating improved agricultural practices and productivity. If the temperature rises below 2 degrees by 2050, our food imports have to be doubled to cater to domestic requirement. Shifts towards sustainability, efficient resource management, and climate-resilient practices will be essential for future food security.

In summary, the Indian agriculture scenario is complex, characterized by both challenges and opportunities. Strategic investments in technology, sustainable practices, and supportive policies could enhance agricultural productivity while ensuring environmental sustainability.

THE GLOBAL GRAIN, PULSES, AND OILSEEDS SECTOR: DEEP ROOTS IN INDIA AND A VISION FOR THE FUTURE

The global grain, pulses, and oilseeds sector is more than just a network of trade—it is the lifeblood of food security and economic stability for millions across the world. India, with its rich agricultural heritage and burgeoning economy, plays a pivotal role in shaping the pulse, grain, and oilseeds markets, both as a major producer and a significant consumer. As the world faces complex challenges, including climate change, population growth, and fluctuating market demands, the upcoming Grains World 2024 event in New Delhi aims to bring stakeholders together for meaningful dialogue on making the sector more sustainable and creating better trading opportunities.

When it comes to key grains like rice, India dominates global trade with 40% share while being the second largest producer and has a substantial leverage in global trade.

A Global Landscape Rooted in Pulses, Grains, and Oilseeds

Grains, pulses, and oilseeds are crucial components of the global food supply, serving as essential sources of nutrition and economic value. Wheat, rice, bar-

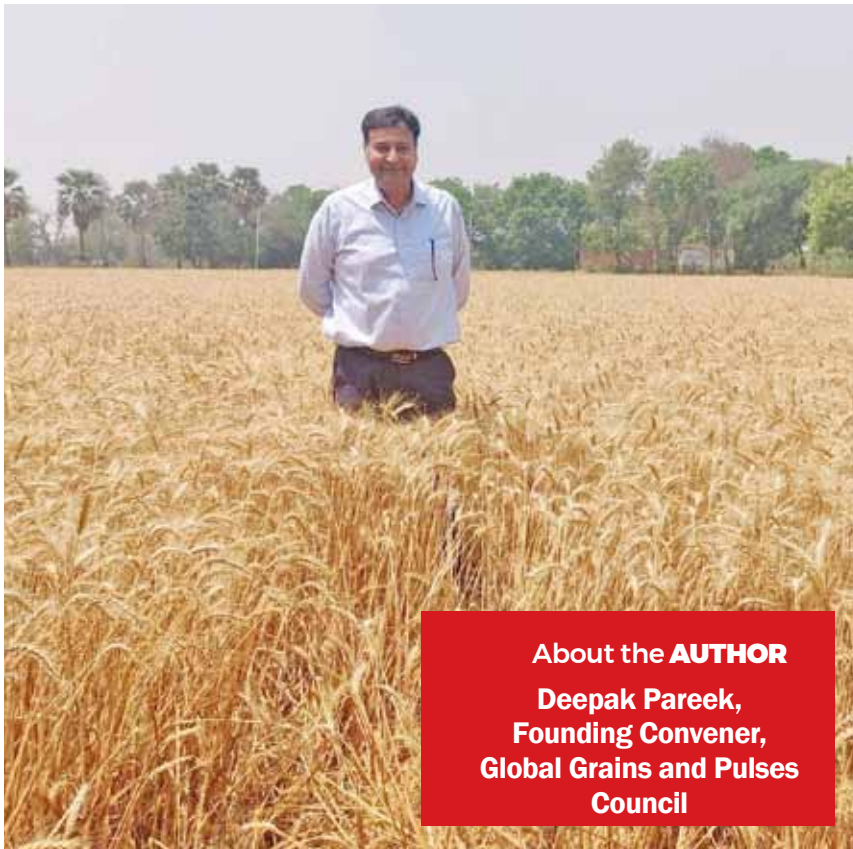
ley, lentils, chickpeas, beans, soybeans, and sunflower seeds form the backbone of many diets worldwide, especially in developing countries where they are staple foods. The grain, pulses, and oilseeds trade connect continents—from the plains of North and South America to the farms of Africa and Asia—creating a global tapestry of agriculture and trade.

In this vast network, India stands as a central player, not only due to its scale of production but also due to its diverse consumption patterns. Indian pulses—whether it's pigeon pea (tur), chickpea (chana), or lentils (masoor)—are not only staples of the local diet but also important commodities in international trade. Similarly, oilseeds such as mustard, soybean, and groundnut are crucial both for domestic consumption and as valuable globally traded commodities. India is often the world's largest producer, consumer, and importer/exporter of grains, pulses and oilseeds, playing a vital role in the global market by influencing prices, trade flows, and consumption patterns.

India's Critical Role in the Global Market

India has a unique position in the global grains, pulses, and oilseeds landscape. On one hand, it is a major producer of commodities like rice, wheat, an array of pulses, and oilseeds. On the other, India is also a significant importer of pulses and edible oils to meet the needs of its large and diverse population. This dual role as both a producer and importer provide India with considerable influence in international agricultural trade.

India's agricultural output is crucial to the global pulse and oilseed supply chain. For instance, the country's pulses production, which constitutes over 25% of global supply, directly impacts the availability and pricing of this pulse



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across the world. Similarly, India's demand for edible oils, including soybean, sunflower, and palm oil, has a significant impact on global markets. Yet, despite being a leading producer, India often imports pulses and edible oils to meet rising domestic demands and mitigate the impacts of inconsistent monsoon rains or other climatic challenges. When it comes to key grains like rice, India dominates global trade with 40% share while being the second largest producer and has a substantial leverage in global trade.

The deep connection between India and the world grains, pulse and oilseed market creates both opportunities and challenges. Policy changes in India, such as import tariffs or government procurement programs, can send ripples across global markets, affecting countries that rely on India as a key consumer. Similarly, a substantial deviation in the production of any of these commodities, impacts global outlook and hence trade currents. This underscores the interconnected nature of agriculture today—decisions made in New Delhi are felt as far away as Nairobi, Canberra, and Ottawa.

Challenges Hindering Growth and Sustainability

The global grain, pulses, and oilseeds sector faces multiple challenges, with climate change being a significant concern. Erratic weather patterns are impacting production cycles, particularly in countries like India that are highly dependent on monsoon. Fluctuations in rainfall, increased temperatures, and extreme climatic events have all contributed to reduced yields and increased volatility, in both production and prices.

In addition, inconsistent government policies have made planning difficult for farmers and traders alike. In India, for instance, sudden shifts in import-export regulations have historically caused uncertainty, impacting not only domestic markets, but also international supply chains. These policy shifts, driven by attempts to balance consumer affordability

Grains World will serve as a platform for transparent dialogue, enabling stakeholders to better understand the motivations behind India's trade policies and for Indian policymakers to hear from the global community.

with farmer welfare, often disrupt established trading relationships, and lead to market distortions.

There are also challenges around sustainability. As the world seeks to make agriculture more environmentally friendly, there is a pressing need to focus on more sustainable practices, such as crop rotation, improved water management, and reducing dependence on chemical inputs. For oilseeds, enhancing productivity through better seeds, biological inputs, and efficient extraction processes is essential. India, with its vast number of smallholder farmers, needs to address these sustainability challenges, while ensuring that the livelihoods of millions are not compromised.

Grains World 2024: A Pivotal Platform for Transformation

Amid these challenges and opportunities, the Grains World Conference and Expo, set to take place in New Delhi, promises to be a landmark event for the global grain, pulses, and oilseeds community. The event, which will bring together key stakeholders including policymakers, traders, farmers, and AgTech innovators, aims to foster a shared vision for the future of the grain, pulses, and oilseeds sector—one that is sustainable, resilient, and inclusive.

One of the key topics that will be discussed at Grains World will be trade policies. India's evolving trade stance, especially in pulses and edible oils, has

significant implications for global markets. Grains World will serve as a platform for transparent dialogue, enabling stakeholders to better understand the motivations behind India's trade policies and for Indian policymakers to hear from the global community. This kind of open dialogue can lead to more predictable and balanced policies that benefit both producers and consumers, both within India and internationally.

The upcoming Grains World event is not just about addressing challenges; it's also about creating opportunities. The world is keen to deepen its trade ties with India, especially in the grains, pulses, and oilseeds sector. India's vast consumer base and evolving food habits present an opportunity for countries looking to export agricultural commodities. On the other hand, India's rich diversity in pulses, grains, and oilseeds makes it a valuable trading partner for countries seeking to enhance their food security.

A Vision for a Sustainable and Resilient Future

The grains, pulses, and oilseeds sector is at a crossroads. On one path lies continued volatility, climate vulnerability, and market inconsistency. On the other lies the promise of sustainability, technological advancements, and strengthened international partnerships. The upcoming Grains World event offers an opportunity to choose the latter, and to build a resilient future for grains, pulses, and oilseeds that benefits all stakeholders—from smallholder farmers in rural India to consumers across the world.

India's role in this future is undeniably central. As the nation continues to grow and develop, its agricultural sector will have to adapt to new realities—be it through embracing innovative technologies, adopting more sustainable practices, or redefining its trade relationships. Grains World 2024 represents a key step in this journey, as it will enable stakeholders to come together to address the challenges of today and seize the opportunities of tomorrow.

CURRENT TRENDS IN AGRICULTURAL COMMODITIES



The agriculture sector in India provides livelihood to about 42 percent of the population and contributes to around 18 percent in the country's GDP. While the sector still has a huge dependence on the spatial and temporal distribution of the monsoon rainfall and experiences very high price volatility for the produce, it is also progressing rapidly in terms of digitisation that is enabling farmers to access a range of services from access to mandi price information and price discovery through auction platforms, availing customised crop advisory and weather forecasts at a farm level and procuring agri-input materials from online market platforms.

Digitization and Market Integration

Digital initiatives like eNam (National Agriculture Market) scheme of the government and platforms such as ITC's MAARS (Meta Market for Advance Agriculture and Rural Services) have been empowering Farmers and Farmer producer organisations to enhance their production and incomes. To the consuming industries, these developments on digitization has enabled transparent visibility of farm gate prices, and has let them minimise the incremental cost from farm to their manufacturing units.

Market integration is a trend which has come along with digitisation and development of warehousing infrastructure and institutionalising of collateral management & warehouse receipt financing.



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Market integration is a trend which has come along with digitisation and development of warehousing infrastructure and institutionalising of collateral management & warehouse receipt financing. The role of local intermediary- aggregator-trader-financier (Adhathiya & commission agents) are diminishing. Through Farmer producer organisations, small farmers are now able to achieve the scale needed to sell directly to the consuming industries and secure financing without the support of market intermediaries. Further market integration is also providing benefits of uniformity in quality of batches of agri-produce purchased and better traceability to the consuming industries.

Atmanirbharta

Gaining "Atmanirbharta" in edible oils have been an area of policy focus. In oil, the efforts in the past 10 years seems to be yielding results. Domestic oil seed production has increased from 86.30 lakh tonnes in 2015-16 to 121.33 lakh tonnes in 2023-24. The total area coverage of all oilseeds has increased from 25.60 million hectares in 2014-15 to 30.08 million hectares in 2023-24. Consequently, Import dependence on edible oils decreased from 63.2% in 2015-16 to 57% in 2022-23. Coupled with production boosting policy efforts, the policy in-

terventions of adjusting duty on imported edible oils have recently tilted the price advantage towards domestic edible oils. The consuming food industries are now including more cost-effective domestic oils like rice bran oil in their recipes, replacing imported palm oil.

Our nation has been taking significant steps to achieve “Atmanirbharta” in fuel by instituting an ethanol blending program. We have achieved 15% blending in 2024 and are targeting 20% in 2025. The ethanol blending program has supported farmer incomes in sugarcane and maize farmers substantially. The sugar milling sector experienced a revival in the past 10 years, solely due to the additional income generated from ethanol for blending. This in turn has led to improving the financial situation of the mills which supported the mills to pay the farmers on time. There are no more long pending cane arrears for farmers. Further, over all financial stability of the industry and supporting government policies have kept volatility in sugar prices under control benefiting the consuming industries.

The share of grain-based ethanol is also going up, and it is reaching 51% levels now. The feed stock is predominantly Maize procured directly from mandis followed by surplus rice released by FCI to distilleries. The new demand from the grain-based distilleries have led to consistent higher price realizations for maize farmers. The quality requirements of maize for distilleries are much lower than those of food and feed industries. Due to the robust and increasing demand of maize from distilleries the other traditionally consuming industries of maize both in the food and feed sectors have experience an incremental impact around Rs 3/ Kg in their maize procurement prices. Incremental feed costs have put pressure on the live-stock industry. Though the area under maize is increasing and production is going up, the prices of maize are likely to remain supported by the increasing demand from distilleries as the blending targets are also higher year on year.



The agri commodity futures markets are yet to mature and have depth of participation from large number of genuine buyers and sellers.

Shifts in Rainfall Pattern

Climate change and resultant change in weather patterns have been a major concerning factor in recent years. We are experiencing a spatial shift in monsoon rainfall activity towards western regions of the country, and temporal shift in rainfall has become more active to the latter half of the monsoon season. Late rainfalls during Kharif harvesting has been a problem for multiple crops delaying harvest and leading to quick post-harvest deterioration, especially in horticultural crops thus leading to price spikes. This year we have seen the impact of unseasonal rainfall in most vegetables and specifically in potato, onions and tomatoes. As a result of delay in kharif harvest caused by late rainfall, the Rabi sowing gets delayed which further stretches the rabi crop duration well into peak summers leading to fall in yields due to heat stress. We have been experiencing this in wheat and potato in the past few years leading to price rise.

Agri Commodity Futures

Price volatility is always a challenge in Agri commodities. Both large sellers and buyers require mechanisms to hedge their price risk, and globally commod-

ity futures exchanges provide a good mechanism for hedging price risk. However, in India due to policy restrictions commodity futures markets were almost nonexistent from 1966 till 2003. From 2003, commodity futures markets have grown, however, it was mostly in non-agri commodity, and agri but non-food commodities, where the future markets have become vibrant. The agri commodity futures markets are yet to mature and have depth of participation from large number of genuine buyers and sellers. One of the reasons for this are the interventions by market regulators in restricting transactions in agri-food commodity future markets, when volatility sets in driving a bull market. For a stability in prices of agri-commodities in the long term, a vibrant commodity futures market will be of tremendous support.

