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कृषि एवं किसान कल्याण मंत्रालय MINISTRY OF AGRICULTURE AND FARMERS WELFARE









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March 2023 AGRICULTURE TODAY

### AAF AND OTHER MAJOR BUDGET INITIATIVES HOLD PROMISE

Budgets hint at policy direction. This year's Union Budget has given clear indications as to which way the agriculture sector will be directed.

Prominent allocation to the allied sectors of agriculture, fisheries and dairying, is reassuring and shows a marked shift in the Centre's approach. The support given to technology in the budget is also hard to miss.

GOI has set up a digital public infrastructure for agriculture to enable inclusive farmer-centric solutions through relevant information services for crop planning and health, improved access to farm inputs, credit and insurance, help for crop estimation, market intelligence and support for the growth of agri-tech industry and start-ups. This signals GOI's resolve to bring transparency and improve access in providing crucial services to farmers. Agri tech start ups have created a revolution; the FM has acknowledged this through the Agriculture Accelerator Fund.

Allocation of Rs 2,500 crore to village-level cooperative credit societies is a significant step in strengthening the crumbling and decrepit societies whose transparency and efficiency has been often questioned. Strengthening them shall ensure financial inclusion and credit discipline among small and marginal farmers.

GOI has been visibly supporting natural farming; this budget follows suit. Over the next three years, GOI intends to facilitate 1 crore farmers to adopt natural farming. To promote all farmers to use bio inputs, provision of 10,000 Bio-Input Resource Centres has been made for creating a national-level micro-fertilizer and pesticide manufacturing and distribution network.

Soil regeneration has become a point of concurrence for stakeholders in the farming sector. In this issue we have curated articles that dwell on this topic. Also, we have been fortunate enough to have articles from the doyens of the agri credit sector, whose perspectives will be crucial in shaping the way forward. I hope the issue that meticulously combines the voices of the agri sector in these critical segments will interest the readers.

Happy Reading!

none





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### FROM THE EXECUTIVE EDITOR'S DESK

### Why we need better understanding of weeds

e usually think of weeds as valueless plants growing wild – an undesirable or troublesome growth on a field. A better understanding of nature and of cultivation practices is changing these notions.

I agree that weed removal is a major concern for farmers. But some highly successful farmers argue that labeling all weeds as bad is a faulty understanding of nature.

Some agricultural scientists used to earlier dismiss bathua as weed. Due to such faulty understanding of the agri ecosystem, tonnes of nutritional food had been wasted, which could have contributed to combating malnutrition.

With better realization of bathua's highly nutritious properties, it is now being advocated that bathua can be grown as a crop on its own. Over the last decade, researchers have developed four varieties of bathua that ensure high yield and nutritional benefits.

Many progressive farmers with decades of experience argue that one of the biggest mistakes in modern agriculture science is the propagation of monoculture. They hold that the basics of agriculture science are shaken and distorted by monoculture, which is ensured through the use of weedicides and herbicides. Certainly, monoculture is not a norm in our ecosystem. Keeping the balance between fertility and natural vegetation is extremely important.

A few months ago, a video went viral in agriculture circles. It was part of a lecture delivered by a faculty member of IIM Ahmedabad to a group of progres-

sive farmers. The lady said that she and her team were invited by a group of affluent paddy farmers, who wanted to ensure better global marketing for their produce. She found that a weed in the rice fields, which was discarded by affluent farmers as trash, was eaten daily by the labour working on the farm. The weed evidently gave the labour enough strength for the tough farming tasks. Research on the weed proved it to be a superfood. Later, breakfast cereals, biscuits and other ready-to-eat products made from the weed found a huge market globally.

Perhaps we need intensive research into the so-called weeds. Successful farmers across the country emphasise that we must stop defying Mother Nature and try to follow and appreciate it, in terms of identifying and studying the value of weeds. The total game is about balance, maintaining the equilibrium of Nature, and understanding its values.





## REGENERATIVE AGRICULTURE WIN-WIN APPROACH TO TRANSFORM AGRI-FOOD SYSTEMS

egenerative Agriculture (RA) has increasingly been advocated by the civil society, agribusinesses, farmers, NGOs, researchers, and policy planners as alternative to conventional input intensive and exploitative farming. Also, UN Food Systems Summit held in 2021 has emphasised the importance of Regenerative Agriculture for our future sustainability globally. For this, every actor seemed to have own context and there are schools of thoughts defining RA differently.

The key concepts around RA include, Natural Farming (NF), Conservation Agriculture (CA), Permaculture, Zero-Budget Natural Farming (ZBNF), Conservation Agriculture for Sustainable Intensification (CASI), Organic Farming (OF), Carbon Farming (CF) etc., which often limits the uptake of elements of sustainable farming practices. Regenerative Agriculture, therefore, is a set of farming principles which leads to farm and food systems that work in harmony with nature to improve quality of life for everyone involved.

### Multi-Pronged Approach Needed

• One Size Doesn't Fit All: There is no silver bullet for any problem to be addressed. A common set of farming principles for RA can be identified, but the large diversity of farms, farming systems, farmer circumstances and takeoff points across the diversity needs a tailored approach for development and implementation of RA practices.

 Prioritizing and targeting farming systems to deploy RA: Mapping crop types, Post-harvest value addition in millets is vital. We need startups to tap into this opportunity and promote a localized but diversified consumption of millets across India

cropping systems and resources is entry points for targeting deployment of RA systems. Significant advancements have been made in geo-spatial technologies which can help in spatial and temporal mapping of crop types, cropping systems and resource endowments. This will also



Dr ML Jat

### About the **AUTHORS**

Dr RS Paroda is Chairman, Trust for Advancement of Agricultural Sciences (TAAS) & former Secretary Department of Agriculture Research & Education & Director General, ICAR, Dr ML Jat is Director, Global Research Program, Resilient Farm and Food Systems (RFFS), ICRISAT, Hyderabad help in defining RA input-value chains, market linkages and knowledge hubs for scaling RA.

• Targeted bundled system solutions: RA is a holistic concept integrating genetic, ecological and socio-economic aspects. It is therefore essential to develop science evidence-based, context and cropping/farming systems-specific (including agroforestry, horticulture and livestock) adapted bundled RA practices with well-defined recommendation domains, rather than component and commodity centric practices.

• Regenerative Agriculture needs phased build-on approach: RA is a relatively new focus and long-way to go. Neither we have full packages of RA ready, nor those can be developed over-night. But that doesn't mean we should wait for long. A phased build-on approach would therefore help to immediately integrate the well tested elements/ practices of RA to build the confidence of stakeholders specially farmers.

• Power RA with digital tools and techniques: RA is a relatively knowledge intensive concept. There has been significant advancement and a greater focus on digital tools and techniques in agriculture. Therefore, application of digital tools and techniques for RA can help in bridging the knowledge gaps and boost its uptake.

 Strengthen research and policy on ecosystem services: The potential for farmers to directly benefit from soil C sequestration may be limited but lifecycle analysis and valuation of ecosystem services can provide larger carbon offsets to incentivise farmers through carbon credits and ecosystem services. There is a larger potential to generate carbon credits and ecosystem services through RA. But this needs development and use of new approaches, tools, protocols, verification systems and enabling policies for mainstreaming RA in the R&D plans to create pull-factors for accelerated adoption.

• Strengthening capacity on RA: Since RA is knowledge intensive concept and there is lack of capacity, a new



### Harness the power of soil bio-diversity

Soil-crop microbiome interactions governs the performance of management practices in terms of yield potential and sustainability of RA systems. Comprehensive basic and strategic research would, therefore, need to be initiated on ecological plant protection, rhizosphere microbiome effects of nutrient cycling, capture and release, plant uptake and produce quality. There is a large microbial diversity which will play significant role for the success of RA. Establishing 'Bio-Banks' would, therefore, be central to success of RA.

cadre of RA-Community of Practitioners (RA-CoP) need to be developed though inclusion of RA in course curriculum, development of inclusive training modules, hands-on training on bundled RA practices and certification courses on RA as structured and regular activity.

• Define business models and market opportunities: Comprehensive assessment of consumer perceptions & preferences, market size and entrepreneurship opportunities can help in identifying and defining the potential niche for RA and can boost adoption of RA. Well defined business models on output and input markets as well as carbon markets can potentially help in accelerated uptake of RA.

Policy support and Investments:





A comprehensive assessment on potential for RA is essential for targeting investment priorities. Enabling policy not only for RA production systems but also markets and value chains is a must.

Regenerative Agriculture can help in addressing the second-generation problems of Green Revolution in irrigated intensive systems as well as in drylands where natural resources are severely stressed. RA is a 'win-win' approach that helps in transforming agri-food systems while addressing the existing challenges in agriculture. We must move forward to achieve RA so critical for SDGs. This essentially needs a holistic approach towards discovery to delivery with much greater investments in agricultural research and innovation for development (ARI4D).

### REGENERATIVE VS ORGANIC AGRICULTURE DIFFERENT PRACTICES, COMMON GOAL OUTCOMES

he importance of regenerative agriculture was prominently emphasized in Intergovernmental Panel on Climate Change enlisting ecological functions in building resilience of agroecosystems as climate –smart regenerative agriculture.

On the other hand, no scientifically structured studies have been conducted on water –use-efficiency and water savings in relation to regenerative agriculture. Replacing water guzzling crops like rice, wheat, sugarcane with comparatively less water requiring crops like gram and chickpeas alone saved 5.5 billion litres of water.

Trials on regenerative agriculture (as a water stewardship plan) in states like Madhya Pradesh and Maharshtra have saved 15 billion litres of water, helping 110 billion urban and 270 billion rural people. These statistics reveal volumes about the magnified impact of regenerative agriculture reaching out to reduction in water foot prints of agriculture offering carbon trading in international market.

### Organic agriculture aims at zero use of agrochemicals

Regenerative agriculture is very often compared with organic agriculture. Both the

concepts have some difference with a common goal of outcomes on ecological balance and biological diversity, leading to emergence of another concept called regenerative organic agriculture.

Regenerative agriculture (about principles not practices as adaptive management approach supported by soil health principles) is based around observable improvements in ecological and social function of the farm and farming community, while organic agriculture( prescriptive standards for crop production) is more about a set of rules to follow with major emphasis on avoidance of agrochemicals.

Interestingly, the technique of cover cropping as a part of regenerative agriculture, the definition remains murky. and many other beneficial practices are in area a grey covering the legal definitions.

### About the **AUTHORS**

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Dr AK Srivastava is currently pursuing soil fertility and plant nutrition research at ICAR-IARI, Assam

### **FUTURE WISE**

certification and clear methods of measurements and monitoring.

On the other hand, organic farming may not have a specific definition, but certifications at least provide a clear understanding about the required practices to adopt.

### Role of organic manures and composts

While comparing regenerative agriculture with organic agriculture, we comprehensively overlook the harmful effects of organic pesticides, could be even more harmful than synthetic pesticides in organically produced fruits and vegetables for example as wide spread myth. Are natural pesticides safer than artificial pesticides?. The candid answer is. not necessarily. Comparing copper sulphate and pyrethrum with synthetic pesticides like chlorpyrifos or chlorothalonil, the former have more acute and chronic toxicity over latter group of pesticides.

Likewsie, Bt insecticides producing natural toxins, of late have shown some symptoms of toxicity to wetland crops. The other group represented by spinosad and abamectin, the organic pesticides at lower doses are reported triggering lysosomal defects, elevated accumulation reactive oxygen species, lipid dysregulation and neurodegeneration to non-target insects. These scientific outcomes put an alarm bell to researchers and policy makers to keep a regular guard on health of agroecosystem, the modus-operandi of which need to be developed and put to stringent practice.

### Use of microbial consortium being promoted

Role of organic manures and composts, biochars and terra preta, no till and pasture cropping, annual organic cropping, holistic management of grazing aquaculture, ecological perennial cropping, silvipasture and agroforestry , all aid in developing a sound success of regenerative agriculture. Of late, some novelties have emerged suiting to regenerative agriculture, comprising microbial consortium (developing synthetic

Unless, we adhere to such policy regulations, we will not be able to harness the real impact of regenerative agriculture as holistic approach and make further inroads through scientific funding and pan-India collaborative research networking



Dr SK Malhotra Yoga is my hobby to balance my life physically, mentally and spiritually

microbes using synonymous molecules secondary metabolites secreted of different microbes participating in bv both plant grwioth regulation as well as microbial bioagents) exploiting varied microbial niches of phytobiome to develop microbesmediated crop production system, rhizosphere hybridization for developing more biochemically active rhizosphere through elevated loading of active and novel microbes, on-farm organic module for organic farm waste recycling and exploiting the rhizosphere and endosphere microbial diversity, in addition to bioprospecting microbiome for soil health-plant health management addressing both soil fertility constraints



Collating researchers globally in fruit science is refreshing and energizing for Dr Srivastava and plant diseases as a value –chain – management of microbes. Development of crop-based soil health card addressing biological improvements in soil health in response to regenerative agriculture is another futuristic pivotal agenda.

### Important To Adhere To Policy Regulations

When no leaitimate definition of regenerative agriculture ( no doubt, it seeks to rehabilitate and enhance agroecosystem as a whole ) is offered, it is every likely that the punch of outcomes of such practices could be diluted over time, thereby goes to extinction or overtaken by some other concept, since many of terms like agro-ecological farming . alternate agriculture, alternate, sustainable agriculture, nature inclusive agriculture, green agriculture, biodynamic agriculture etc. are often used synonymously to challenge the outcomes of regenerative agriculture.

Unless, we adhere to such policy regulations, we will not be able to harness the real impact of regenerative agriculture as holistic approach and make further inroads through scientific funding and pan-India collaborative research networking. Sooner we do it , better it is for the future health of contemporary agriculture (expanding agriculture to newer land is almost bare minimum and arresting further land degradation with lowered carbon-and water foot-prints is a numerouno priority of policy makers) to feed our ever-growing population, soon surpassing the population of China.

Therefore, complete technical and scientific dos and don't with clear-cut policy paper on Regenerative Agriculture in Indian context is the call of the day.

## REGENRATIVE / ECO AGRICULTURE V

oving towards climate resilient food system is far too complex for any sort of commercial "silver bullet" to solve. Chemicals cannot be wished away overnight. Middle path of transformation is the way. India spends nearly Rs.2 Lac crores on fertilizer subsidy. The emergence of eco-friendly bio inputs including Bio Fertilizers, Bio Pesticides, Bio Composts, Bio Stimulants for transition to Regenerative/Eco Agriculture is a promising development, where input cost reduces and productivity increases in a sustainable manner.

There is an urgent need to scale up this. A 20:20 Model in this regard is increasingly being adopted by more and more farmers. This with Digital Technology can help reach large number of small farmers in the remotest areas.

### **Rain-Fed Areas And Regenerative Eco Agriculture**

Almost two thirds of our arable land is under rain-fed farming. Local and national authorities and commercial ventures are designed to supply 'one-size-fits-all' technologies, inputs. Rain-fed areas produce 90% of millets, 80% of oil seeds and pulses and 60% of cotton and support 40% of our population and 60% of livestock.

There is a big scope of taking low input, eco-friendly integrated farming and regenerative practice for these areas. Most of these areas practice integrated farming involving integrated farms with live stocks and mixed cropping systems. In the coastal areas small aqua agri units give sustainable practices. Utilizing crop residues for animal feed and scientific bio compost preparation are important components here.

### MIDDLE PATH FOR TRANSFORMATION - THE 20:20 MODEL

We cannot wish away chemicals overnight and there are many failed examples of such sudden switch overs. It is possible to have stepwise change over by including eco-friendly products that help reduce input costs on one hand and at the same time improve farm productivity sustainably. This is what the farmers want and have started accepting. Once this is demonstrated, in the next years, the bio inputs can be doubled and tripled and even total switch over.

The "20:20 Model" is about increasing farm production by 20% with lowering of 'input' costs by 20% in sus- tainable manner. It is based

on using new generation eco-friendly bio inputs like Bio-fertilizers. **Bio-Pesticides** (both microbial and botanicals ), Bio Composts from farm agro wastes, Bio Stimulants etc. In a way it is the 'Middle Path' of moving from chemicals to eco-friendly farming.

### About the **AUTHOR**

Padmashri Dr MH Mehta is the Chairman of the National Working Group, Indian Chamber of Food and Agriculture (ICFA), Chairman, The Science Ashram and Gujarat Life Sciences, and former Vice Chancellor of Gujarat Agricultural University (GAU). He is recognized for leadership to Asian and African countries for Eco Agri Revolution



Farmer perusing the appLead farmer with the app on his handsetGroup of farmers learning and accessing the app (From Solidaridad International Report 2020 – 21).

### **REACHING THE SMALL FARMERS**

Digitalization has the potential to bring transformation and reach the unreached and scaling up. An excellent example was development of the Solidaridad 20:20 App for Solidaridad International for the Soyabean and Mustard farmers in MP and Rajasthan States. Taking are from the fact that rural penetration of mobile phone and even smart phone have been rising and touching more than 90% rural population. An easily accessible App – Soli 20:20 App was developed. This has resulted in a huge benefit for even small farmers.

It is being used in the remotest areas for moving towards higher production with lower input cost in an eco-friendly sustainable way. It is now being taken up for other crops and projects for Sugarcane, Tea, Cotton etc. in different regions and even for several overseas countries. This will be a great success story of transformation to Regenerative/Eco Agriculture from conventional farming.