A major challenge of Indian agriculture is low yield levels compared to the global averages. This is one of the reasons of Indian produce not being competitive in the global market. One of the reasons for our lower productivity is our aversion to GMOs which is not based on strictly scientific reasons. With climate change and increasing population we would need to increase production using the limited arable land. GMOs are proven to be quite promising across the globe for enhancing yields and bringing in tolerance/ resistance to biotic and abiotic stress. It is imperative for us to approach GM crop varieties as an approach for higher yields and stress tolerance.

The Indian agri-commodity sector is rapidly evolving to support the requirements of a rising population and growing economy. Digitization has empowered farmers with information. Government policy has been quite supportive to increase farmer income which is also on the rise. As rural incomes rise, it will have a feedback effect on the agri-commodity sector and economy at large, this is quite evident from the reports of many of the FMCG manufacturers being able to grow in the rural areas at a much higher rate than the urban areas.

BLOCKCHAIN AND AI

PAVING THE PATH FOR INDIAN FARMERS' CREDITWORTHINESS

Indian agriculture, often hailed as the backbone of the nation, contributes around 20% to the GDP and provides livelihood to over 50% of the population. Yet, a large portion of Indian farmers remain unbanked or underbanked. Limited access to formal credit forces them to rely on high-interest informal sources, perpetuating cycles of debt. Modern technologies like Blockchain and Artificial Intelligence (AI) offer a transformative potential to change this narrative. By digitizing farmers' cash transactions and leveraging these records to build credible credit histories, these technologies can significantly enhance farmers' access to affordable credit.

Challenges in Farmers' Creditworthiness

- Informal Transactions: Large proportion of Indian farmers deal in cash at



With localized AI models trained on regional data, financial institutions can accurately predict repayment capabilities, ensuring loans are extended to reliable borrowers.

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their primary leg of sales, leaving no traceable records of their sales proceeds.

- Lack of Collateral: Marginal farmers often lack collateral, a key requirement for traditional loans.
- High Transaction Costs: Intermediaries inflate costs, reducing farmers' income.
- Limited Financial Literacy: Many farmers are unaware of financial products and services.

These factors combine to create a vicious cycle where farmers remain excluded from formal credit systems. Blockchain and AI can break this cycle by creating a transparent, data-driven ecosystem.

Blockchain and Its Potential in Agriculture

Blockchain is a decentralized ledger technology that records transactions

securely and immutably. In agriculture, Blockchain can digitize transactions, tokenize assets, and ensure transparency. Tokenized records, stored on a Blockchain, can form the foundation for building farmers' creditworthiness.

AI: Transforming Credit Assessment

Artificial Intelligence (AI) excels at analyzing vast datasets and identifying patterns, making it an ideal tool for assessing farmers' creditworthiness. AI can evaluate non-traditional data such as transaction history, crop patterns, and weather forecasts to predict a farmer's repayment capability.

Use Case: AI for Credit Scoring

In Kenya, platforms like FarmDrive analyze farmers' mobile money records, GPS data, and agricultural inputs to build credit scores. This has allowed thousands of previously "unbankable" farmers to access loans.

Adopting AI-driven credit scoring in India can transform agricultural finance. With localized AI models trained on regional data, financial institutions can accurately predict repayment capabilities, ensuring loans are extended to reliable borrowers.

Combining Blockchain and AI: A Game-Changer

The synergy of Blockchain and AI offers unparalleled opportunities:

- **Immutable Records:** Blockchain ensures secure, tamper-proof transaction records.
- **Enhanced Credit Scoring:** AI analyzes Blockchain data alongside other metrics to create dynamic credit scores.
- **Real-Time Monitoring:** Blockchain enables real-time updates of transactions, while AI provides actionable insights.

Steps to Implement Blockchain and AI for Indian Farmers

Tokenization of Transactions

The majority of Indian farmers operate



By digitizing cash transactions, building tokenized records, and leveraging AI-driven credit scoring, millions of unbanked farmers can be brought into the formal financial system.

in cash economies, especially at mandis and local procurement centres. Tokenization can transform these cash transactions into secure digital assets recorded on a Blockchain. This step is critical in building a verifiable credit history for farmers.

Key Steps in Tokenization

Setup Tokenization Platforms:

- Introduce Blockchain-based platforms at mandis where every transaction is digitally recorded.
- Buyers can pay farmers in digital tokens instead of cash, ensuring every transaction has a traceable record.

Integration with Payment Systems:

- Use mobile wallets to store tokens. These wallets can be linked to farmers' bank accounts or Aadhaar for seamless cash conversion when needed.
- Allow farmers to redeem tokens as cash or use them directly for purchasing seeds, fertilizers, and other inputs.

Blockchain Records:

- Each transaction token is logged on

a Blockchain ledger, providing tamper-proof records of sales proceeds. These immutable records can be shared with financial institutions as proof of income.

Example:

In **Rwanda**, coffee farmers use Blockchain to tokenize their sales proceeds, creating a transparent, traceable system that improves access to finance. Indian mandis can replicate this model for crops like wheat, rice, pulses, and horticulture products.

AI-Powered Credit Scoring Models:

AI can revolutionize how financial institutions assess farmers' creditworthiness by analyzing Blockchain transaction records alongside non-traditional data. This approach is especially important for marginal farmers who lack traditional credit history or collateral.

Key Steps in Building AI-Driven Credit Models

Data Collection:

- Use Blockchain to provide transaction histories.
- Integrate additional data points such as:
 - Crop patterns and yields.
 - Weather forecasts.
 - Input usage and market trends.
- Incorporate geo-tagging and satellite data for land use and productivity analysis.

AI Algorithm Development:

- Train AI models using historical agricultural and financial data.
- Develop region-specific algorithms that account for local risks, soil types, and crop cycles.

Dynamic Credit Scoring:

- Use real-time data to create adaptive credit scores.
- Update scores frequently to reflect recent sales, weather impacts, and repayment behavior.

Explainable AI (XAI):

- Ensure AI models provide transparent explanations for credit decisions. This builds trust among farmers and financial institutions.

Partnerships with Financial Institutions:

Financial institutions are key players in converting Blockchain records and AI-driven credit scores into actionable benefits for farmers. Building partnerships between technology providers and banks can ensure seamless integration of these innovations.

Key Steps to Forge Partnerships

Awareness and Training for Banks:

- Conduct workshops to educate banks and NBFCs on using Blockchain records and AI credit scores.
- Showcase pilot projects demonstrating reduced risk and increased repayment rates.

Blockchain Integration:

- Develop APIs to allow financial institutions to access Blockchain data securely.
- Enable banks to verify farmers' income and transaction histories without additional paperwork.

Pilot Programs in Key States:

- Launch pilots in high-production states like Punjab, Maharashtra, or Tamil Nadu.
- Focus on specific crops (e.g., sugarcane, rice) or marginalized groups (e.g., women farmers).

Policy Advocacy:

- Work with the Reserve Bank of India (RBI) to include Blockchain-based records and AI scores in credit assessment frameworks.
- Encourage NABARD to promote technology adoption through subsidies or grants.

Example:

In **Ethiopia**, the government and private banks collaborated on a Blockchain initiative to provide traceable financial histories for coffee farmers, enabling them to access formal loans. Indian banks can similarly partner with AgriTech firms to expand financial inclusion.

Strengthen Data Privacy and Security



Blockchain and AI present a groundbreaking opportunity to revolutionize Indian agriculture by improving farmers' creditworthiness

Handling sensitive farmer data responsibly is crucial:

- **Establish Clear Regulations:** Introduce policies to regulate data usage in Blockchain and AI systems, ensuring farmers' data is not misused.
- **Decentralized Storage:** Use Blockchain's decentralized nature to prevent data breaches and enhance trust.
- **Educate Stakeholders:** Train all stakeholders, including farmers, mandis, and banks, on data privacy best practices.

Example:

The European Union's **GDPR (General Data Protection Regulation)** offers a framework India can follow to secure agricultural data.

Scaling Through Public-Private Partnerships (PPPs)

Large-scale implementation requires collaboration between governments, private firms, and AgriTech startups:

- **Government-Led Initiatives:** Expand existing programs like Digital India to include Blockchain and AI for agriculture.
- **Startup Ecosystems:** Partner with startups specializing in AgriTech to develop and deploy solutions.
- **Corporate Participation:** Encourage CSR (Corporate Social Responsibility) initiatives from corporations to fund technology adoption.

Example:

The government's partnership with **Microsoft** in Karnataka to improve agricultural productivity using AI is a model for scaling Blockchain and AI initiatives.

Blockchain and AI present a groundbreaking opportunity to revolutionize Indian agriculture by improving farmers' creditworthiness. By digitizing cash transactions, building tokenized records, and leveraging AI-driven credit scoring, millions of unbanked farmers can be brought into the formal financial system.

The successful implementation of these technologies requires collaboration between governments, financial institutions, and startups. With the right policies and partnerships, India can empower its farmers, fostering financial inclusion and sustainable growth.

The journey is challenging, but the rewards—empowered farmers and a prosperous agricultural economy—are worth the effort.

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CORN ECOSYSTEM DEVELOPMENT IN INDIA

UNLOCKING POTENTIAL AND ADDRESSING CHALLENGES

Developing high-productivity zones for corn near demand pockets, expanding mechanization, and adopting improved inputs can boost local corn production while reducing losses.

Corn is India's third-largest cereal crop after rice and wheat, playing a versatile role in agriculture by providing critical inputs for food, feed, and biofuel. India ranks as the 5th largest producer of corn globally and the 14th largest exporter, with production reaching 38 million metric tons (MT) in 2023. Major export destinations include Vietnam, Nepal, Bangladesh, Malaysia, and Thailand. The top corn-producing states are Karnataka, Madhya Pradesh, Bihar, Tamil Nadu, Telangana, Maharashtra, and Andhra Pradesh, highlighting the crop's widespread geographical significance.

The Rising Demand for Animal Feed

India's livestock and poultry sectors are among the largest consumers of corn, with about 62% of domestic corn production dedicated to animal feed. As demand for meat and dairy rises, the

feed industry has become vital to India's agricultural economy. Corn's high energy content supports economic growth by reducing production costs in the livestock sector, which contributes nearly 4% to India's GDP.

India's expanding poultry sector offers significant opportunities for corn producers, driven by both domestic and export demand. However, to sustainably meet this demand, the feed industry must adopt innovative solutions. Developing high-productivity zones for corn near demand pockets, expanding mechanization, and adopting improved inputs can boost local corn production while reducing losses. Additionally, creating an end-to-end value chain will address price volatility and provide assured buy-back options for growers.

Biotech innovations can enhance yield potential and improve the nutritional quality of feed. Incorporating biotech into farming practices enables the industry to produce higher-yielding corn varieties that meet the growing demand for animal feed sustainably.

Corn's Potential in Sustainable Biofuel Production

In 2021-22, India's crude oil imports amounted to USD 120 billion, meeting about 86% of its petroleum product demand (*Source: PPAC*). With India aiming for a 20% ethanol blend in petrol by 2025, biofuel production has become an important focus for sustainable energy. Corn is emerging as a promising feedstock for ethanol, providing a cleaner alternative to fossil fuels and contributing to energy security. Corn-based ethanol not only reduces greenhouse gas emissions but also supports rural econo-

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mies by creating jobs, particularly in agri-based employment sectors. India's ethanol blending rate increased from 5% in 2019-20 to about 9.5% in 2021-22, driven by a rise in ethanol supply from 2 billion liters in 2019-20 to approximately 4.1 billion liters in 2021-22 (Source: PWC Report).

Using corn for biofuel supports food security by shifting the focus from other food-based biofuel feedstocks, such as molasses and broken rice, to corn, which has a relatively low water footprint and emits fewer greenhouse gases. Developing corn varieties with higher starch content can further optimize biofuel production by increasing ethanol yield, with enhanced drought resistance and pest tolerance, thus contributing to India's renewable energy goals.

Economic and Environmental Impact of Corn Production

Corn production has broad economic implications, affecting food pricing, feed costs, and biofuel economics. For example, a 20% increase in corn prices in 2023, driven by irregular monsoons and supply chain disruptions, underscores the volatility in agricultural stability. Stabilizing prices through policy interventions and building resilient supply chains are crucial steps.

From an environmental perspective, corn's relatively low water footprint, requiring about 450-480 liters per kilogram, is advantageous in water-stressed regions, especially those dominated by water-intensive rice cultivation. Advances in crop science, such as drought-resistant and pest-tolerant varieties, have improved resilience to climate challenges, stabilizing yields. Furthermore, India's total energy supply composition—43% coal, 24% oil, 22% biofuel and waste, 6% natural gas, 2% hydro, and 1% nuclear—highlights the potential for biofuel to diversify the energy mix (Source: PWC Report).

The corn sector in India is a substantial contributor to the economy, supporting employment across the entire value chain, from farming and processing to

From an environmental perspective, corn's relatively low water footprint, requiring about 450-480 liters per kilogram, is advantageous in water-stressed regions, especially those dominated by water-intensive rice cultivation.

distribution. Maize cultivation, marketing, and value addition alone generate over 1,000 million man-days, providing critical employment opportunities throughout the country. With an impressive contribution of 400 billion rupees to the national GDP, maize stands as a key crop for economic growth. Strategic investments in infrastructure, such as improved storage facilities and robust market linkages, can further enhance farmer incomes, reduce post-harvest losses, and ensure that a greater share of the crop's value directly benefits farmers, fostering a more resilient agricultural economy (Source: ICAR-IIMR).

Leveraging Regional Advantages and Technological Advancements

Certain states, including Maharashtra, Gujarat, and Bihar, leverage favorable climates and modern agricultural practices to drive corn production. These regions offer a blueprint for advanced irrigation and crop management techniques, enhancing productivity and reducing labor dependency. Expanding access to affordable technology and training is essential for building a robust, resilient corn ecosystem in India.

Modern practices such as precision agriculture and data-driven farming have the potential to conserve resources and increase yields. Government programs and private-sector investments in AgTech can drive this modernization, equipping farmers to compete globally. Innovations in corn varieties with higher resistance to pests, diseases, and climate-related stresses can significantly

improve productivity.