### **The Roadmap**

India is in an ideal condition to lead a sustainable Regenerative/Eco Agri Revolution. We will need to move in a well planned manner through a balanced approach.

- The common mission is to move from Green to Ever Green Eco Agriculture Revolution.
- Take up the middle path of transformation through a 20:20 like Model.

### **PRANAM – The Welcome Initiative**

In the Budget of 2023, Agriculture is looked through the prism of environment and sustainability. The announcement of PM – PRANAM (PM Program for Restoration, Awareness, Nourishment and Amelioration of Mother Earth) will incentivize States / UTs to promote alternative to chemical fertilizers i.e. Bio Fertilizers and also GOBARDHAN scheme of Waste to Wealth for circular economy. The aim to promote 10,000 bio input resource centre to help farmers adopt natural / eco agriculture is another remarkable step of moving towards regen / eco agriculture. Again the increased emphasize on Millets goes well with Eco Agri mission.



- Use of digital platform to reach the smallest farmers with such eco-agri model.
- Have a plan and fund for each



Dr Mehta is a keen sportsman especially fond of swimming and cycling, and is deeply interested in literature and music. He plays a rare instrument – the Kastha Tarang State for at least 20% eco-friendly bio-inputs (Bio Fertilizers, Biopesticides, Bio-Composts etc.) and supply to the farmers at subsidized / zero cost.

- Have Bio input (including Bio Composts) testing and promotion Labs in each State / region for uniform and performance bio inputs.
- Change over to Millets for improved nutrition, water use efficiency and low agri inputs.
- Integrated Farming Models such as Livestock, Agri-Horticulture, Agro Forestry as well as Aqua-Agro Units.
- Agro wastes and animal wastes conversion to high value Bio Composts as the Key input for Sustainable circular agriculture. Adaptation of multi-microbial spray to convert crop residue to in-situ bio composts for economical and environmental benefits.
- Encourage Bio input and Digital start-ups to make India a leader in global market.

### INDIAN AGRICULTURE CREDIT SYSTEM PHYGITAL SOLUTIONS, TECHNOVATIONS

he Indian agriculture sector revealed its innate strength and resilience during the pandemic. Even during those testing times, agriculture grew at a healthy rate of 3.3% at constant prices during 2020-21. This was when the economy recorded negative GDP growth of -6.6%. The growth has been boosted further by the growth in agricultural exports, and has improved farmer incomes. This was possible on account of effective government policies for boosting agriculture exports, which stood at USD 41.9 billion in 2020-21. The figure touched a historic high of USD 50.21 billion in 2021-22.

Increasing investments in agriculture

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are critical to achieving this growth. The investment rate in agriculture (ratio of gross capital formation in agriculture to GDP-Agri) stood at 12% in 2000-2001. The figure increased to 18% in 2011-12. For 2020-21, the figure stood at 15.9%. The norm in Indian agriculture has been that private sector investment constitutes almost 80% of the capital formation. Bank credit is the major driver, and the significance of bank credit to boost farm-level investments is well documented.

### Credit-Deprived Regions Need Attention

Agriculture credit has grown at a commendable rate in recent years. This has been possible due to the committed efforts of the various stakeholders. Equal focus is needed on better regional distribution of agriculture credit.

South India accounts for 18% of the Gross Cropped Area (GCA). And South India takes up almost 45% of the total agriculture credit disbursed in the country. Central, Eastern and Northeast regions account for 43% of the GCA. But these regions utilize only 22% of agriculture credit.

Cropping intensity is indicative of the potential demand for credit. This is significantly higher in Eastern and Central regions. During 2000-2001, the share of agriculture credit in the NE region stood at 0.2%. This currently stands at around 0.75%. NE region has immense potential for the development of horticulture. Investment in this sector can opens doors for higher farmer prosperity in NE. The skewed regional share of total agriculture credit can be attributed to diverse factors. Robust infrastructure and stable and order situation play a major part. These factors encourage banks to lend higher amounts. It has been observed that banks prefer areas with availability of irrigation and reliable rainfall patterns, since these protect farmers from risk to crops. Hence banks can expect higher repayment rates.

### **Oil Sector And Agriculture Credit**

Our edible oil exports stand at about 50% of our total domestic demand. The Oil Palm Mission of GOI aims to make India self-reliant in the sector by bringing more the area under cultivation. Additional land under oil palm production will increase the demand for credit for cultivation and processing. The value chain shall be supported through initiatives like ODOP (One District One Product). These will link production systems to markets and strengthen value chain financing. The individual based agriculture credit dispensation that we see currently is not an ideal template. Value chain financing shall enable efficient cash flow since risk shall be shared across the commodity value chain.

### **Digitization in Agri Credit System**

Value creation and expansion of credit are strengthened by the digitization of agriculture credit. It is important to link the production and marketing systems. e-NAM is the government's initiative to boost agricultural marketing and usher in transparency and efficiency in commodities.

Supportive initiatives like e-NAM ensure expansion of credit and lead to efficiency gains. At present, the production side enjoys the lion's share of the agriculture credit landscape. We need equal focus on marketing and post-harvest requirements, which are currently creditstarved (including the product landscape) from a farmer's perspective.

The gap can be filled through digitisation along with FPO-based financing. FPOs can drive the value chains. Banks



### **ROLE OF NBFCs**

NBFCs can play a critical role to help reach the last line. The intensive use of technology by NBFCs gives them the edge over traditional rural financial sector entities. The financial inclusion landscape is being transformed by digital lending. Fintech-based credit inclusion can be a highly potent instrument to cater to the credit needs of rural areas. From 2016 to 2020, the gross advances of NBFC grew at a CAGR of 15.7%. The advances of the NBFC sector to agriculture and allied activities grew by 12%. The share of agriculture and related activities in the total gross advances of the NBFC sector has stayed in the range of 2.38% (2017 and 2018) and 3.06% (2019).

and NBFC can provide the financial support which is critical for growth. The credit guarantee fund support for FPO financing is an important initiative. It can maximize the credit flow for FPOs.

The phygital space has emerged as a strong sector. Start-ups are delivering tailor-made digital products and providing customized solutions. This shall significantly increase efficiency gains in agriculture. Mass adoption of technology has been demonstrated by the success of UPI. It can be achieved through relevance and ease of use.

### **Thrust On Innovations**

We need more innovations in agri credit systems by institutions. Mass loan waivers and interest rate subventions for short-term credit disbursement are popular among the masses, but these restrict innovations. The reconfigured Direct Benefit Transfer (DBT) can be utilized to deliver subsidies to farmers. The restructuring or writing-off for loans should be seen as an ad hoc option.

Digital presence in the rural economy has seen an impressive growth over the last few years. This has been aided by an encouraging rise in digital DBT, UPI for payments, and expanding the digital payment system infrastructure. GOI can maximize the potential of these interventions. An effective range of digital products can be used to deepen and strengthen the last mile reach of the agriculture credit system. Technology is the major enabler to ensure improved and faster services, achieve greater expansion and also efficiency of credit delivery.

### AgriTech Startups collaborations, Agri Financing opportunities

ajor disruptions across the India's digital ecosystem i.e., affordability and availability of high-speed internet and increased digital literacy outreach have presented an exciting opportunity for innovation in agricultural ecosystem, wherein Agritech Start-ups are leveraging next generation technology such as data analytics, AI, ML, the IoT and Software as a Service (SaaS) to disrupt the Agri ecosystem. The Government's recent reforms have given further impetus to the fact that, full potential of agriculture in India can only



### About the **AUTHOR**

Mr Shantanu Pendsey is the head of Agri Business Unit and Govt. Sponsored Schemes (ABU & GSS), State Bank of India be achieved through widespread adoption of technology.

### Union Budget Gives Impetus To Agritech Start-ups

This year Union Budget, defined as the 'First Budget of Amrit Kaal' has showcased GOI's strong focus towards empowerment of farmers, women and economically weaker sections. With the objective to achieve Rs 20 lakh crores of Agriculture Credit and promote prosperity across the rural ecosystem, GOI has announced setting up of Agriculture Accelerator Fund to encourage Agriculture start-ups by young entrepreneurs in rural areas.

GOI has also announced set up of Digital Public infrastructure for Agriculture as an open source interoperable public good to augment access to credit, insurance, market intelligence and support for growth of Agri-tech industries and start-ups. This will give further fillip to the

AGRICULTURE TODAY March 2023

### **TOGETHER WE GROW**

Agritech Start-up ecosystem. With innovative and affordable solutions as well as modern technologies from the Agritech Start-ups, the productivity and profitability of the farmers will be enhanced.

### **Challenges For Agriculture**

The agribusiness ecosystem remains largely unorganized, fragmented, and unstructured. The small and marginal farmers have limited access to technology, inputs, credit, capital and market. There are several pain points exists across the Agri Value Chain, like limited technology access for farmers, inefficient supply chain, lack of quality testing leading to uneven quality, lack of access to credit and financial solutions, Volatility in input prices, etc.

### Agritech Start-ups: Redefining Agri Value Chain

By leveraging numerous technologies like Data Analytics & Machine Learning, Data platforms for pricing info, AI, Satellite Imagery, produce traceability, Robotics & Drones, etc., Agritech players are transforming the way agriculture is traditionally being done across all stages of the value chain from Farm to Fork viz.

Farm inputs, Farming, Cultivation & Harvesting, Distribution & Transportation, Postproduction processing and handling, Retailing/selling, etc. With the adoption of new and unique business models, these start-ups are addressing the pain points across the Agri Value Chain.

In market linkages, across farm inputs, they are merging technology with physical infrastructure to offer farm inputs at affordable price. Some of the agritechs are actively engaged in Biotechnology through research on plant/animal life sciences and genomics. Through Precision agriculture and farm management, they are helping farmer improve their yields by up to 30%.

These Agritechs are also providing farm equipments for rent on a pay-peruse basis to the farmers. These players are helping the farmers to enhance their productivity through farm mechanization and automation viz. using machinery,



There is an unprecedented opportunity for collaborations between agritech start-ups and traditional lenders such as Banks and NBFCs. The new entities can act as business correspondents for banks facilitating deeper financial inclusion and Agri credit access for the unbanked populace

tools and robots in seeding, material handling, harvesting, etc.

### **Better Farm Gate Infrastructure**

Agritech Start-ups are also investing in Farm Gate Infrastructure using technologies like Greenhouse Systems, Indoor/ Outdoor Farming, Drip Irrigation, Envi-



Mr Pendsey is fond of trekking, photography and tourism ronmental Control such as heating and ventilation. With quality management and traceability like Post-harvest produce handling, quality check & analysis, produce monitoring & traceability in storage and transportation, Agritechs are helping farmers to have better produce.

In supply chain tech and output market linkage, these players are eliminating wastage of farm produce, thus creating a win-win situation for both farmers as well as the consumers. Agritechs are also facilitating financial services in the form of micro-credit, farm loans for production, input & equipment procurement and crop insurances to farmers.

Many Agritechs are also involved in advisory services by way of online information platforms for agronomic, pricing, market info, etc. Agri fintech players also play a key role in imparting financial literacy for the marginalised. This is especially relevant for women in agriculture as they face unique challenges like limited control and ownership over assets such as land and their inability to offer hard collateral for loans.

### Factors Contributing To Growth Of Agritech Start-ups

Demand side factors like increasing consumer inclination towards healthier food, importance of reduced food wastage, environmental factors such as climate change and water shortage, continuous increase in tolerance of pests to crop protection measures, decrease in quality of soil due to unsustainable farming and labour shortage are helping drive the adoption of Agritech Start-ups in the country.

Additional factors like GOI support through policies, Increased Internet connectivity and penetration across remotest parts of the country, Improved Farm Mechanization & Automation and Collaborations with large technology players have further helped in growth of Agritech Start-ups in the country.

### Collaboration, Agri Financing Opportunities

With such a diverse ecosystem laid by the Agritech Start-ups and key initiatives being spearheaded by them, it has opened up an unprecedented opportunity for collaborations between them and traditional lenders such as Banks and NBFCs. These entities can act as business correspondents for banks facilitating deeper financial inclusion and Agri credit access for the unbanked populace.

An Agri-Value Chain comprises of a set of stakeholders and activities connected with managing inputs, production, infusing technology, post-harvest management, value addition by processing, marketing, financing, exports, mitigating risk, etc., from the place of their primary production to the end consumers.

Agritechs Can Be Gateway For Financial Institutions

These Agritechs through technology and outreach are disrupting each base/ node of the Agri-Value Chain. The stakeholders within the chain need finance for production, procurement, processing, storage and distribution. Input suppliers, Farmers, Traders, Small-scale processors, Wholesalers, Retailers, Exporters, etc. need credit to sustain their activities and support the Agri Value Chain.

Thus, Agritechs can be a gateway for financial institutions to improve their outreach to the stakeholders of the Agri Value Chain and offer multiple opportunities for the Banks to finance each stakeholder. The stakeholders have credible information base about the other stakeholders within a Agri Value Chain which enables the Banks to efficiently evaluate



Agri fintech start-ups play a key role in imparting financial literacy for the marginalised. This is especially relevant for women in agriculture as they face unique challenges like limited control and ownership over assets and their inability to offer hard collateral for loans

credit worthiness of the stakeholders on the chain; reduce transaction costs; identify risks; analyse competitiveness of the entire chain; and design financial products and services accordingly.

These collaborative models not only help increase the reach of Agri-credit but also make it extremely efficient in terms of interest rates. Such models hold the promise of leveraging key strengths of the participating entities. Banks offer their low-cost capital, while Agritechs bring in their tech-enabled expertise to reach, evaluate and service the credit needs of the unserved/underserved populace.

### SBI partnering with Agritech Start-ups

SBI is providing curated products to the Start-up ecosystem viz. Loans and Deposits, Transaction Banking, Investment products, Inward and Outward Remittances, Forex, Insurance, Cash Management Products, Payment Gateway integrations, Custodial services, Handling of regulatory filings, Fund raising, Card solutions, Credit solutions, Treasury solutions, Demat and Trading, Capital Market and Legal Advisory. To boost the Startup ecosystem and support their growth, Bank has a dedicated branch for Startups 'SBI Start-Up Branch' at Koramangala, Bengaluru. Bank shall be opening more such branches shortly across various geographies of the country.

### Various Collaborative Models Developed

Looking at the sheer scale of opportunities available with the Agritech Startups, SBI is actively exploring tie-ups with these entities. The bank has developed various collaborative models for the ecosystem viz. Direct partnerships, Financing of forward and backward linkages, Transaction banking opportunities, Credit access for the farmers associated with these start-ups, Digital Banking collaborations through YONO Krishi platform and Investment opportunities. SBI's presence of 23,000 branches all across the country coupled with the innovations and technologies of Agri Start-ups/Agritechs would multi-scale the reach as well as ease of use. This will also facilitate government initiatives in rural areas, improvement in farm gate infrastructure and technology adoption in farm sectors.





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### OMNIBUS AGRI-CREDIT GUARANTEE SCHEME

### ACCELERATOR FOR GROWTH

iven the big push for agriculture credit announced in the Union budget with a target of Rs 20 lakh crore by end of the next financial year, the need for an omnibus credit guarantee scheme covering all types of loans given by lenders in the "Agriculture" segment akin to the scheme that we have for the MSME loans through a Guarantee Trust administered by SIDBI, acquires added importance.

NABARD as the counterpart of SIDBI in the agri space, could be the administrator for this scheme which can cover all loans falling within the definition of "Agriculture" as per the relevant Master Directions issued by RBI.

Such a credit guarantee scheme would indeed be a big credit accelerator benefiting both farmers (who need not then provide collateral for all types of loans up to say Rs 2 crores ) and lenders led by banks (as the capital cost will be lower and a default guarantee will mitigate risk)

The gross value added (GVA) through agriculture, forestry and fishing constituting the primary sector of our economy was estimated at about 18/19% of total GVA. In this category, forestry is a segment which has a minor share compared to the other two.

This estimate also does not include the contribution of the food processing industry which would include activities like dairy products, ready-to-eat items, processed/packaged food, juices/beverages and the like. These can be categorised as part of the Agricultural value chain, constituting the forward linkages, reaching up to the consumer.

### About the **AUTHOR**

Mr S. Adikesavan is a commentator on finance and banking. The views are personal

### Credit availability needs boost

Credit availability for agriculture and allied activities which is being facilitated by commercial banks and the cooperatives needs to be pushed further. There

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is a prima facie gap between the output value and credit deployed in agriculture. This indicates scope for further widening and deepening of credit deployment.

The entire gap may not be available for funding because of the availability of internal credit interse among stakeholders (like farmers getting fertilisers on credit/procurers or Arthias giving advance money to farmers, etc.,). There is definitely scope for further credit support to what can be broadly termed the entire Agri Value Chain —from farm to fork as it were.

Even out of the existing credit support available for the agricultural sector it is estimated that the share of institutional credit has reached a level of about only 70% now (RBI's Internal Working Group Report 2019).

If the country has to continually modernise agricultural practices and enhance the flow of credit to all segments of the Agri Value Chain, there is a pressing need for a systemic credit accelerator in the Agricultural segment. Right now, acceleration is sought to be provided by follow-up by theDepartment of Finance and the Ministry of Agriculture. Unless systemic enablers are provided, such efforts will not lead to sustained results.