Addressing Post-Harvest Losses

India's corn sector suffers from significant losses due to insufficient storage and processing infrastructure, impacting farmers economically and discouraging them from scaling production. Establishing rural processing units and storage facilities can mitigate these losses and strengthen the value chain. Investments in rural logistics, including cold storage and efficient crop handling facilities, can directly impact farmer earnings by preserving yield quality.

Reducing post-harvest losses through the development of corn varieties with longer shelf lives and spoilage resistance is essential. Introducing biotech varieties to improve storage capabilities, reduce food waste, and increase profitability can further strengthen the corn ecosystem.

A Sustainable Path Forward

India's corn ecosystem holds vast potential in food, feed, and fuel sectors. However, unlocking this potential requires addressing technology adoption, environmental impact, and infrastructure gaps. Sustainable farming practices—such as crop rotation, conservation tillage, and precision irrigation—are critical for reducing environmental strain and preserving soil health.

Biotechnology stands at the forefront of these efforts, providing solutions that enhance corn's resilience to climate change, improve yields, and reduce the crop's environmental footprint. Integrated pest resistance can mitigate threats like the Fall Armyworm, which has had devastating impacts in recent years.

Through a balanced approach that integrates economic, environmental, and technological strategies, including biotechnology, India can fully harness corn's potential. Collaboration among policymakers, farmers, and industry leaders will be crucial to creating a sustainable, productive future for India's corn sector, benefiting the agricultural community and the nation at large.

Feeding 10 Billion

RETHINKING AGRICULTURE WITH HIGH-YIELD, NUTRIENT-RICH SEED INNOVATIONS

Global population, expected to exceed 10 billion in the next 30 years, will necessitate food production to increase by 60%. To tackle this monumental challenge, agricultural practices must evolve, leveraging modern technologies and sustainable methods to boost productivity without further straining resources. Fertilizers, while having played

a crucial role in increasing yields over the years, now present several challenges that require a more balanced approach to food production.

The need for sustainable food production is more urgent than ever, as unpredictable weather patterns, water scarcity, and reduced arable land place increasing pressure on farmers. A more balanced approach is required, one that not only optimizes the use of fertiliz-

New rice and wheat varieties developed by both public and private sectors have shown a remarkable 30% reduction in the need for nitrogen-based fertilizers, offering a glimpse into the potential for a more efficient agricultural future.

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Industry of India,
and
MD & CEO,
Seedworks International Pvt. Ltd.





ers but also integrates sustainable, affordable, and scalable solutions. This scenario calls for a shift in how we cultivate crops, which need to be nutrient-efficient, emerging as a key innovation in promoting sustainable agriculture.

Resource Efficient Crops

The adoption of crops that are resource-efficient is essential for the future of food production. For instance, water-efficient crop varieties can maintain high productivity even under the increasing threat of droughts and extreme temperatures caused by climate change. In regions where water availability is already limited, these crops provide a lifeline for farmers. Similarly, crops that require fewer fertilizers and chemical inputs can significantly reduce the environmental impact of farming, particularly in countries like India, where fertilizer usage is among the highest in the world.

In the 2022-23 fiscal year, India consumed more than 62.4 million metric tonnes of fertilizers, with subsidies exceeding INR 2 lakh crore annually. Depending solely on fertilizers to drive productivity comes with both economic and ecological costs. Nutrient-efficient crops, which optimize the uptake and use of fertilizers, offer a way to reduce these impacts while improving soil health and lowering input costs for farmers.

Innovations such as biofertilizers and biostimulants are also gaining traction as sustainable alternatives for enhancing soil fertility. Integrated soil management, which includes these biological inputs, helps rejuvenate soils and makes them more resilient to the stresses of modern farming.

The Indian seed industry has been actively developing nutrient-efficient and climate-resilient crops. Through both conventional breeding and biotechnology, the industry has introduced varieties that perform well in nutrient-poor and water-scarce environments. For example, new rice and wheat varieties developed by both public and private sectors have shown a remarkable 30% reduction

in the need for nitrogen-based fertilizers, offering a glimpse into the potential for a more efficient agricultural future.

Multi-Pronged Approach

India's agricultural challenges are vast, and a multi-pronged approach is needed to address them. Seeds, being the most fundamental input in farming, are central to this effort. The Indian seed industry firmly believes that nutrient-efficient and resource efficient seeds must play a pivotal role in achieving sustainable and high-yield agriculture.

To fully unlock the potential of these innovations, government support is crucial. Policies that promote the adoption of nutrient-responsive and biofortified seeds through targeted subsidies and incentives will be key, alongside greater investment in research and development. Collaboration between the private sector, research institutions, and farmers will ensure that these advanced seeds reach all corners of the country, tailored to its diverse agro-climatic conditions.

The future of India's agricultural success depends not on increasing the quantity of inputs but on improving the quality and efficiency of what we use. By shifting towards nutrient-efficient and biofortified crops, India can build a more sustainable, resilient, and productive agricultural system.

The Indian seed industry firmly believes that nutrient-efficient and resource efficient seeds must play a pivotal role in achieving sustainable and high-yield agriculture.

STEADYING PULSE RATE

Pulses as the name goes is the key ingredient to build the human body, and has been vital for a healthy diet. It acts as a tonic for the body which helps to develop, manage and maintain the entire body. However, pulses consumption, the key staple of Indian food, is now observing a change because of economical and “instant” need to satisfy the appetite. Besides this, the adversities of lower production and government juggling to keep the food supply intact has also impacted the overall trade flows in pulses.

From the above table we can understand that there are only two key pulses which are the backbone of the entire pulses' basket. Desi chickpeas and Toor contribute to 60% of the entire pulses consumption in India. When there is a shortfall in the production of these, certain percentage of consumption shifts to moong and lentils.

Also, with Government opening the duty-free import of yellow peas, some consumption has also shifted to yellow peas. However, over the last few months, pulses industry has been facing challenges on account of various factors

Weather Vagaries

Weather/rainfall has been key factor disturbing the supply and demand of the key pulses, and thus dependency on the imported cargo becomes more. There

The government has been modifying the import policy abruptly which not only changes the market dynamics in domestic market but also in the sourcing destination.

have been late rains initially and then rains during the harvesting period. This has caused yield damage, and consequently lower production. Also, hail/ground frost during the crop growth and maturity period have also interfered with the yield.

Lower Production

Production of key pulses such as chana and Toor has been lower over the last 2-3 years on account of lower prices, diseases and weather-related yield issues. Lower production results in higher prices, and Government is taking steps to curb the upside movement in the prices. According to trade estimates, Toor production fell to 25-28 Lakh MT in 2014-15, lowest in 10 years while that of chana also fell to the similar year lows. This was largely less than expected yield and weather vagaries.

Abrupt Policy Changes

The government has been modifying the import policy abruptly which not only changes the market dynamics in domestic market but also in the sourcing destination. There are numerous instances such as after the Government banned yellow peas import in 2017-18, exporting nations had to search for destination. This is largely on account of India being the largest importer of all key pulses in the world. The production in the sourcing destination tends to drop significantly, and when there is a need, supplies will not be there.

Further, in the domestic market when government extended the duty-free import of yellow peas for the third time, the domestic market prices declined sharply due to adequate supplies. On one hand, it has caused huge losses to the traders, stockists and other value chain participants. It has resulted in wide scale liquidity crunch, and the spill over is also being observed in other pulses trade. On the other hand, it has discouraged value chain participants to take any fresh position.



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Supply And Demand in The Key Pulses Basket

Pulses (fig in Lakh MT)	Production	Consumption	Deficit	Average Imports
Desi chickpeas	68	85	-17	1.5
Lentils	12	18	-6	8.0-9.0
Toor	30	41	-11	6.0-7.0
Moong	25	28	-3	NA
Urad	22	26	-4	5.0-6.0

The other impact which could be observed is on the sowing front. Farmers will be less likely go ahead with the sowing of the said pulses crops on account of lower returns earned. This could affect the local farmers, as they will not reap good returns due to abundant supply of imported cargo at lower prices.

Additionally, Government imposing a stock limit on the importers of not holding the stocks for more than a month discourages them to buy it as the importers take the risk of importing it, holding it and selling it in the market. If there is a need, the Government can impose stock limit of holding goods not more than 2 months, otherwise can do without it.

Possible Remedial Measures

The Government is the watch dog for controlling the overall prices of the pulses and grains and making adequate availability of the same. Therefore, they should take steps which are win for all the value chain participants.

Government announces the Minimum Support Price for key pulses and grains and is efficiently managing the same. But abrupt stock limit imposition and ban on imports or exports adversely impacts the entire eco-system. For instance, the Government could impose an import duty on yellow peas for regulating the flow of the commodity in the market. It should restrict duty-free import of peas as it is discouraging sowing of desi yellow peas, and has hit farmers' income.

Also, it could regulate the finished goods market to cap sharp rise in the



Additionally, Government imposing a stock limit on the importers of not holding the stocks for more than a month discourages them to buy it as the importers take the risk of importing it, holding it and selling it in the market.

prices. Government could at every key mandis or APMCs ask the retails to cap their Minimum Selling Price.

Currently, retails are keeping approximately 20% more from the cost of production. At times of lower availability Government could ask them to sell the retailers the finished good *i.e.*, dal at a margin of not more than 5-10%. This will not only help the retailers, but also the end consumers as they would get adequate availability at affordable prices.

Secondly, to maintain adequate availability it should introduce new variety of seeds and also provide real time assistance to the farmers for when to safeguard their crop from adverse weather. Prior information can be given to the farmers to harvest their crop to enable them from any incessant rains.

Thirdly, as there is no control on the climatic disturbances, it should also be understood and prepare agreement for long term from the sourcing destination such as for Toor, lentils and desi chickpeas. This would help the country to tackle the huge deficit in production and control prices from rising substantially in the market.

It should also regularly conduct seminar for the promotion and consumption of pulses, so that the use should increase substantially.

Govt allows duty free import of Desi chickpeas upto 31.03.2025	Duty free import of lentils upto 31.03.2025	Duty free import of Malawi Toor upto 31.03.2026	Annual quota of 2.5 Lakh MT of urad & 1.0 Lakh MT Of Toor upto March 2026.
		Restricted import of yellow peas and subject to MIP of 200CIF per KG	
Duty-free import of yellow peas until BL date 31.12.2024			

POSHN



A PRODUCT-FIRST APPROACH TOWARDS SOLVING COMPLEX PROBLEMS

The agritech market in India is expected to grow from US\$4 billion in 2022 to US\$34 billion by 2027. The agritech sector has the potential to increase farmers' incomes, increase productivity, and increase access to affordable working capital solutions. One of the startups revolutionising the entire sector is Poshn.

A Product-First Approach

Poshn, founded by Mr Bhuvesh Gupta & Mr Shashank Singh, is a platform that takes a product-first approach towards solving complex problems in the B2B food supply chain. A full stack food supply chain company, in an otherwise fragmented supply and inelastic and fragmented demand, the start-up is making the wholesale Food supply chain effective and seamless. It offers full-stack services for the food commodities that buyers can purchase from millers and stockists. It not only provides seamless discovery of and transactions for the staples market, but also assists buyers/sellers with logistics and offers flexible payment solutions.

From being a dominant player in Delhi NCR, Poshn is now a leading commodity platform across India. Poshn is working with more than 500 wholesalers across eCommerce, modern trade, general trade and institutional buyers. It has ventured into several categories

Poshn is an asset light firm, offering a one stop for all wholesale buying and selling of food commodities by transforming the highly fragmented processed commodity trade market into a technology lead global marketplace.

such as sugar, pulses, oils, grains, dry fruits, spices, etc. over the last 12 months.

Investment Influx

The agritech sector has seen a surge in investment, with venture capitalists and international investors showing increasing interest. In 2020, the sector received over US\$300 million in investment.

About the AUTHOR

**Shashank Singh,
Co-founder, Poshn**





Poshn has raised in May 2024 \$4 million in its pre-Series A round, including \$2 million in debt led by Prime Venture Partners and Zephyr Peacock India taking the total equity raise to \$8 million.

Earlier in 2022, the startup had raised \$4 million in a seed round from Prime Venture Partner and Zephyr Peacock. Additionally, it has partnered with Banks & NBFCs for its debt requirements. Some notable names include ICICI Bank, Alteria Capital, UCIC, Northern Arc, Blacksoil, and Capsave.

Technology Infusion

Poshn is an asset light firm, offering a one stop for all wholesale buying and selling of food commodities by transforming the highly fragmented processed commodity trade market into a technology lead global marketplace.

Using their proprietary AI model, Poshn has been successful in reducing the time to trade by breaking the demand requests into smaller segments and mapping them with several suppliers to find the best match. As a result, this is fulfilled within a matter of minutes, compared to several weeks with the tra-

ditional process.

With the infusion of advanced technology, they have been able to reduce complexities in the process and market, and also been able to increase supplier retention. They have also been able to playbook the go to market strategies which helps us expand across categories at an unparalleled growth rate. The end to end value chain digitisation by Poshn has brought unparalleled market efficiencies and transparencies in the

Using their proprietary AI model, Poshn has been successful in reducing the time to trade by breaking the demand requests into smaller segments and mapping them with several suppliers to find the best match.

value chain, unlocking value for all the stakeholders

Poshn's top line technology layer involves clusters of intelligence engines that powers the price discovery, reverse auctioning, matching of right fulfilment partner and multi-channel conversations across our products. They use Artificial intelligence (AI) and machine learning (ML) with prediction analytics to develop data driven intelligence to power systems. NLP is used to derive the inferences for their multi-channel conversations between their stakeholders. Big Data powers our analytics engine to derive actionable insights. Poshn heavily uses multi-cloud computing platforms to run their applications, automation workflows and data aggregation pipelines.

Poshn also has plans to launch its own private label and to participate in cross border trades in the near future. With the help of its existing relationship, Poshn believes it is capable of building a challenger brand in the market. On the technology side, it will continue to improve its full stack offering to make the wholesale food supply chain in India more efficient.

THE RISE OF CO-FARMERS

ENHANCING SUSTAINABILITY IN MANAGED AGRICULTURAL SYSTEMS

Farmland has always stood as a dependable asset, but its true value shines when it is expertly managed with modern agricultural practices. In managed farmlands, experienced agricultural professionals blend traditional wisdom with cutting-edge techniques, transforming the land into a thriving investment. By carefully selecting crops, employing sustainable practices, and optimizing every square foot, managed farmlands not only maintain value but continuously enhance it.