An analysis of the CGTSME experience and independent international studies (ADB Brief No 167, March 2021) yields two relevant lessons: we can reasonably hope to leverage the corpus of a credit guarantee fund up to 10/12 times and the corpus fund can be managed without any erosion, in the medium-tolong term, even after claim payouts.

There are three credit guarantee schemes in India's agricultural sector. The Small Farmers Agribusiness Consortium (SFAC) under the Ministry of Agriculture has a guarantee scheme called Nabsanrakshan, for bank loans to FPCs. NABARD had recently introduced a guarantee scheme for loans to FPOs. FPC is a corporate entity under the Companies Act, 2013 and is one class of FPOs, which could have any other legal status also. Loans under the Agri Infra Fund scheme, part of the Atmanirbhar

### **The MSME Model Can Be Copied**

We can copy the template of the MSME space. India's MSME sector has benefited greatly through the popular CGTSME scheme administered by SIDBI under which all loans to the MSME segment up to Rs 2 crore are covered by a credit Guarantee. This benefits both the borrower and the lender.

No collateral security needs to be offered for loans up to Rs 2 crores and the credit cost for lenders also comes down drastically because of the availability of the CGTSME guarantee scheme. The credit risk weightage for Guaranteed loans being Zero as per Basel norms, the returns to banks from such loans are also higher.



package, have been covered under the CGTSME scheme up to Rs 2 crore

### Integrating existing schemes, enhancing coverage

All other loans including the ubiquitous KCC loans (which constitute 50% of the outstanding segmental loans) do not have any credit guarantee umbrella. An omnibus credit guarantee cover for all agri value chain loans up to Rs 2 crores (including KCCs) — by integrating the existing schemes and enhancing the coverage — can be the next big step in agri credit in the country.

This will infuse new vigour to institutional agri lending across the board. It will help even tenant/leasehold farmers get bank loans. At present, millions of tenant farmers do not get any loans as they do not have land ownership. With a credit guarantee cover, it would be possible to structure loans to them too, with certain caveats.

For a start, a corpus fund of Rs 10,000 crores would be good enough. The contribution can come from GOI (say 75%), commercial banks (15%) and NABARD (10%). Going by rule-of-thumb leverage of 10/12 for such schemes and an average claim cover of say 70/75%, it can cover incremental loans of about Rs 1.5 lakh crore.

The corpus contribution can come in stages too and as Nabsanrakshan has a structure in place, the rollout of this omnibus credit guarantee for the agri segment (covering the entire value chain) under the aegis of NABARD can be effortlessly executed.

### tête-à-tête with Anjana Women's Day Special

### **'NOTHING IS INPOSSIBLE'** DR VIBHA DHAWAN

t all started with plants. Young Vibha was mesmerized with what the nature had to offer and before she could realize it, she had made Botany her area of expertise. Today Dr Vibha Dhawan helms The Energy and Resources Institute (TERI), a research institute in New Delhi that specializes in the fields of energy, environment and sustainable development.

### **Supportive Family**

Dr Dhawan was born in Delhi on 4 June

1960 to to late Shri Dwarka Nath Dhawan, an employee of NTPC and late Smt Sudershan Dhawan, a social worker. She completed her schooling from Ramjas Girls School, Daryaganj in 1976.

Dr Dhawan was an ambitious student and aspired to be the best in her chosen field. She was fortunate enough to have a family who supported her in this endeavour. "My parents and grandmother always encouraged me to go for higher studies. They always gave me confidence that girls can and must do everything. They must have a career. I always remember my father's face and words, 'Don't care for small problems which can always be resolved'."

She graduated from Daulat Ram College in botany in 1979. Dr Dhawan pursued her post graduation in Hindu College and obtained M.Phil in 1982 and Ph. D. in 1985 from Delhi University. "During the 70s and early 80s, bio-technology was a new subject and was a very exciting field of research."

### **Stellar Career**

Research associate, Faculty, Scientist, Director, Dean, Vice Chancellor, Executive Director and Director General, Dr Vibha Bhawan went through the entire gamut of the career spectrum.

Currently Dr Dhawan helms the Department Biotechnology Technology (DBT) - TERI - Centre of Excellence (CoE) project on the Integrated Production of Advanced Biofuels and Bio-commodities. Dr Dhawan is focusing on making the production of biofuels economically viable with minimal waste generation. Under her leadership the center is undertaking active research explorations towards the development of advanced biofuel production technologies.





An astute academician, Dr Vibha has been involved in developing and teaching the biotechnology course at TERI University since its inception in 1999. She was involved in developing the curriculum and its continuous upgradation. "The entire course of biotech regulations was conceived and developed in consultation with Michigan State University, USA and initially funded by USTDA. We worked very closely in developing the course curricula and its delivery. This was a challenging task, as there are no textbooks available on this recently evolving subject emerging of commercialization of new biotechnology," she says.

### Setting Standards

As a member of NCS-TCP (National Certification System for Tissue Culture Raised Plants), since its inception, Dr Vibha was involved with setting up of SOPs (Standard Operating Principles) for tissue culture laboratories. "The doctête-à-tête with Anjana

Women's Day Special

### **Awards and Recognitions**

- · Fellow, National Academy of Sciences, India
- All India Biotech Association (AIBA) award, 1998
- Kamal Kumari National Award for Science and Technology ,1998
- Biotech Product and Process Development and Commercialization Award, 2000.
- Women Leadership Agriculture Award 2016
- Indian Women Achievers Sammaan 2017

ument defining the criteria was prepared by me and accepted by the committee with minor suggestions and accreditation of test laboratories for virus testing and establishing clonal fidelity".

Her deep insight in the field of biotechnology made her associate with many coveted projects in India. Although India pioneered many research discoveries in the field of plant tissue culture, it remained an academic exercise confined to laboratories. To bridge the yawning gap between the laboratory and the field, the Department of Biotechnology, GOI, sponsored setting up of two pilot-scale projects for mass scale cloning of forestry species in 1989. Dr Vibha was associ-



Micropropagation Technology Park (MTP) was another project that originated from the enthusiasm of the pilot project. At this facility, besides developing protocols for new species, entrepreneurs undergo hands-on training to generate much-needed manpower in the field of commercial micro-propagation.

### **Getting States Biotech Ready**

Dr Vibha was actively involved in the DBT's Mission for North-East for Quality Planting Material.

Further, in her role as Advisor to the Chief Minister of Assam, she was involved with policymaking related to biotech/bio-resources activities for the state. She remained the state's advisor for two terms from 2006-2016.

### **Commercializing Biotechnology**

Under the leadership of Dr Dhawan, TERI has developed a number of technologies, which have been commercialized globally. She was instrumental in developing strategies for commercialization and negotiations at different levels. TERI's Micropropagation Technology



### tête-à-tête with Anjana Women's Day Special

Park has multiplied a large number of plantlets for Dutch Seed Company for their hybrid seed programme. TERI has also undertaken a project with BP Industries for large scale Jatropha cultivation in Andhra Pradesh.

### **Connecting Biotech with Public**

As many misconceptions revolve around biotechnology, Dr Dhawan rooted for interactions that conveyed the truth about biotechnology. "We organize several stakeholder-dialogues in different parts of the country and bring together experts from academic institutions, industry executives, farmers, activists from consumer groups, students and others. The developers of the technology could appreciate concerns over this new technology and the consumer needs, which helped them to optimize their research agenda. The outcome of these meetings was published in the form of a book 'Relevance of Genetically Modified plants to Indian Agriculture'.

Dr Dhawan is a perfectionist at heart, and has always strived to aim for excellence. She has six books and over 50 publications to her credit.

### Breaking The Glass Ceiling

Dr Dhawan is among the few women in India to shoulder responsibilities of leadership . Being a woman, she is

### **Experience with International Organizations**

Consultant USAID for setting up of Tissue Culture Lab	May 2016 – August 2016	
in Afghanistan		
Deputy Director – Research Partnerships &	Sept 2011 - Nov 2015	

Co-ordination Borlaug Institute for South Asia

Coordinator, Asia-Pacific Consortium on Agricultural Biotechnology (APCoAB), an initiative of APAARI (Asia-Pacific Association of Agricultural Research Institutions, FAO, Bangkok)

- 015
- May 2004 April 2005

World Bank: Appointed as Consultant to do a report on Biosafety Regulations in India in 2005

CGIAR CAS-IP - Appointed as Consultant in 2008 for "Strategies study on stewardship and liability in the context of IPR" along with Dr Rebecca Bratspies and Prof. Michael Blakeney.