At the heart of managed farmlands are flourishing plantations, cultivated to yield a diverse range of plantations including both timber and fruit trees.

Unlike typical investments, managed farmlands have the unique advantage of organic growth. Season after season, they not only give yield but also enrich the soil, nurture biodiversity, and build an asset that truly grows in both value and potential.

Especially now, with the world's population expected to skyrocket to 10 billion by 2050, there's going to be a huge demand in the amount of food we need to consume (approximately 70% surge in food demand). This means we need to evaluate how our farming methodologies affect the environment.

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Mr. Ashok Jayanthi,
Chairman & Co-founder,
Hosachiguru



In recent times, agriculture has become more intensive to meet these growing demands, relying heavily on synthetic fertilizers and pesticides. Unfortunately, industrial Agriculture practices harms soil fertility and contaminates groundwater.

To address these challenges, there's a push for sustainable farming practices that mimic natural ecosystems. The goal is to restore the environment to a more resilient and self-sustaining state through managed farmlands.

Cultivating Sustainability Through Managed Farmland's Organic Approach

In managed farmlands,

the practices are based on organic principles. Organic farming means steering clear of chemical fertilizers and pesticides. Moving away from these artificial inputs brings us closer to nature. In an organic approach, the preparations come from the farm, including the animals and plants on the farm. This practice is sustainable and regenerative over time, as it doesn't rely on constant external inputs. This shift has the potential to foster a healthier future generation, and promote environmental sustainability.

Fostering Diversity by Redefining Farming Practices

Monoculture, a common agricultural practice, is seen as a major challenge because it reduces diversity in ecosystems. Nature thrives on diversity, much like humans do. When we limit our ecology to just a few species, it upsets the balance in nature. And resorting to chemical pesticides, fertilizers, and machinery, inevitable. Which impacts climate negatively and depletes resources.

Instead, we advocate for biodiversity and natural succession in agriculture. This means encouraging the growth of multiple layers of perennial plants, leading to diverse and plentiful harvests. By following permaculture guidelines and implementing syntrophic farming practices we achieve regenerative farming. We can create organic and edible gardens that support both the environment and safe food.

Boosting Ecosystems Through Regenerative Farming

Regenerative farming is a forward-thinking, holistic approach to agriculture that reaches beyond sustainability to actively restore and enhance ecosystems, soil health, and biodiversity. Unlike conventional methods, regenerative farming revitalizes the land, fostering resilient agricultural systems that work in harmony with nature. By integrating practices such as biomass plantations, mulching, rainwater harvesting, organic inputs, and no-till farming, regenerative

Syntropic farming, a component of permaculture, imitates nature to create dynamic and economically sustainable ecosystems, restoring depleted soil biodiversity.

farming enriches soil health, boosts microbial activity, prevents erosion, and helps counter the impacts of climate change. Through these methods, the soil is transformed into a living, breathing entity, yielding both high-quality produce and environmental benefits for generations to come.

Reviving Soil Health with Syntropic Farming Solutions

Syntropic farming, a component of permaculture, imitates nature to create dynamic and economically sustainable ecosystems, restoring depleted soil biodiversity. Its main aim is to reforest the planet by promoting crop diversity, much like the layers found in forests. This method optimizes space and resources, mimicking natural plant arrangements. The use of organic mulch retains moisture, suppresses weeds, and enriches the soil, ensuring its health. By minimizing soil disruption, microbial activity is preserved, maintaining a healthy soil cycle. The preference for perennial crops provides long-lasting benefits, preventing erosion and ensuring stability.

Syntropic farming is in harmony with regenerative agriculture, continuously enhancing soil health and biodiversity. By following permaculture principles, we achieve biodiversity, preserve clean air and soil, and strive for cleaner eating habits.

Building Soil Health with Agroforestry Integration

Agroforestry takes a strategic approach

to farming by incorporating trees into agricultural landscapes, creating a synergistic environment where crops, trees, and nature coexist and thrive. By contributing organic matter through leaf litter and root decomposition, trees improve soil structure, enhance nutrient cycling, and support efficient water retention, making farmland more resilient and fertile. Furthermore, trees play a crucial role in combating climate change by capturing and storing carbon within their biomass and in the soil. Agroforestry not only enhances soil health but also creates habitats, provides food and shelter for diverse species, and supports overall ecosystem well-being, establishing a model for sustainable and regenerative land management.

Transforming Food Systems with Sustainable Communities

As the global population grows, the challenge of providing healthy diets for everyone looms larger. Community-based food systems offer a solution to this dilemma. When individuals passionate about their communities and sustainability unite, they can transform how food is grown, emphasizing organic methods.

In community gardens, eco-enthusiasts collaborate to cultivate food in a manner resembling natural forests, incorporating various edible species.

Prioritizing Sustainable Ecosystems

The initial step towards establishing a sustainable ecosystem involves recognizing the abundance of life underground, with soil hosting over 25% of Earth's biodiversity. Consequently, our efforts should align with permaculture principles, emphasizing syntrophic and regenerative farming. By doing so, we aim to decrease the labour required for food production over time while allowing nature to regenerate itself.

When communities prioritize integrating sustainable practices into their daily routines, meaningful strides can be made in the realm of sustainable agriculture.

MAHARISHI VEDIC ORGANIC AGRICULTURE AND ENVIRONMENTAL RELATIONSHIPS™

Reconnecting Man and Nature

Maharishi Vedic Organic Agriculture and Environmental Relationships is the knowledge of agriculture and the environment revived from the Vedic tradition of India by Maharishi Mahesh Yogi. This science of Consciousness-based Agriculture presents a new, holistic paradigm focused on reconnecting man and nature from their common source in consciousness. This vital relationship between man's intelligence and nature's intelligence is the ultimate key to successful agriculture in a natural and environmentally sustainable manner.

Maharishi Technologies of Consciousness in Agriculture

To apply Vedic science in agriculture, we need to understand just how nature functions, from both the modern and the Vedic perspective. Cutting-edge physics has given us a model of nature in which physical creation is an expression, a manifestation of underlying fields of energy and intelligence called quantum fields. Molecules, atoms, and subatomic

To apply Vedic science in agriculture, we need to understand just how nature functions, from both the modern and the Vedic perspective.

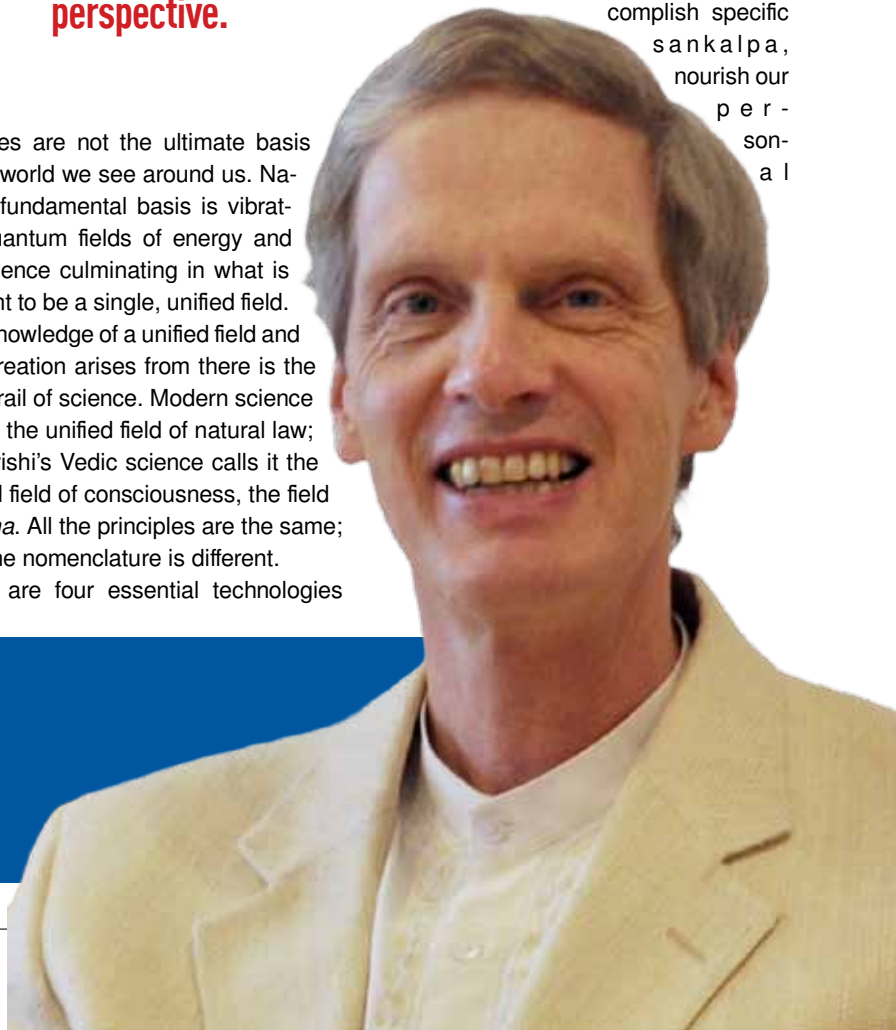
particles are not the ultimate basis of the world we see around us. Nature's fundamental basis is vibrating quantum fields of energy and intelligence culminating in what is thought to be a single, unified field. This knowledge of a unified field and how creation arises from there is the holy grail of science. Modern science calls it the unified field of natural law; Maharishi's Vedic science calls it the unified field of consciousness, the field of *Atma*. All the principles are the same; only the nomenclature is different. There are four essential technologies

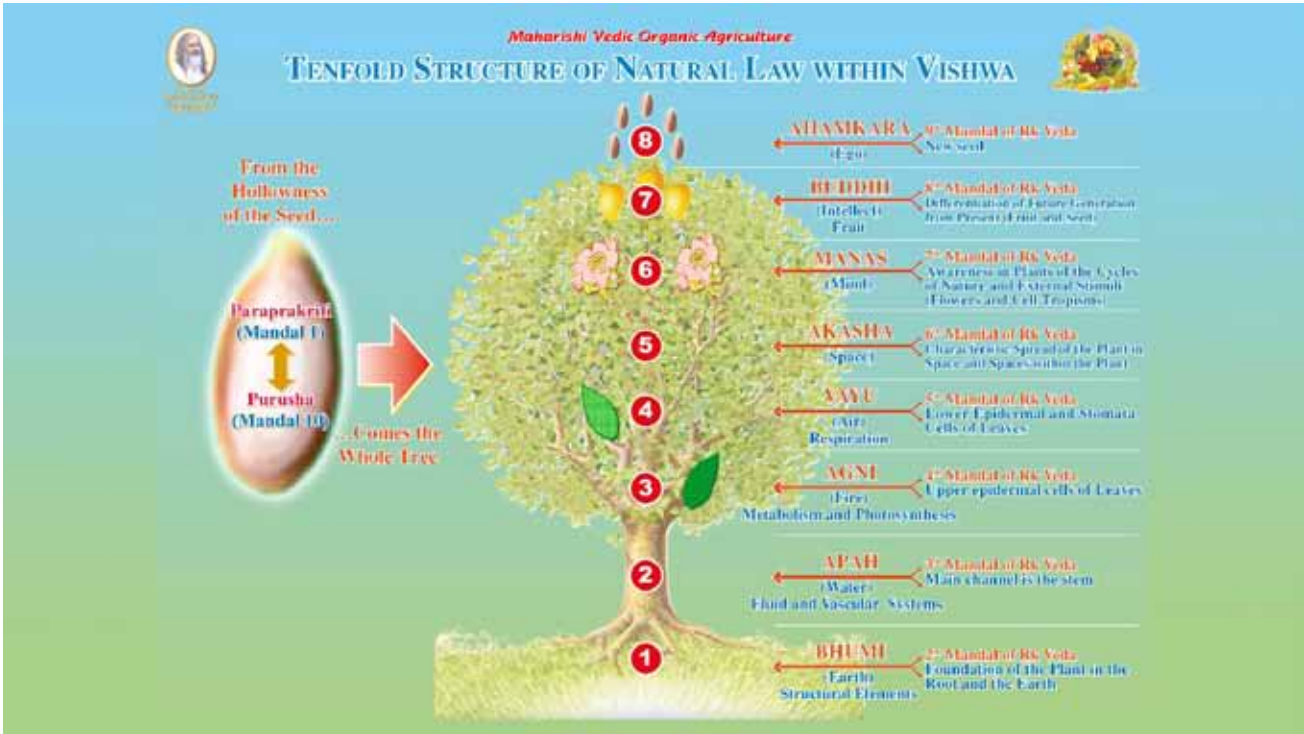
that MVOA uses:

1. **Maharishi's Transcendental Meditation™ and TM-Sidhi Programmes™**: the complete science of correct meditation and suitable mantras.
2. **Maharishi Yagya Programme™**: the science of yagya through the application of Vedic mantras to accomplish specific *sankalpa*, nourish our *personal*

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- lives, and balance the environment.
3. **Maharishi Jyotish™**: the Vedic science that aligns farming activities with nature's natural cycles and rhythms to gain nature's support.
 4. **Maharishi Sthapatya Veda™**: the Vedic science of vastu, where farming structures and field arrangements are aligned with the sun's nourishing light and the Earth's natural magnetic fields.

Transcendental Meditation™

It creates brain coherence simply and immediately upon learning. This brain coherence is the basis of balance in the physiology and creative and integrated mental functioning. With TM practice, farmers are alert, relaxed, stress-free, and naturally attuned to the environment around them.

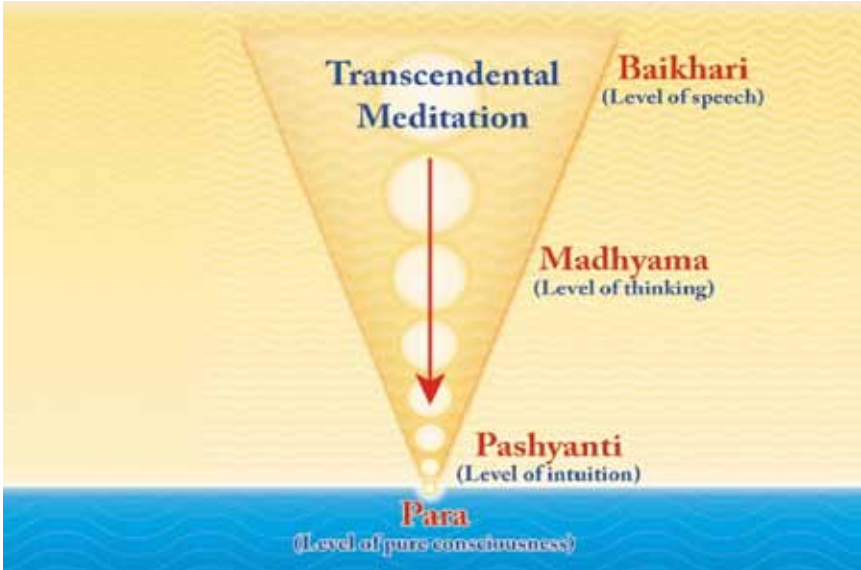
This simple, easy-to-learn mental technique involves no change in lifestyle, is completely independent of religion and culture, and thus can be practiced by any farmer in any country. It does not involve any concentration or contemplation. It is both the easiest to practice, and produces the most clinically verified results of all the meditation practices re-

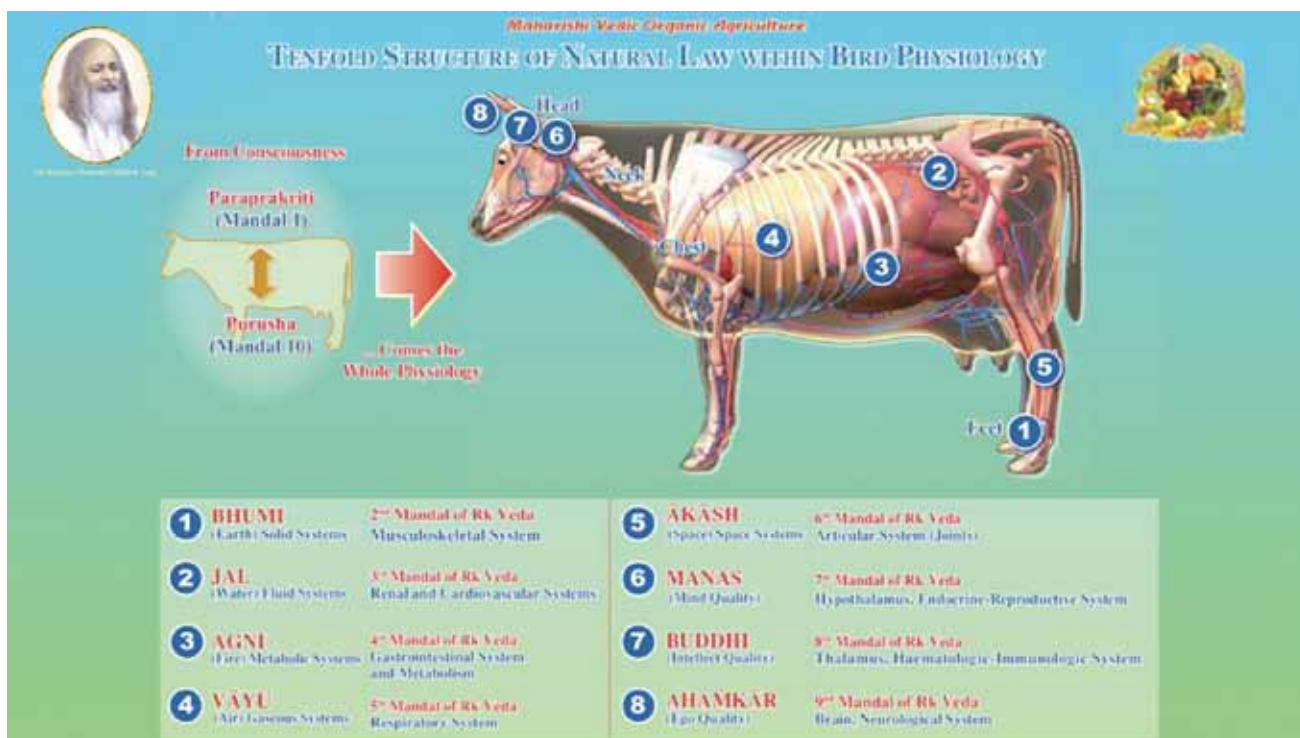
This science of Consciousness-based Agriculture presents a new, holistic paradigm focused on reconnecting man and nature from their common source in consciousness.

searched worldwide. More than ten million people have learned this technology worldwide over the last 50 years, making Transcendental Meditation the most researched and scientifically verified personal development technology today.

The TM-Sidhi Program

It is a powerful, advanced meditation program that develops high-level brain





coherence and physiological integration. Extensive scientific research has found it to have powerful coherence-creating effects for both the individual and society as a whole and to produce a profound balance in the environment.

Maharishi Yagya

Vedic science presents the unfoldment of the physical world from consciousness as *Atma, Veda, Sharir, Vishwa, Brahm*. In this understanding, the physical world originates in *Atma* or pure consciousness. The actual manifestation process is governed by the eight *Prakriti*: *Bhumi, Apah, Agni, Vayu, Akasha, Manas, Buddhi*, and *Ahamkara*. These have their basis in a more fundamental level of the three *gunas, Sattva, Rajas, and Tamas*, which originate in *Atma*.

These Prakriti are not to be confused with physical earth, water, fire, air, space, mind, intellect, and ego. The *Prakriti* are structuring dynamics of nature, containing within them the intelligence and organizing power to manifest and administer our physical world. Each *Prakriti* is a collection of laws of nature known to modern science.

“The Vedic approach to agricultural management gives us one central control point, the eight *Prakriti* for simultaneously managing everything in the agricultural environment.”

—Maharishi

By gaining a fundamental and causal understanding of how nature functions, we can more easily manage all the complex factors required for successful farming from a single, unified basis. This is the gold standard for agriculture.

Vedic and Modern Approach

It is essential to understand that the Vedic approach and the modern approach are not different. Both find the source of nature in abstract, fundamental fields from which emerge laws of nature that are at the basis of the manifestation process. Only the terminology is different. What is called a law of nature in the fields of biology, chemistry, and agriculture science is called a *devata* in Vedic science. Again, it is just a difference in nomenclature. All the principles and laws are the same. Both the laws of nature and the *devata* are dynamic expressions of the intelligence and organizing

power in nature.

If we can balance the *Prakriti*, then, by restoring balance in nature, everything from climate change to soil balance can be addressed simultaneously and naturally.

Scientific Validation and Research

The four technologies of Maharishi Vedic Organic Agriculture have been extensively researched through more than 750 rigorous scientific studies, many of them published in peer-reviewed scholarly journals and professional conference proceedings. These studies confirm that Vedic science, when properly applied, has the potential to solve many of the problems of agriculture.

The Maharishi Vedic Organic Agriculture Institute has already begun to demonstrate that *Yagya*, when properly applied by pandits who practice Transcendental Meditation, is directly effective

tive in balancing the environment.

In 2016, by the month of May, the drought in Maharashtra left 300 million people without sufficient water. At this time, a 21-day Maharishi Ashtaprakriti Yagya was performed by 50 of India's most accomplished pandits from the traditions of Rig Veda, Sama Veda, Krishna Yajur Veda, Shukla Yajur Veda, and Atharva Veda. All those pandits practiced Transcendental Meditation daily before recitation. On the first day of the Yagya, it rained in the local area. By the time the 21-day Yagya was complete, it was raining all over Maharashtra, and the two-year drought was broken. Before this Yagya, reports said that it had not rained in the month of May in Maharashtra for 20 years!

The application of the Maharishi Ashtaprakriti concept is now being refined to allow it to be practiced by both live groups of pandits for large projects and high-fidelity recordings using the latest audio technology for smaller applications. This will enable it to be easily applied around the world.

This science of Consciousness-based Agriculture presents a new, holistic paradigm focused on reconnecting man and nature from their common source in consciousness.

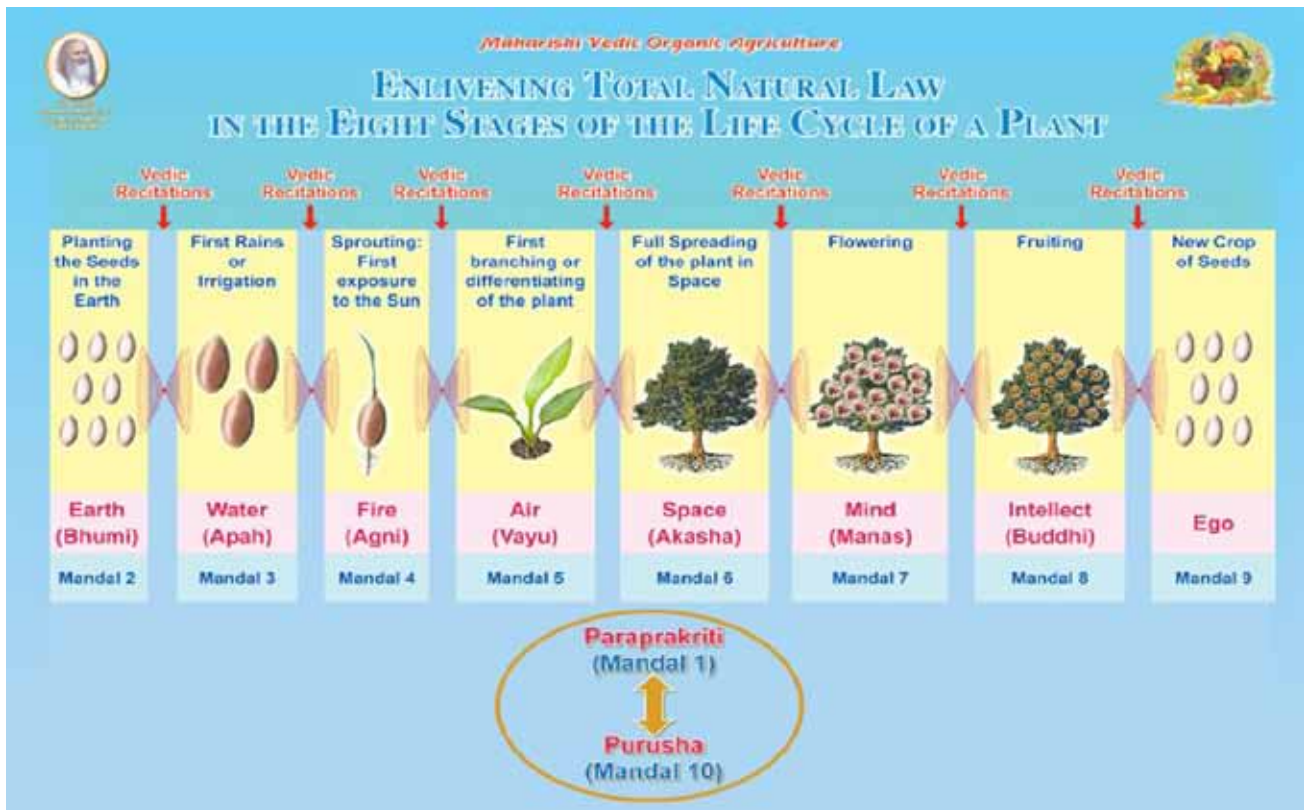
Research on the application of Yagya to balance the environment is now set to begin in earnest.

The TM and TM-Sidhi Programmes have recently been applied in rural India. In the Himalayan valleys of Badrinath and Kedarnath, more than 20,000 lady farmers have been trained in these meditation programmes and studies are ongoing on the effect of meditation practices on farmers' health, creativity, energy, well-being, and effectiveness in farming.

Four permanent, residential groups of 10,000 practitioners of the TM and TM-Sidhi Programmes are currently being trained in India to create coherence and harmony for the whole world. These groups should dramatically affect India's environmental balance and provide a foundation at the level of coherent collective consciousness for improved agriculture throughout the country.

A New Paradigm

Combining these practices and their scientific validation with Jyotish and St-hapatya Veda principles and practice will create a new paradigm for India and the world, a paradigm that potentially can solve not only the world's looming food crisis but also the world's current climate crisis. Climate change and weather patterns are not magical. They are based on imbalances that man has created in nature. If we rebalance human behavior, we rebalance our environment. The programmes of Maharishi Vedic Organic Agriculture provide solutions to both of these problems.



EMPOWERING THE NEXT GENERATION

HOW YOUTH LEADERSHIP IN AGROECOLOGY SHAPES OUR FUTURE



While the world is facing climate change, global food insecurity and many other problems in the agricultural sector, youths are rising to leadership in agroecology. It is not just a question of how farming is carried out but how the structure of producing and distributing food can be made sustainable in the face of challenges that are inherent in the world today.

The Significance of Youth in Agroecology

The youths are right at the heart of it all – from the climate crisis, to social injustices to the unstable economy. However, this also gives them the power to be the keys to our future. Farming has always been regarded as an *'unhip'* profession, but it does not have to be this way. Engaging youth as agents of change, innovators and leaders of change in their various communities to redesign that one word that most people associate

with poverty, pain, hardship – farmer, we can alter the courses of thousands of young people with the dream of making farming a respectable profession.

Engaging youth in agroecological practices not only reduces the youth bulge but also drives innovation and value addition in agriculture, from production to processing. In Africa, for instance, young people are involved in food production, input processing, and extension services, with their leadership helping shape the next generation of agricultural thinkers and doers.

Youth play a key role in promoting sustainable and profitable agroecological practices. They are adaptable to new technologies that enhance environmental conservation and mitigate climate change impacts. Beyond their role as producers and consumers, they are actively involved in shaping governmental and non-governmental policies that support agroecology and ensure their interests are represented.

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Challenges and Opportunities

Today's youth demographic is unprecedented in size, posing significant challenges for employment and food security. Approximately 16% of the global population is young individuals, with over 80% living in developing countries. In rural areas, around 80% of young people participate in food production, whether formally or informally. Despite their involvement in agriculture, young people often experience high levels of food and nutritional insecurity, facing issues such as low or unpaid wages, marginalization, inability to access land, credit and market and exploitative labor conditions. This situation contributes to a precarious future for today's youth, exacerbated by the shortcomings of current food systems.