"Women should have confidence that nothing is impossible. They can overcome any problem through hard work."

aware of the trial and tribulations that women go through while supporting their career. "It is comparatively difficult for women to reach/ sustain top positions, since

they are also deeply engaged with caring for the family and children. Many women thus either opt for lighter jobs or take a break in the early years of their careers. However, I must say women have the unique capability of multitasking and thus can manage multiple responsibilities at any given time. Good support from the family ensures that they reach the top. Also, it is the responsibility of the parents to bring up their daughters and sons on an equal platform. Daughters must appreciate having a career and sons must be taught that they are equal partners for bringing up their children.



### REGENERATIVE AGRICULTURE

### The Rational Approach to Sustainability

egenerative agriculture practices such as natural farming protect against further depletion of water tables, loss of biodiversity, soil degradation, and increase in greenhouse gas emissions. They can enhance farmers' income while delivering environmental benefits.

High-input, resource-intensive conventional agriculture practices cannot deliver sustainable food and agricultural production. We need to adopt holistic and sustainable solutions which are cost-effective, environment friendly and resilient to changing climatic conditions. Such practices need to be incorporated into national policies to ensure their nationwide adoption and effective implementation.

Hon'ble Prime Minister has been strongly emphasizing on the need of transformation to sustainable farming practices such as natural farming. NITI Aayog has taken multidimensional initiatives through policy, research, documentation of best practices, dissemination of reliable information, international cooperation etc.

NITI Aayog has developed an exclusive website for natural farming covering exhaustive information and has compiled 110 success stories from across the country in effort to boost the practice across the nation. Emphasis has been given to agro-ecological transformation in the Union budget 2022-23

### About the **AUTHORS**

Dr. Neelam Patel is Senior Adviser (Agriculture), NITI Aayog Dr Athira S and Dr SC Meena are Research Officers, NITI Aayog

NITI Aayog has developed an exclusive website for natural farming covering exhaustive information and has compiled 110 success stories from across the country in an effort to boost the practice across the nation

and 2023-24 with announcements related to promotion of natural farming starting with Ganga corridor, revision of syllabi of SAUs and setting up of 10,000 Bio-input Resource Centres.

GOI has introduced 'Bharatiya Prakritik Krishi Paddhati' (BPKP) under Centrally Sponsored Scheme "Paramparagat Krishi Vikas Yojana" (PKVY) to promote natural farming, since 2019. More than 1.6 million (16,78,693) farmers are practicing natural farming in more than 1 million lakh ha area (10, 05, 623) in India.

### Benefits Of Natural Farming

Various studies have documented the effectiveness of Natural Farming in enhancing soil health, fertility, microbial biomass and soil respiration. A systematic comparison between natural farming and non- natural farming fields conducted in Andhra Pradesh reveals that the natural farming fields host an average 232 earthworms per square metre compared with just 32 on non-natural farming fields. As per the Center for Study of Science, Technology and Policy (CSTEP) report based on a study in AP in 2020, natural farming requires 50%–60% less water and electricity when compared to conventional farming practices. This helps in reducing the burden of electricity subsidy. Another study by Council on Energy, Environment and Water (CEEW) in AP reveals that adoption of natural farming in paddy cultivation leads to reduction of 74 kg/acre urea application. This could mean dramatic reduction in reliance on fertilisers and fertiliser subsidies, if adopted nationwide.

### **Huge Saving Of Water**

Another study covering 500+ households in AP by CSTEP found that switching to natural farming from conventional farming had also saved 1,400-3,500 kl of water, 12-50 GJ of energy, and 1.4-6.6 Mt CO2 emission reduction per acre in irrigated crop conditions.

Crop Cutting Experiments by Centre for Economic and Social Studies (CESS) conducted in 13 districts of AP in Kharif 2018 reveals 18% reduction in cost of cultivation and 9–111% increase in net return in natural farming. Farmers have reported 14.34-45.55% reduction in cost of cultivation and 11.8-21.55% increase of in the net returns over conventional farming in a study conducted in Himachal Pradesh in 2021, covering 325 farmers from all four ACZs.

A study carried out covering 1.2 lakh farmers in HP found that crop yields had increased by 27% along with 56% decrease in the cost of cultivation. Controlled field experiments in 44 locations over 3 seasons in AP done by RySS in collaboration with University of Reading's Research England Global Challenges Research Fund (GCRF) reveal that natural farming has no yield penalty when compared to organic and chemical



farming.

### Multidimensional Benefits

Natural farming has multidimensional benefits related to profitability, environment and health. These can ensure sustainability and food/nutrition security for future generations. These will help India achieve its SDG targets within the stipulated period, thereby contributing to the fulfilment of Global Agenda 2030.

There is clear and growing evidence that developed countries and multilateral agencies like FAO, ICRAF and UNEP are focusing greater attention on promotion of agro-ecology. The grant of Euro 20 Million by the German Federal Ministry for Economic Cooperation and Development (BMZ), for the establishment of an Indo-German Global Centre for Agro-ecology Research and Learning (IGGCARL) in AP is an indication in this regard.

To ensure sustainability of agricultural practices it is critical that in addition to policy support, adequate academic and research support is ensured. This would promote continued learning and research and generate scientific evidence. This would go a long way in instilling confidence among farmers and consumers and other stakeholders on the feasibility of natural farming practices.

Capacity building activities at various levels including extension officials and constant handholding of farmers are equally important in propagation of these practices. Retraining of KVK and ATMA workers on the principles and benefits of natural farming needs to be done.

### **Ensuring Ease For Adoption**

A farmer friendly community-based certification process and standards for natural farming inputs and practices can be developed to standardize the outputs of natural farming. A firm branding and marketing network for natural products will ensure a complete value chain for Natural Farming. These efforts will reinforce the farmers' confidence in natural farming, accelerating its adoption.

Transitioning to natural farming is good for farmers' livelihoods, citizens' health, planetary health and good for the finances of Governments. These extraordinary benefits make a compelling case for universalization of natural farming.

### **MOTHER NATURE**

### REGENERATIVE AGRICULTURE SOME MAJOR STRATEGIES

Adopting climate smart agriculture practices such as RA will lessen the effects of extreme weather events and fight GHG emissions. RA will provide strategies for soil improvement and increased soil fertility

here are various strategies to achieve regenerative agriculture. Some of them are discussed here.

### **Soil improvement**

In order to preserve biological productivity, maintain air and water quality, and promote plant, animal, and human health, soil must be able to continue to function as a vibrant living system within ecosystem and land-use boundaries. Soil health is now described as "the ability of the soil to support the productivity, variety, and environmental services of terrestrial ecosystems" by the Intergovernmental Technical Panel on Soils (ITPS). The desirable physical, chemical, biological, and biological (microbial diversity, N mineralization, and soil respiration) characteristics of healthy soil are those that support strong, productive crops. These characteristics include soil texture, water holding capacity, pH, and soil organic matter.

### **Planting of Cover Crops**

During non-cash cropping seasons, cover crops are often produced in between primary crops to cover the soil and keep living plants there. This is done by either planting cover crops after harvest or by under-seeding cash crops usually grains with perennial crops that will grow and sustain soil cover throughout the following season. The widespread use of cover crops could cut agricultural GHG emissions by 10%, which is comparable to employing notill or other cropping strategies, in addition to enhancing soil fertility and assisting in carbon sequestration.

### **Crop Rotation**

Crop rotation, commonly referred to as diversity, is a time-honored method of increasing productivity and profit by bringing about nutritional advantages and severing the cycle of pests, diseases, and weeds. However, due to a strong reliance on artificial fertilisers and pesticides, improved crop varieties, and, in some cases, economic factors, crop rotation as a practise returned to monocultures around

### **MOTHER NATURE**

Dr Kaushik loves to explore new

places and to listen to music

the middle of the previous century. All of them finally led to the degradation of the land and the extinction of SOM. Crop rotation's ability to enhance soil quality, crop productivity, and water usage effectiveness is becoming more widely acknowledged.

### Insect, Disease and weeds Suppression

Numerous bacteria and fungi found in soil have been identified as pest and disease suppressors. Through a number of processes, such as competition, hyperparasitism, and antibiosis, microbial biological control agents shield crops from diseases. Numerous advantageous soil fungus, viruses, bacteria, and microfauna have been identified as prospective candidates for biological control and the restoration of ecological balance.

There is proof that management techniques including intercropping, cover crops, reduced tillage, and the use of organic fertilisers boost predatory and beneficial insects, which results in natural pest control (Dassou et al. 2016).

### **Beneficial Soil Microbes**

Soil bacteria employ a number of molecular and physiological processes to enhance plant growth in the presence of biotic and abiotic stress. By controlling numerous growth hormones or enhancing nutrient absorption, PGPR promote plant growth. It is believed that plants growing in unfavourable soil conditions will experience these positive impacts more strongly.