To mitigate those challenges, one must adopt friendly policies and financial instruments where practical participation in agroecology will be fully realized. Any program that brings cash and market opportunities to young farmers would greatly add on their capacity to practice agroecology. It holds true to the fact that today's youths are at the receiving end of climate change and other societal issues than any other generation. Since the era of industrialization and IT solutions, farming has been considered as a routine job, lagging behind other occupations. But by presenting positive role models of young leaders in agroecology, we can help others perceive farming as not just possible, but desirable and fulfilling, in addition to being socially useful. Similar to the ideas of Gen Y Employment, technological advancement should be incorporated with traditional practices to ensure youth embrace farming. There is evidence that young leaders are living up to their potential and are already impacting and changing the world.

With an emphasis on the cultural significance of farming, change agents from the state of Assam, have led over a hundred training sessions on organic and natural farming practices. Beyond them,



Engaging youth as agents of change, innovators and leaders of change in their various communities to redesign that one word that most people associate with poverty, pain, hardship – farmer, we can alter the courses of thousands of young people with the dream of making farming a respectable profession.

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they have chosen other young people from their neighborhoods and mentored them in the direction of pursuing careers in agriculture. They have also developed environmentally beneficial businesses, such as making environmentally friendly plates and bowls from areca nut leaves, which provide a better means of subsistence. This has brought about a significant shift, inspiring over a hundred farmers to adopt sustainable farming practices, focusing on undesirable plant

species, and looking into their potential and integration into local food networks.

Way Forward

Leading us through the path of sustainable agriculture remains in the hands of the young in modern society. This includes individually empowering the marginalized, questioning the status quo and providing them with requisite support to foster leadership that enhances diversity, equity and strong food systems. Looking to the future, it is imperative that such young leaders be backed by support to create an environment of future sustainability. We have a responsibility to invest in our children's education, to provide them with resources, and to ensure that young people have seats at the table when decisions are being made. Now is the time for action — let us stand behind these young leaders and build the future that we all deserve.

BRICK KILNS:

DIFFICULT BALANCE BETWEEN ECONOMIC NEED, FARMLAND AND ENVIRONMENTAL DAMAGE

Varanasi city, known as one of the oldest cities in the world and India's holiest place, offers a striking contrast between ancient history and modern challenges. During my recent visit to the districts surrounding this holy city, I was struck by the sight of numerous tall, thin towers dotting the horizon. For someone arriving for the first time, these could easily be mistaken for temple spires, but they are, in fact, chimneys of brick kilns.

Brick Kilns – Stripping Away Top Soil

Brick kilns have been part of life here for thousands of years with profound socio-environmental implications. India still uses brick-making techniques dating back to the Indus Valley Civilization, around 4000 BC. Brick kilns play an essential role in supporting the livelihoods of many families in the Varanasi region. The brick industry provides both seasonal and full-time employment for thousands of workers, many of whom migrate from distant regions. The production of bricks sustains local construction efforts and drives the region's infrastructure development, contributing significantly to the local economy.

Newer, more sustainable alternatives are often too expensive, so traditional bricks remain popular. However, this reliance on traditional methods has severe consequences, as fertile topsoil from farmlands is used for brick production, gradually depleting this critical re-



Photo: Jean de Die Yanra



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Brick factories rent farmland from young smallholder farmers and strip away the fertile topsoil, leaving the land less productive for farming.

source. In the past, kilns were built in forests or barren lands, but now they have moved to farmland due to land scarcity. Brick factories rent farmland from young smallholder farmers and strip away the fertile topsoil, leaving the land less productive for farming. This is a major issue in regions where farmland is already limited.

Farmers, often unaware of the long-term impact of losing topsoil, lease their land to brick kiln companies for short-term financial gain. Leasing offers higher income without the risks of farming, making it especially appealing to young farmers who face challenges like marriage, health issues, or the cost of education. Many lease their land, earn quick money, and then migrate to cities for alternative work.

Poor Working Conditions

Meanwhile, despite their economic contribution, the workers in brick kilns, both locals and migrants, endure harsh conditions. Laborers toil for long hours in harsh environments, often exposed to extreme temperatures and poor venti-



Photo: Kibrom Sibhatu

lation. These conditions can severely impact their health and well-being. The industry, largely unorganized and manual, demands intensive labor, with many workers still involved in outdated practices like hand-molding and sun-drying bricks.

Environment Pollution

The brick kiln industry's environmental footprint is significant. The heavy reliance on coal and biomass fuels in the production process results in high levels of air pollution. Harmful emissions such as sulfur dioxide, nitrogen oxides, and carbon monoxide escape into the atmosphere, contributing to respiratory illnesses among both workers and nearby residents. These kilns are also a major source of deforestation, as biomass—often in the form of wood—is frequently used as fuel, accelerating deforestation in the region.

In Varanasi and surrounding districts, brick kilns highlight the difficult balance between economic necessity and environmental damage. While brick kilns provide critical economic opportunities,

Sadly, when one farmer rents their land to brick kiln companies, neighboring farmers are often forced to do the same. This is because once the topsoil of adjacent plots is excavated, two major problems arise. First, farming operations become more difficult due to uneven land. Second, during the rainy season, rainwater erodes the topsoil from neighboring plots, carrying it into the excavated land. This process further removes the soil quality of the unexcavated plots while enriching the excavated areas. As a result, once one farmer leases their land, this 'tragedy of the commons' becomes inevitable.

Farmers, often unaware of the long-term impact of losing topsoil, lease their land to brick kiln companies for short-term financial gain.



Photo: Kibrom Sibhatu

their negative impact on farmlands, the environment, and worker health cannot be ignored. As India strives to balance rapid urbanization with sustainable practices, there is an urgent need for government interventions, technology up-

grades, and better working conditions. The introduction of energy-efficient kilns and stricter pollution controls are steps in the right direction, but much more needs to be done.

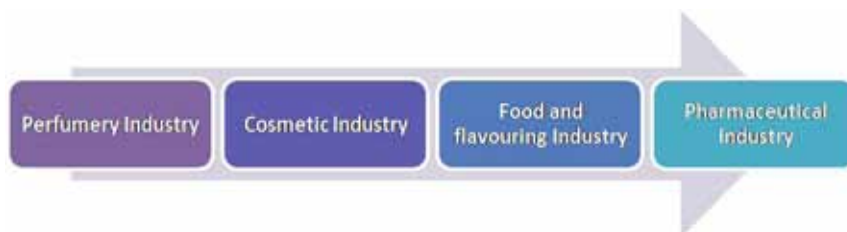
Damask Rose

A POTENTIAL FLOWER CROP FOR SUBTROPICAL REGION

Geographically and historically, it is believed that the Damask rose originated in the distant parts of Persia, or nowadays known as Iran, and then spread to European nations and the northern part of Africa. Iran, Bulgaria, Turkey, India, Morocco, China, southern France, southern Italy, Russia, Libya and Ukraine are among the nations where it is grown. In India, it is grown in Rajasthan, Uttar Pradesh, Jammu and Kashmir, and some areas of Himachal Pradesh and Uttarakhand on 2500-3000 ha of land to generate 0.2 MT of rose essential oil every year. The damask rose oil, also referred to as "attar" or "otto," is an extremely precious product that is often referred to as "liquid gold." 45 tons of concrete, absolute, and damask rose oil is required annually on a global scale. Bulgaria and Turkey are the world's leading rose oil producers, accounting for 80-90% of global production. Consequently, rose essential oil became more expensive globally, achieving roughly \$7500 per kilogram. Many factors influence the quality of rose oil, including genotype, prevailing weather conditions, propagation method, level of trimming, time and way of flower picking, distillation method, and flower storage period.

Economic importance

Essential oil, rose water, rose absolute and concrete are the most valuable products made from Damask roses. Steam distillation is used to produce rose oil and water, and solvent extraction is used to produce rose absolute and concrete. Rose essential oil has a complex composition with over 275 minor ingredients and a small number of significant



Essential oil, rose water, rose absolute and concrete are the most valuable products made from Damask roses

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compounds. Rose essential oil is used in many different industrial applications, such as fragrances and cosmetics, tobacco, liquor, and sweet foods in the culinary and the pharmaceutical industry sectors. Rose oil is used to flavour tea and liquors, as well as to provide fragrance to soap and cosmetic products. It is also utilized in lotions, soaps, and creams due to its strong aroma and mild antibacterial properties.

Furthermore, Damask rose has high levels of antioxidants such as phenolics, flavonoids, carotenoids and anthocyanins. Damask rose formulations have traditionally been used as astringents, tonics, mild laxatives, and antibacterials to treat chest pain, constipation, depression, gastrointestinal, eye sickness, inflammation, respiratory problems and menstrual bleeding.

Soil and Climate

A deep and fertile loamy soil is ideal for commercial rose cultivation. Nonetheless, it may be produced effectively on a variety of soils with proper agronomic procedures. Roses thrive best in soil that ranges in pH from 6.0 to 7.5, which is moderately acidic to moderately alkaline.

High air humidity and moderate temperatures are needed for damask roses. They are typically grown in temperatures between 20 and 30°C during the day and 18 to 20°C at night. Vernalization

Roses are grown in open areas with enough sun light. In subtropical areas, the land is prepared in full during the month of April and left open during the summer. During field preparation, farmyard manure @ 10–15 tons per hectare is applied. After that, the planting area is correctly arranged out into beds of appropriate dimensions. The planting of rose is carried out in 0.45 m³ pits spaced one meter apart. Rooted plants can be transplanted from July to August, but autumn planting is ideal. To plant one hectare of land, approximately 10,000 plants are required. During the first year, after each hoeing, 4-5 cm of soil is added around each plant.

Challenges and opportunities of Damask oil production

Damask rose cultivation is a significant commercial dynamic that comprises all agricultural activities such as planting, harvesting and processing. Nonetheless, its cultivation is problematic in all countries that grow it.

- Roses are frost sensitive and show uneven flowering patterns.
- One major challenge is space availability, as the current gardens are small and dispersed because of the inheritance of the land.
- Producers are shifting from cultivation of rose to other agricultural crops or economic activities to increase income and reduce risk due to market fluctuations.
- Rose cultivation is labour intensive, especially for flower picking.
- The temperature during harvest influences the amount of oil in the flower; high temperatures cause the trichomes on the petals to lose their essential oil content.
- These flowers have low yield and oil content.
- Current oil distillation processes yield low oil recovery rates for roses.
- Most rose growers are unaware of new production technologies.

Prospects

Rosa damascena Mill. is a popular *Rosa* species used in flavouring, aroma, and oil extraction. *R. damascena* products are primarily used in the scent and skincare industries, but they also possess beneficial medical properties such as antimicrobial, antioxidant, and cytotoxic properties. Despite the fact that its cultivation has a high economic potential, it is restricted due to the numerous constraints that rose producers face. Only about half of the world's total rose oil demand (15-20 tons) is currently produced. Therefore, farmers must adopt scientific cultivation of it in large areas and establish processing facilities because this crop is in high demand in both national and international markets.

and short days are required to initiate flowering, which occurs in late spring and early summer. Low night temperatures of 10-12° C during the flowering stage significantly reduce oil synthesis, whereas temperatures of 20° C or higher promote oil synthesis. Air humidity has a minimal impact on rose development, although in the spring and early summer, 70% humidity is ideal for a good Damask rose harvest.



45 tons of concrete, absolute, and damask rose oil is required annually on a global scale.

produced in dense bundles in short groups: each flower weighs between 2.2 and 5.0 g.

Nutrient management

The damask rose is a labour-intensive crop that needs a lot of nutrients. After pruning, FYM @15 to 20 tons/ha is applied and thoroughly mixed with the soil. It has been discovered that applying 120 kilograms of Nitrogen, 60 kilograms of Potassium and 60 kilogram of Phosphorus per ha y⁻¹ will increase Damask rose flower yield. The nitrogen is applied in two equal dosages. Half of the nitrogen is applied during pruning and the other half is applied 15 days later.

Recommended Varieties

- Noorjahan: Central Institute of Medicinal and Aromatic Plants (CIMAP) has developed the superior Damask rose variety known as “Noorjahan,” which can be grown in Uttar Pradesh and the neighbouring states of subtropical climates. The oil has a subtropical oil content of 0.025–0.030% and a temperate oil content of 0.035–0.040%. The oil of Noorjahan variety has almost 30% geraniol, 24% citronellol, 12% nerol and 1.3% rose oxide.
- Ranisahiba: This half-sib selection rose variety yields up to 40 q/ha of flowers in three months, which makes it perfect for rose water production. According to the report, the oil contains 35% geraniol, 7% geranyl acetate, 5% citronellol and 10% trans-rose oxide.
- Jwala: It can be grown in northern plains of subtropical, low hills, and mild temperate climates at elevations up to 1200 meters. It is resistant to hail, rain, and strong wind, and it blooms in March and April and again in the month of September. Flowers of the Jwala plant are

Plasticulture

For Sustainable Soil and Water Management

In a world increasingly burdened by population growth, climate change, and resource depletion, the agriculture sector faces the daunting task of producing enough food sustainably.

Sustainable soil and water management emerges as a cornerstone for addressing these challenges, ensuring food security while preserving natural resources. The advent of technologies has revolutionized high-tech agriculture combining traditional practices with modern technology. The world is moving towards third modern farming revolution in the form of Precision Farming.

According to a 2021 report by Markets and Markets, the global precision farming market is projected to grow from \$7.0 billion in 2020 to \$12.9 billion by 2025, at a CAGR of 12.2%. Plasticulture Technology play a significant role in precision farming and is gaining popularity among the farmers globally, revolutionizing the way modern agriculture is practiced

Plasticulture

Plasticulture combines the use of plastic in agriculture *i.e.*, synthetic polymers in agriculture particularly for soil and water management.

Plasticulture technique involves plastic



Mulch, which helps to retain soil moisture, control weeds, and regulate soil temperature, in Drip Irrigation systems, plastic pipes and emitters deliver water directly to the plant roots, and plastic-covered greenhouse structures provide

Integrating Sustainable SSWM with RS, GPS and GIS in Plasticulture can significantly enhance agricultural efficiency and sustainability.

controlled environments for crop production contributing to sustainable practices. India has increasingly adopted Plasticulture, and to promote plasticulture *i.e.*, application of plastics in agriculture, the National Committee on Plasticulture Applications in Horticulture was started in 2001. This subsequently was renamed to National Committee on Precision Agriculture & Horticulture.

Agri Plastics

In Plasticulture, “Agri Plastic” products are made of polymers such as Low-Density Polyethylene (LPDE), Linear Low-Density Polyethylene (LLDPE), Polypropylene (PP) and Polyvinyl Chloride (PVC).