### **Minimal Tillage**

The most effective management technique for raising SOC stocks in croplands is minimal tillage combined with residue retention in a double-cropping system. In addition to supporting more biologically active and productive soil, increasing SOC stock or concentration in the topsoil also fosters resilience to severe weather. In the upper soil (0–30 cm), where no influence was found in the complete soil profile, Haddaway et al. 2017 showed that the enhanced C stock

under no tillage versus heavy tillage was around 4.6 Mg/ha (0.78–8.43 g ha, 95%) after 10 years. In contrast, continuous cropping with zero tillage in a warm, semiarid temperate or subtropical climate was shown to be unimportant for SOC accumulation; yet, slow accumulation of SOC was observed.

### **Climate Mitigation in Agriculture**

Reduced greenhouse gas emissions are one of the additional benefits of RA, claim RA practitioners. Methane and nitrous oxide from enteric fermentation of livestock/animals and crops, respectively, account for 14.6% of Australia's yearly GHG emissions. Due to SOC loss, rising temperatures and probable soil erosion can lower agricultural yield by 10% to 20%.

Adopting climate smart agriculture practises, such as RA, will lessen the effects of extreme weather events and fight GHG emissions. RA will provide the strategies such as soil improvement by beneficial PGPR microbes, cover crops helps in soil fertility, crop rotation will control the seasonal pest and diseases, beneficial microbes plays a very important role in controlling the pest and diseases at field level. Finally, the SOM and SOC are important factors in soil biodiversity because they control a variety of biological processes in the soil.

Even a little drop in SOC can have negative effects on soil health by hindering ecosystem operations. Management strategies have a significant impact on microbial community development, which in turn affects ecosystem services. It is commonly known that intensively treated soils experience a loss of soil biodiversity.

### About the **AUTHOR**

Dr Nutan Kaushik is Director General, Amity Food & Agriculture Foundation. Dr Perumalla Srikanth is with Amity Institute of Horticulture Studies and Research, Noida

### PADMA SHRI DR ARVIND KUMAR

### WE NEED STRONGER INDUSTRY-Academia Partnership

y parents were school teachers who worked in a village. Since childhood, I had watched farmers facing difficulties. Undertaking higher studies in agriculture became a natural choice for me.

I completed my PG degree when I was not even 18 years old. I also got the University Gold Medal for standing first in agronomy. I was not even 21 when I was engaged by the varsity for teaching teachers who were some years my senior. This exposure trained me in hard work and labour. I used to prepare a single lecture in seven to eight hours so that I was thorough with every question the students may pose.

It was a huge honour for me that I was asked to establish Rani Lakshmi Bai Central Agricultural University at Jhansi. I am extremely happy and proud that I was able to fulfill the task and set up a world class organization. It is indeed a model institution in the country and we developed it in record time.

It was the result of the cumulative efforts of each and every member of the team.

### NAHEP, a World Bank-Aided Project

National Agricultural Higher Education Project (NAHEP), aided by World Bank, gave immense strength to the universities. We have 74 agriculture universities. We need to strengthen them. These following points are of concern.

\* Investment in agriculture research

Many private agricultural universities have mushroomed, but they do not have proper faculty. If institutes do not have proper faculty support or facilities, it harms the national objectives and education is very important. Governments must enhance allocation for the purpose.

\* In many varsities, faculty positions are not filled. Required support from state governments are not there

\*Earlier, youth did not like turn to agriculture as a career. Now there is greater participation of the youth. We need to promote this further.



We need to work on better collaboration with industry. It shall help if the industry identifies the gap areas and these are shared with the academia. Then students can be trained accordingly. Many varsities have started well-equipped incubation centers. Close liaison between the industry and the varsities needs to be further strengthened.

\* There are many areas where students have established successful enterprises. The ARYA program of ICAR is a very good initiative.

In the areas of experiential learning, skill development, incubation centers etc, they have played a creditable role. This needs to be supported and strengthened.

\* Faculty upgradation program is a major area. Teachers need to be trained on a regular basis for achieving the desired objectives.

\* We must strengthen international collaborations. These are now possible through NAHEP. Students exchange programs should be encouraged more. To achieve the objective of One World, One Future, we need global linkages. These need to be expanded.

The faculty should also be provided with global exposure.

\* The universities can perform even better with better infrastructure. This can be accelerated with strong financial backup.

\* We need to work on better collaboration with industry. It shall help if the industry identifies the gap areas and these are shared with the academia. Then students can be trained accordingly. Many varsities have started well-equipped incubation centers. Close liaison between the industry and the varsities needs to be further strengthened.

Industries can invest in their own Chairs in the varsity, on the western pattern. More involvement and interaction between industry and academia shall yield positive results.

\* Universities can be endowed with



innovation grants for new areas of study. \* Centers of excellence can be cre-

ated in specific areas.

### Privatization Of Agriculture Education Should Be With Caution

Many private agricultural universities have mushroomed, but they do not have proper faculty. They are admitting many more students than they can effectively cater to. If institutes do not have proper faculty support or facilities, it harms the national objectives. Quality education is a major thrust of the National Education Policy.

### Organic farming And Natural Farming

We have to be careful and undertake deep research before adopting them at large scale. This can be good for vegetables, fruits, or for farming on river banks or coastal areas. We have to reduce the chemical load in a slow and steady manner. Certification of organic farming products is a major area. This needs to be done in a responsible manner. In crops like rice, wheat or sugarcane, it will take large scale research and analysis to undertake any major shifts.

### **Message For Teaching Community**

Teachers must update their knowledge from time to time. We all must aim for multi-institutional and multi-disciplinary approach for expansive knowledge of the diverse fields. We also need smart teaching for smart students, so teachers must update their technical knowledge regularly.

### **Message For Students**

Our young generation will have to shoulder the responsibility of nutrition security. They must also learn different skills so that they can be job providers and not just job seekers. They must stay in touch with the farming community

Farmers are practitioners of agriculture. Students must develop close liaison with the farming community and also with the industry. They must develop their entrepreneurial skills. They must be inclined towards innovation. Constant interaction with the farming communities will also enable them to educate the grassroots practitioners.

### PADMA SHRI DR KHADER VALLI THE MILLETS MAN

ur agriculture is sabotaged all over the planet by the food corporate companies. It does not make sense for all of us scientifically to eat rice, wheat and sugar.

The consumption of millets is known to have a very beneficial impact upon the body. But no one promotes it because of the stranglehold of rice and wheat. Hence I use the word 'sabotaged'.

How insecure we have become by the sabotage of the agriculture industry by the so-called agriculturists. This is what drew me to agriculture. 30 years ago I started my journey.

### **Food Security With Millets**

There is nothing that can sustain food security of the planet other than millets. Each kilo of rice takes 8000 litres of water. Millets require 200 litres of water per kg. It takes 40 times more water to produce one kg of rice.

Now let's come to the consumption pattern. Each kg of rice is eaten by five people. Each kg of millets is eaten by 10 people. Hence rice is 80 times heavier upon the various resources of the planet.

You can grow millets even over barren land. You can grow them anywhere on the planet.

With all the jugglery of fertilizers, the tampering of nature, the construction of multiple dams, with all the mayhem being created, even the most successful farmers are not able to produce more than 300 quintals over ten acres of irrigated land. Anywhere on this planet, this is the maximum calculation. And then we talk of food security.

Punjab is completely destroyed be-



cause of this brainwashing. We are left with only ten years more water in Punjab. We need to get out of vicious cycle of wheat and rice. Give me the water that is left. I will feed you for 600 years by growing millets. What more food security do you need beyond this?

If we shift to millets, nature will protect us by itself. We don't need any dams. Everyone should stop eating rice and wheat. All the people should be following this regime, and we shall be able to close down all the hospitals in five years, because the consumption of millets will set off such a beneficial chain within the body.

### On Siridhanya

Siridhanya are the five millets that I have grouped. With the consumption of Siridhanya, we have found reversal of almost all diseases very efficiently.

These are a group of minor millets. The carb to fibre ratio is single digit. These are all Chhota Anaj – Kodo, Foxtail, Barnyard, Browntop, Little Millet. In the category of Mota anaj, we have Jowar, Bajra, Nachni, Chhena etc.

Siridhanya consumption ensures ultimate health, ultimate wealth. We have campaigned for its consumption since 1997, because it has brought such immense gains to people.

### **On Higher Production Of Millets**

Karnataka is now number one in the production of minor millets. Farmers are getting good price for millets. This is a phenomenal success. GOI has pushed the global millets campaign because millets can feed the globe. It offers food security plus nutrition security.

GOI has made enabling policies. It is ultimately the responsibility of people to recognize the goodness and shift to the production and consumption of millets. It is our responsibility to save our agriculture and save our planet.

For us too, the journey has been tough. It was hard work to convince the farmers. If you are able to convince the city folks who are sick, if you are able to convince the farmers, then it happens.