Agri-plastics play a crucial role in enhancing agricultural productivity by effectively managing important factors for crops and livestock, including temperature, light, humidity, irrigation, weed and pest control, and crop and fodder protection. This also leads to a reduction in the

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The following are the main areas where Plasticulture technology is used:

Water management:

- Theliningofcanals, ponds & reservoirs with plastics film
- Drip & Sprinkler Irrigation
- Polyvinyl chloride & High-densitypolyethylene pipes are used for water conveyance
- Subsurface Drainage

Post-harvest Management:

- Packaging products, plastic crates, bins, boxes, andmany others.
- Atmospheric Packaging (MAP)

Controlled environment agriculture:

- Green houses
- Shadenet houses
- Low tunnels
- Plant Protection nets

Nursery Management:

- Nursery bags, Pro-trays, Plastic plugs, Coco-pits, Hanging baskets, Trays, etc
- Surface cover cultivation
- Soil Solarisation
- Plastics Mulching

consumption of resources such as water and chemicals.

Combining Plasticulture and Technology

Plasticulture when combined with advanced technologies such as remote sensing, GPS, and GIS, offers a powerful approach to sustainable soil and water management. The integration of advanced technologies such as Remote Sensing and Geographic Information Systems (GIS) offers unprecedented opportunities for high-tech agriculture.

Remote Sensing (RS): In the context of plasticulture, remote sensing can monitor crop health, soil moisture levels, and the effectiveness of plastic covers. By analyzing spectral data, farmers can detect stress in crops early and make informed decisions regarding irrigation and nutrient management. Valuable insights into soil health, crop conditions, and water resources are provided by this technology.

GPS (Global Positioning System): By using GPS, farmers can apply plastic materials with accuracy, optimizing their use and minimizing waste. This technology also facilitates the monitoring of land use and changes in agricultural practices over time, enabling better resource management.

GIS (Geographic Information Systems): In plasticulture, GIS can be used to create detailed maps of soil types, moisture levels, and crop conditions. This

According to the FAO, some 12.5 million tonnes of plastic products was used in the agricultural value chain in 2019.

information helps farmers make strategic decisions regarding irrigation practices, crop rotation, and the application of plastic materials, ensuring that they are used efficiently and sustainably. It integrates various data types to create detailed maps and models, aiding in decision-making processes.

By integrating plasticulture with Remote Sensing, Global Positioning System (GPS) and GIS, farmers around the world have optimized water use and soil management.

BENEFITS

With the help of using Plasticulture for agriculture many notable improvements have been evidenced such as

Parameters	Percentage
Improvement in Production	50% - 60%
Saving of Water usage	60%-70%
Saving of Fertilizers	30%-40%
Savings on Labor	7%-18%
Early fruiting, Excellent quality of seedlings & Enhances quality of produce	10-25 days

Plasticulture in Sustainable Agriculture

To harness the full potential of Plasticulture in conjunction with remote sensing, GPS, and GIS, farmers around the world have been using this technology to support sustainable agriculture practices. Sustainable Agriculture Practices aims to address the issue of water scarcity and dwindling groundwater reserves. It involves working with and engaging farmers and implementing sustainable agriculture approach like Sustainable Soil and Water Management (SSWM) at the farm level.

Integrating Sustainable SSWM with RS, GPS and GIS in Plasticulture can significantly enhance agricultural efficiency and sustainability. This combination allows for data-driven decision-making, optimized resource use, and better environmental stewardship. Despite the evident benefits, several challenges limit the adoption of sustainable practices and advanced technologies in Indian agriculture:

- Lack of Awareness: Many farmers are unaware of the benefits and subsidies of SSWM, RS, and GIS technologies.
- High Initial Costs: The upfront investment for advanced technologies can be prohibitive, especially for smallholder farmers.
- Infrastructure Deficiencies: Limited access to internet and technology hampers the implementation of precision agriculture practices.
- Data Management Issues: The effective use of RS and GIS requires accurate data, which may not always be available.

While Plasticulture has been en-

dorsed as a way for farmers to efficiently grow crops along with managing water resources and cost saving on fertilizers and pesticides, it has also been called into question, as the agricultural practices generate huge quantities of after use plastic materials which constitute a waste that will need an appropriate collection and disposal.

Disposal of Plastic Waste

Farm plastic, if not stored and disposed of properly, can quickly contaminate the environment, seeping into rivers and posing a risk to soil health, which ultimately endangers livestock. The majority of current mechanisms, policies, and laws concerning plastic do not specifically deal with agricultural plastics, as they mainly concentrate on other types of plastics. These policies, are limited to address specific aspects of agricultural plastic lifecycle, complexity, and broadness of applications, as well as difficulties associated with high contamination, low volumes, decentralized collection schemes, etc.

To address these challenges, a multi-faceted and Innovative approach is needed:

Awareness Programs

Government and NGOs should conduct workshops and training sessions to educate farmers about sustainable practices and technologies.

- **Subsidies and Financial Support:** Providing financial incentives for adopting modern technologies can encourage farmers to invest in RS and GIS systems.
- **Strengthening Infrastructure:** Improving internet connectivity in rural areas will facilitate better access to technology.
- **Collaboration with Research Institutions:** Engaging with agricultural research organizations can help in developing localized solutions based on data collected through RS and GIS
- **IoT Integration:** Combining Internet of Things (IoT) devices with RS and GIS for real-time monitoring and decision-making.



- **Blockchain Technology:** Using blockchain for transparent and secure transactions in the agricultural supply chain.
- **Artificial Intelligence (AI):** Leveraging AI for predictive analytics and precision farming.
- **Database:** The dedicated geo-referenced database, created for the present study in a GIS, permits to define the generation areas of plastic waste all over the territory and to identify the critical points of generation of APW.

Policy Recommendations

- **Incentivize Innovation:** Encouraging research and development in sustainable agricultural technologies.
- **Strengthen Extension Services:** Enhancing the capacity of extension services to disseminate knowledge and support farmers.
- **Promote Sustainable Practices:** In India, the Ministry of Environment, Forest and Climate Change, in 2016 introduced amendments to the Plastic Waste Management Rules, 2016, through the Plastic Waste Management (Amendment) Rules, 2024. The Plastic Waste Management Rules, 2016, along with the amendments in 2024, represent a comprehensive approach to tackling plastic pollution in India.

By integrating agricultural plastic waste management into these broader ini-

tiatives, there is an opportunity to address the unique challenges posed by plastic use in agriculture. A first approach could be, for example, the gradual adoption of measures enabling the agricultural sector to comply with the International Voluntary Guidelines and Standards defined by the FAO and the WHO. Collaborative efforts can drive innovation, awareness, and systemic change, ultimately leading to more sustainable agricultural practices and a reduction in plastic waste.

Way Forward

Sustainable Soil and Water Management, bolstered by Remote Sensing and GIS technologies, holds immense potential to revolutionize agriculture both in India and globally. The development of a resilient and thriving agricultural sector can be achieved while also conserving natural resources. As we navigate the complexities of modern agriculture, embracing innovative practices and technologies will be vital in overcoming challenges. The cooperation of government, financial institutions, and the farming community has the potential to create a more sustainable, robust and resilient agriculture ecology. The path toward sustainable agriculture must be rooted in a deep understanding of local contexts, continuous learning, and the willingness to adapt to changing circumstances. By harnessing the power of technology and fostering a culture of sustainability, we can ensure that agriculture thrives for generations to come.

MARKETING APPROACHES UNLEASHING THE POTENTIAL IN RURAL INDIA

The Indian commerce or business pattern is broadly categorised into rural and urban markets. Now, the rural markets have emerged as significant part of worldwide market, they can't be ignored. The negative effect of all the financial crisis in urban India has been counterbalanced by empowering execution in rural India.

The prospect of rural markets is said to be similar to a 'woken up sleeping giant'. Of late, country markets have gained centrality in India, as the development of the economy has come about into significant increase in the buying capacity of rural people. Due to different revolutions introduced from time to time, now the rural areas are utilizing modern and urban manufactured items. In this viewpoint, a different marketing strategy has been developed which is called Rural Marketing. Quite a few times, the rural marketing is compared with agricultural marketing. But Agricultural marketing is trade of products produced in rural area to mostly urban customers whereas rural marketing is selling of products and services to rural customers.

4 A's of Rural Marketing

While entering the rural market, businesses have to follow their marketing strategies as per the 4 A's of rural marketing to fulfil the exact needs



A rural marketing strategy entails the methodical arrangement of adequate consumer products and agricultural supplies to be supplied to villages at an affordable price, thus meeting the needs of rural consumers.

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of the rural customers. They are:

1. Affordability: Rural marketing drives must reach rural consumers by understanding and fulfilling their required needs. The products or services that are marketed should be in the purchasing capacity of the rural customers.

2. Availability: Maintaining consistent access to products in remote regions is a crucial element of rural marketing. Making the retailers to have enough stock of products resolves this issue more than 90%.

3. Acceptability: There should be acknowledgement for your product or service among rural customers. Your marketing plan should ensure that your product or service will be beneficial to their lives and pleases them that you would fulfil their required needs.

4. Awareness: While aiming a rural consumer with rural marketing strategies, brands should understand that their message should connect with the customers' mindset. For optimizing awareness, brands can publicize the commercials on media like TV or Radio and Outdoor. Product packaging, colours, taglines, slogans etc play an indispensable role in awareness programs.

Rural Market – Pool of Openings

Due to green revolution, the rural sectors are utilizing a huge amount of industrial and urban produced items. Urban markets have come to a saturation level and in addition to that the urban customers are not satisfied easily. Hence enterprises have to find new openings forever to draw their attention.

The statistic exemplifies the estimated number of rural households throughout India from 2018 to 2022, based on revenue generation. By the year 2022, it was anticipated that approximately 131 million households would report an annual income ranging from five to ten thousand U.S. dollars, a rise from 92 million households in 2019.

Recent Rural Marketing Strategies

A rural marketing strategy entails the methodical arrangement of adequate



The marketers need to develop correlation with the rural consumers and then they should provide products according to their wishes and demands

consumer products and agricultural supplies to be supplied to villages at an affordable price, thus meeting the needs of rural consumers.

Product Strategies

Product Launch: According to the crop cycle the rural consumers earn a huge amount two times a year i.e., rabi & Kariff. Therefore, it is essential for marketers to introduce their products during these seasons.

New Product Design: The company must design a strong model of the product while marketing it for rural consumers, and it must draw the attention of rural consumers.

Brand Name: Brands are identified by the straightforwardness of their names, the design of their logos, the flavour of their products, and their colour schemes.

Small Unit Low Price Packaging: Considering the daily wagers who have less offhand income; the products are packed in small quantities with a nominal price to meet the requirements of the rural consumers.

Pricing Strategies

Differential Pricing: The price of the

product should be slightly reduced to grab the attention of rural consumers.

Psychological Pricing: A product is priced at peculiar amounts like Rs 9, Rs 59, Rs 99, etc. which appears less than Rs 10, Rs 60 and Rs 100 respectively.

Create Value for Money: The rural consumers do care about the performance, sturdiness and life of the products rather than its design and attractiveness. i.e., the value it produces to the customer.

Pricing on Special Events: In village areas, festivals and occasions are greatly valued and celebrated. Therefore, companies should plan to give various offers and discounts during these occasions.

Simple Packing: Rural customers look for the usefulness of the product. So, it would be a ravage of money if the brand expends on stylish product packaging. Hence simple packaging is good enough.

Retail Strategies: In rural areas, retailers serve as the primary channel for sales within villages. The companies should come forward with cash discounts, attractive rewards, gift vouchers, special schemes, offers and quantity discounts to increase the credibility in such retailers towards the brand name and boost product sales.

Bundle Pricing: A bundle is a mix of different products in a single pack obtainable to the consumer for a rational price. Marketers need to strategize the pricing of a product bundle to create an appealing offer for rural consumers.

Distribution Strategies

Local Markets: In rural areas, local markets are found in the form of fairs, farmers' market, Sunday market and feeder market.

Company Depots: The company would own warehouses and depots in some main rural areas to make the goods readily available to the local consumers and nearby cities.

Public Distribution System: The government runs fair price shops in the rural places to sell durable products which are required for daily usage at subsidized prices.

Retailers: A rural consumer acquires a product through a retail shop located in the village. Hence, companies must plan their product supply through retailers.

Redistribution Suppliers and Clearing Mediators: The redistribution suppliers and the clearing agents play the mediators role between the companies and rural consumers.

Delivery Vans: The organization is required to operate its vans for the purpose of transporting goods to remote regions that lack adequate transportation infrastructure in rural markets.

4. Promotion Strategies

Mass Media: The villagers get entertainment and information mainly from TV, radio, press and cinema. The companies publicize their products through these popular mass media.

Personalized Media: Hiring a salesperson for doing door to door sales and collecting information from people by asking queries related to the product and the brand.

Local Media: Local media like Audio Visual Van, fares, folk programmes, etc. demonstrating advertisements, video clips, short movies, billboards and images at these places are also useful promotional activity.

Hiring Models and Actors for Promotion: Rural people are fascinated by the movie and television actors and models, and consider them as their role models. Hence, the marketers slot in popular faces in their TV commercials to endorse the brand.

Advertise Through Paintings: The rural consumers are inclined towards the bright colours and the pictorial representation of the products; hence, wall paintings in prime areas is a fair idea in the rural markets.

Other Marketing Strategies to Conquer Rural Markets

- Customization of Products
- A promotional campaign centered around traditions and values is an-



other viable option for targeting a festival.

- People belonging to the village background having the willingness to work in rural areas must be selected and trained.
- To gain a deeper understanding of the rural market, the company ought to engage the services of a rural marketing expert agency that possesses extensive knowledge and experience in the field, as well as proficiency in the regional language.
- The company must schedule the marketing cycle of products by the planting, rising and yielding times of the harvests.
- By using digital marketing technology, in villages marketers can publicise by mobile/ WhatsApp messaging, internet ads, applications and interactive voice response to promote their products.
- With a long-term vision only, the companies can invest in rural marketing and should wait patiently till the required goal is achieved.
- Spreading the goodwill through mouth publicity by the local people is the best way to build up the brand image and loyalty in a rural market.

Way forward

- The Indian government ought to take the lead in establishing modern infrastructure facilities in rural regions.
- Appropriate facilities of markets and warehouses will result in fair prices.
- Roadways in rural areas should be

linked with nearest railway stations, ports and airports.

- The power of general insurance should be given to cooperatives.
- The establishment of effective communication systems for rural markets is essential.
- As recommended by the National Commission on Agriculture, the government should not rely on private agencies to stock up food grains.
- There is a need for a greater number of go-downs, additional platforms for packaging cum information cell, banks and post offices for proper functioning in rural areas.
- Communication must be in their local languages and dialects.
- Companies should employ trained sales personnel.

The marketers need to develop correlation with the rural consumers and then they should provide products according to their wishes and demands. The economy has consistently been a crucial consideration for business entities when formulating the concept of rural marketing in India. The Indian rural market makes substantial profits as the population largely lives in villages. Hence companies must focus on the rural markets and adopt new innovative strategies in order to tap the untapped rural markets for their long run survival and to grow rapidly in the market. Despite numerous challenges, rural markets consistently present significant opportunities for companies to expand their growth.



SMALL SPACES BIG IMPACT

TERRACE GARDENS FOR CLIMATE RESILIENCE

India's 2024 Climate Report highlights an urgent crisis: the country endured extreme weather events on nearly every day in the first nine months of this year, claiming more than 3,000 lives and damaging over 3.2 million hectares of crops. These severe conditions affected nearly all Indian states and Union Territories, underscoring the need for adaptable and immediate solutions. For urban communities—especially for those who work outdoors or live in temporary shelters—the risks of extreme temperatures are even more pronounced. Cities across India are facing increased strain as temperatures continue to rise, overwhelming infrastructure and public health resources. Though state governments are implementing night shelters, adjusting school timings, and running awareness campaigns, these measures alone are in-



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sufficient against the mounting climate challenges.

Urban areas are increasingly looking toward green solutions like terrace and balcony gardens, which can play a crucial role in adapting to climate extremes. Studies reveal that integrating greenery into cityscapes can naturally regulate temperatures and contribute to urban resilience. Around the world, cities are finding success with similar strategies; for example, Copenhagen in Denmark has transformed its environment by promoting green roofs and encouraging residents to maintain these spaces themselves. This approach not only cools urban spaces but also encourages community responsibility and engagement. India has a real opportunity to adopt similar practices with terrace and balcony gardens, which are versatile enough to be incorporated into various

types of housing and accessible across economic groups.

Green Cover on Roof

Terrace and balcony gardens offer significant benefits in the fight against climate extremes, especially during heat waves, which have become more intense in Indian cities. Vegetation on rooftops and balconies can reduce the surrounding temperature through natural shading and evapotranspiration, the cooling process of water evaporating from plants. Studies show that a green roof can lower surface temperatures by up to 20°C compared to traditional concrete, creating more comfortable conditions. This cooling effect not only improves air quality but also reduces energy consumption by cutting down the need for air conditioning, indirectly curbing greenhouse gas emissions. Urban balconies and terraces can easily host vegetables, herbs, and other plants, providing residents with fresh produce while also addressing the urban heat island effect. These spaces offer a chance to reconnect with nature, supporting better mental well-being and stress relief.

Beyond temperature control, terrace and balcony gardens provide insulation benefits during colder months, reducing indoor heating needs. Green walls and roofs act as a natural buffer, retaining warmth and helping to cut energy costs. Additionally, green roofs serve

Terrace and balcony gardens offer an opportunity to enhance ecological stability in urban centers, enriching daily city life and creating connections to the natural world.

as windbreaks, softening the impact of chilly winds. While often valued for their cooling properties, these green solutions offer year-round benefits, helping to stabilize indoor temperatures and making them a valuable strategy for climate adaptation in urban spaces.

Miniature Ecosystems

The environmental impact of the green spaces goes further by creating small ecosystems that attract birds, pollinators, and insects, which support biodiversity. Terrace and balcony gardens offer an opportunity to enhance ecological stability in urban centers, enriching daily city life and creating connections to the natural world. These gardens often become gathering points for neighbours to share gardening knowledge, exchange seeds, and collaborate, nurturing a shared sense of purpose and building community bonds around sustainability.

Fighting Climate Change

India's cities could become leaders in adopting green spaces as a central strategy for climate adaptation. Supportive policies and incentives would help drive the adoption of green roofs and balcony gardens. Updating building codes to encourage green rooftops in new construction and offering subsidies or tax breaks to households retrofitting their terraces with plants would make these green spaces more common across urban areas. With the right backing, terrace and balcony gardens could quickly become a familiar sight in Indian cities, creating a low-cost, high-impact response to the immediate challenges of climate change.

Green roofs, terraces, and balcony gardens offer more than just aesthetic value; they are essential for strengthening cities against climate challenges. Expanding these practices can transform Indian cities into cooler, healthier spaces that soften the impacts of rising temperatures and unpredictable weather. With climate change posing serious threats, India's cities have an opportunity to adopt green spaces on rooftops and balconies as a straightforward, effective approach. By integrating greenery into urban planning, we can create cities that withstand climate extremes while supporting a sustainable and healthier environment.



NANO UREA: TRANSFORMING AGRICULTURAL EFFICIENCY FOR A SUSTAINABLE FUTURE

As the global population surges and agricultural demands intensify, the quest for more efficient and sustainable farming practices has never been more critical. Traditional fertilizers, while essential for crop growth, often come with significant drawbacks, including inefficiencies in nutrient use and environmental concerns. Conventional urea fertilizers can lead to substantial nitrogen losses through volatilization, leaching, and runoff, contributing to soil degradation and water pollution. Addressing these issues is crucial for both enhancing agricultural productivity and protecting environmental health.

Enter nano urea—a groundbreaking innovation that promises to redefine fertilizer application practices through advanced nanotechnology. Nano urea represents a novel approach where urea molecules are engineered at the nanometer scale and encapsulated in a specialized coating. This design allows for a controlled and sustained release of nitrogen, which significantly improves nutrient uptake by crops. By minimizing the common losses associated with traditional urea fertilizers, nano urea enhances the efficiency of nutrient use, leading to more effective crop growth with reduced fertilizer inputs. Moreover, the benefits of nano urea extend beyond mere efficiency. Its controlled-release mechanism helps mitigate environmental impacts by reducing the risk of nutrient runoff and volatilization. This not only diminishes water pollution and soil acidification but also aligns with global efforts to reduce greenhouse gas emissions associated with agricultural practices.

In addition to its environmental advantages, nano urea offers economic benefits to farmers. With increased nutri-

1 Bottle Nano Urea → 1 Bag of Traditional Urea

ent use efficiency, farmers can achieve higher crop yields with less fertilizer, resulting in cost savings and improved profitability. The reduction in the amount of fertilizer application also benefits labour and time savings, further enhancing the effectiveness of this innovative technology.

Nano Urea

IFFCO's Nano Urea(liquid) is world's first nano fertilizer which has been notified by Fertilizer Control Order (FCO, 1985) Government of India. At the Nano Biotechnology Research Centre in Kalol, Gujarat, Sir Ramesh Raliya and his team have pioneered the development of Nano Urea (liquid). Since May 2021, the progress of nano urea has captured significant attention, and its commercial



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IFFCO Nano urea (liquid)

production began in June 2021. IFFCO markets this product at Rs. 240 per 500 ml bottle. Each bottle of nano urea contains the equivalent amount of nitrogen nutrients as found in a conventional urea bag, but with the advantage of concentrated nano-sized particles, providing 40,000 mg/l (ppm) of nitrogen.

Nano urea is composed of: 0.01 to 5 weight percent quinhydrone, 0.01 to 10 weight percent calcium cyanamide, and 85 to 99.98 weight percent urea. It may also include additional micronutrients, though these do not provide nitrogen. The nanoparticles in nano urea typically measure between 20 and 50 nanometres in size, with the nitrogen nanoparticles constituting 4% of the total weight.

Although IFFCO suggests that 500 ml of nano urea is adequate for one acre of crops, the precise amount needed can vary based on the crop variety and its specific nitrogen requirements. For application, nano urea is used as a liquid solution and should be sprayed onto the leaves of the crops. Prior to use, the bottle should be shaken well to ensure proper mixing. During active growth

stages, apply the solution at a rate of 2 to 4 ml per litre of water. This method of application is designed to maximize the absorption of nutrients by the plants, ensuring efficient use of the fertilizer and potentially improving crop yields. The introduction of nano urea represents a significant advancement in agricultural technology, offering a more targeted and efficient approach to nutrient management.

Traditional Urea vs. Nano Urea

Traditional urea fertilizers are typically applied to the soil through methods such as broadcasting, incorporation, or fertigation. Broadcasting involves spreading urea granules evenly across the soil surface, which then requires mixing into the soil through tillage to reduce nitrogen loss from volatilization and runoff. Alternatively, urea can be incorporated directly into the soil using ploughing or harrowing, which integrates the fertilizer into the root zone and improves nutrient availability. In fertigation, urea is dissolved in water and applied through irrigation systems, allowing for uniform distribution of nitrogen throughout the soil. Despite these methods being effective, they often encounter challenges such as nitrogen volatilization, where nitrogen escapes into the atmosphere, and leaching, where it is washed away into water bodies.

In contrast, nano urea represents a significant advancement in fertilizer application technology with its distinct

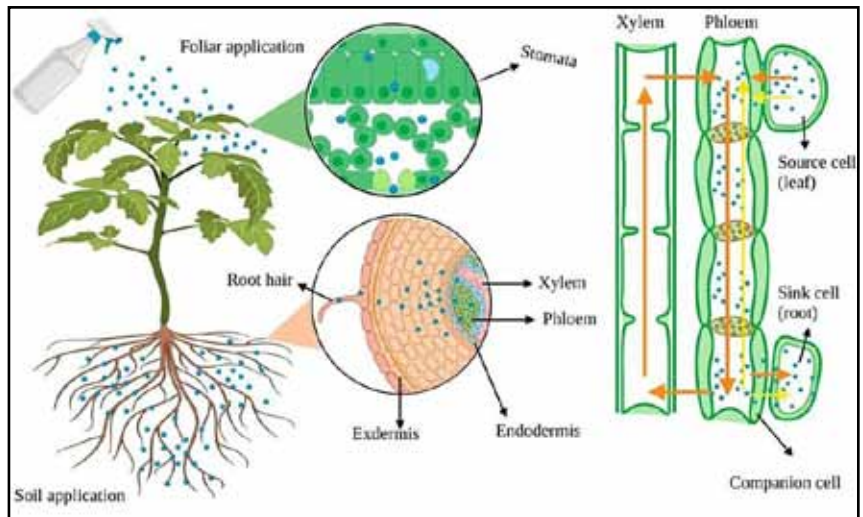


Fig. 4 Mode of Action of Nano Urea

application methods. Nano urea is usually applied as a liquid solution directly onto plant leaves. The tiny nanoparticles in nano urea penetrate the leaf

cuticle more efficiently than traditional granules, allowing for superior nitrogen absorption. Additionally, nano urea features a controlled-release formulation, which provides a steady and sustained release of nitrogen, thereby reducing the frequency of applications and ensuring prolonged nutrient availability. This controlled-release mechanism also minimizes the common issues of nutrient volatilization and runoff associated with traditional fertilizers. Furthermore, nano urea can be used in fertigation systems, enhancing efficiency due to its smaller particle size, which facilitates better distribution and absorption. Overall, nano urea offers a more effective and environmentally friendly approach to fertilization, ensuring that plants receive

Overall, nano urea offers a more effective and environmentally friendly approach to fertilization, ensuring that plants receive the necessary nutrients while mitigating environmental impacts.



Fig.2 Traditional urea spray



Fig.3 Nano Urea (Liquid Spray)



the necessary nutrients while mitigating environmental impacts.

Potential Benefits of Nano Urea

Nano urea offers a more effective, environmentally friendly, and cost-efficient approach to fertilizer application, supporting better crop growth and sustainability in agriculture:

- **Increased Efficiency:** Nano urea delivers nutrients more effectively because its tiny particles are better absorbed by plants. This means plants get more of the essential nitrogen they need to grow, leading to healthier plants and higher crop yields.
- **Lower Fertilizer Usage:** With nano urea, you use less fertilizer to get the same or even better results compared to traditional urea. This reduction in fertilizer use can lead to cost savings for farmers.
- **Reduced Nutrient Loss:** Traditional fertilizers often lose nitrogen to the air or water, which can be wasteful and environmentally harmful. Nano urea releases nutrients slowly and steadily, which minimizes these losses and ensures that more of the nitrogen is used by the plants.
- **Environmental Benefits:** By reducing nitrogen runoff and volatilization, nano urea helps protect water sources from pollution and decreases

IFFCO's Nano Urea(liquid) is world's first nano fertilizer which has been notified by Fertilizer Control Order (FCO, 1985) Government of India.

the risk of environmental issues like algal blooms. This makes it an eco-friendly option.

- **Improved Soil Health:** Nano urea's efficient nutrient delivery means less frequent application is needed. This can help maintain soil health and reduce the potential for soil degradation that can come from over-fertilization.
- **Enhanced Crop Quality:** With more consistent nutrient supply, plants grow more uniformly and produce better-quality crops. This can lead to better yields and more nutritious produce.
- **Versatile Application:** Nano urea can be applied in several ways, including spraying on plant leaves or mixing with irrigation water. This flexibility makes it suitable for various types of crops and farming systems.
- **Faster Plant Response:** The effi-

cient absorption of nano urea means plants can quickly take up the nutrients, leading to faster growth and quicker improvements in plant health.

- **Cost Savings:** Although nano urea might have a higher initial cost, its efficiency means less overall fertilizer is needed, which can result in long-term savings for farmers.

Advancing Sustainable Agriculture

Nano urea represents a significant step towards more sustainable agricultural practices. As the global demand for food grows, the need for efficient and environmentally friendly solutions becomes increasingly important. Nano urea's ability to optimize nutrient use while reducing environmental impact makes it a valuable tool in the pursuit of sustainable agriculture.

Nano urea is more than just a new type of fertilizer; it represents a transformative shift in how we approach nutrient management in agriculture. With its ability to enhance efficiency, reduce environmental impact, and offer economic benefits, nano urea stands at the forefront of a more sustainable agricultural future. As the technology matures and becomes more widely available, it has the potential to play a crucial role in addressing the challenges of modern farming and ensuring a more sustainable and secure food supply for the world.



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