### Popularizing The Consumption Of Millets At Farmer Level – Demand Boosts Supply

In big cities, people are finding their health worsening. We need wellness centers. Depending on the wellness centre's capacity to host residential courses, all food must be based on millets. In 10-15 days, people will find how good they

### **Policy Support Needed From GOI**

- 1. Millet food should be out of the purview of GST. The health of the nation matters more.
- 2. Subsidies given for chemical fertilizer companies should be diverted to millet farmers
- 3. There should be a ministry for Rainfed Agriculture to address the need for R&D.
- 4. There should be recommendation from the Centre and states that all government agencies must serve millet food only. GOI must also request the big private organizations to take this into consideration.
- The Army and para-military forces, the police all must shift to consumption of millets.
- 5. Millets should be promoted in schools. Mid-day meals can be based on millets. Slow and steady transition has to be put into practice.
- 6. Incentives must be given to millet growers. They can be given financial support.

Everything cannot be done by the government. We have to educate ourselves. This campaign must begin at school level. The government can do far more with people's support.



feel compared to what they were eating before. The demand will boost the supply.

We have conducted thousands of awareness classes in the cities. Maybe 3000-4000 classes. At least half the number of these classes have been conducted for farmers. This has to be done on a large scale.

Mota Anaj does not reverse diseases as efficiently as minor millets. We call Mota Anaj neutral grains. If you are not sick, you can consume Mota Anaj once in a while. Rice and wheat are negative grains.

Unfortunately, millets were deleted systematically by the corporate groups in agriculture. For negative propaganda, they called them coarse grains.

We want to develop an ecological model for our country. Food security, good health, environmental restoration – all rolled into one as part of this ecological model. We want to roll back the damage caused to the environment by the present agricultural food practices.



### PADMA SHRI DR BAKSHI RAM Making the sugarcane sector flourish

strayed into the sugarcane sector by chance. I started studying science but not stand the dissection of animals.

Perhaps my work in the sugarcane sector was destined for me. Every opportunity for R&D that was my dream as a researcher, I found in the sugarcane sector. I have now dedicated 37 years of my life to sugarcane research. It has indeed been a marvelous journey.

I would say that these are my prime learnings in the sugarcane sector.

\* MSP of other crops is declared in advance. Before the harvesting begins, even before sowing, farmers know what rate they are going to get. It is not so for sugarcane. Even two months after harvesting begins, farmers don't know what the MSP SAP shall be. State GovernmentsGOI should ensure that by the time mills begin crushing, MSP SAP should be known.

\* There is no guarantee regarding the purity of insecticides. There should be some regulatory mechanism so that the farmer is assured of good quality. After the 2020 crop, farmers in western UP have suffered immense losses due to the ineffectiveness of the pesticide against the top borer, an insect.

The farmer gets two rates in the market for the same insecticide. The difference in the rate is about 50 percentc. But one product is real, one is fake. Almost 50 per cent of tThe insecticides products sold in the market are may not be as per the standards. This is a very serious issue.

\* Farmers are using products sold as

We need proper seed production, seed treatment and distribution so that the crop does not suffer. We need proper variety replacement, proper seed certification

growth hormones or growth regulators for healthy and big sugarcane. No research organization has recommended these products, but this is becoming a very big market. The sale of such products, the sale of bio-fertilizers or other products in the market must be regulated.

\* Sometimes ICAR Institutes get samples for testing, but our recommendations do not count at ICAR state level. The official recommendations are recognized only from the state agricultural universities.

Further, till the state agriculture university does not recommend, the subsidy component shall not be available. We need a solution to this bottleneck. We have two world-class ICAR research and breeding institutes for sugarcane.

The recommendations of these institutions must be valued for breeding and plantation at farmer level.

\* The recommendation of the Cen-



**PADMA SHRI AWARDEES** 



tral Varietal Release Committee (CVRC) must be valued by the states and the varieties released and notified by the CVRC should automatically be released in the recommended states.

### Delay In Communicating Gains To Farmers

The research processes of CVRC are highly sound. I got the award for the early maturing variety C0O- 0238. CVRC recommended the variety in the 2009 through gazette notification.

But in UP, this variety was released in mid 2012, when sugarcane planting had been done. For three years, farmers did not get the rate difference for the early variety. In Punjab the same variety is recommended as mid and in Haryana the variety was officially recommended as an early variety in 2019.

For three years, farmers did not get the rate difference for the early variety.

Sugarcane Breeding Research Institute at Karnal took even longer time to recommend it.

The problem now is that till the time the farmers don't agitate, they don't get the rate for early breed of sugarcane released by ICAR-Sugarcane Breeding Institute, Regional Centre, Karnal. So much energy is lost at farmer level for this struggle which can be completely avoided.

### The Impact Of CoO- 0238

In the total area of sugarcane plantation in India, CoO- 0238 was sown in 54 percent area. The major states using this variety are Haryana, Punjab, Uttarakhand, UP and Bihar over nearly 28 lakh hectares. This area does not include Gujarat, Orissa and MP, where also this variety is planted.

### **Focus On Seed Production**

We need proper seed production, seed treatment and distribution so that the crop does not suffer. Other crops have better certified seed production and distribution systemseed treatment.

Big farmers should produce seed in one-tenth area. If they use this, they can

### Heavy Politics In Sugarcane Sector Adversely Impacts Farmers

I am saddened by the heavy politics in the sugarcane sector at research and recommendation level. Even if another variety is good, some SAUs do not allow its plantation in their state. This is politics. The farmer suffers, the sugar mills suffer, the entire sugar sector of the nation suffers.

But I have seen this politics in the sugarcane sector going on.

We all are proud citizens of the same nation. All research institutes are mainly funded by ICAR. Why should scientists get caught in the label of 'your' or 'mine'? They should recommend what is best for the nation.



protect the crop from disease. Once a variety is released, pProper variety seed replacement through seed is not there. Proper seed certification is not there.

### Major Economic Benefits Of CoO-0238

The economic benefit of CoO- 0238 was studied. The year 2013-2014 was considered the base year, when this variety was introduced in UP. During 2014-15 to In the 2019-20 season, the average yield of five states was increased by 20 tons per hectare. Sugar recovery earlier stood at 9.21 per cent. This figure increased to 11.65 per cent.

Due to improvement in both cane yield and sugar recoveryFrom 2014-15 to 19-20, the monetary benefit for farmers and the sugar industry was Rs 2,07,645 crore during 2014-15 to 2019-20 by adoption of Co 0238. For the sugarcane sector, the additional benefit due to cultivation of Co 0238 in profit terms stood at Rs 67,010 crore.

### How to address the issue of highwater consumption

Drip irrigation should be made mandatory for sugarcane agriculture. It leads to 40 to 50 per cent saving in the need for water. There are varieties that can sustain without water for months. In drought prone areas where sugarcane is grown, such varieties should be promoted. Other R&D techniques can be studied and adopted to address the diverse challenges faced by this sector.

### PADMA SHRI DR ABBAREDDY NAGESWARA RAO ORCHIDS, HE WROTE

The Man Who Has Discovered 35 Orchid Species

y work with orchids was inspired by my two teachers viz. Prof. R.S.Rao, the then Head of the Botany Department of Andhra University (1978) and Dr.J.Joseph, the then Deputy Director, Botanical Survey of India, Eastern Circle, Shillong (Meghalaya).

It was tough work, but my teacher inspired me by saying that with the discovery of new species, your name will be permanent in botanical history. I used to travel to virgin jungles of Arunachal Pradesh for my research, where perhaps no orchid scientist would have gone before. Along with field staff of BSI, we use to take one or two local tribal persons to guide the way in the dense jungle and also to climb the tall trees for collecting sample orchid collections for my research study. Their cooperation and interest was remarkable. After four years, I finalized the thesis and got doctorate from Andhra University for my research.

In 1982, I joined in the department of Environment and Forests of government of Arunachal Pradesh. Up to 2012, I worked there as Orchidologist (orchid scientist) and retired from there. A good part of my work happened at the State Forest Research Institute, Orchidology Division.

I am happy that I could discover nearly 35 new species of orchids. I named some after the state, some after a particular district. Sometimes I honoured my teachers, or the other national and international orchid workers who had greatly inspired me. Naming the orchids was a very exciting task. Later these names



Orchids are in great demand in international flower trade. We have to develop tissue culture labs for production of large varieties of orchids, and we must train our farmers to grow orchids were published with reports in national and international journals. It was a remarkable experience.

### **Medicinal Value Of Orchids**

Some of the indigenous people of different districts who are called 'Gram Vaidyas' (Village Doctors) have great traditional knowledge and know how the orchids and various other plants are to

### **PADMA SHRI AWARDEES**

### **FLOWER POWER**

be used for healing various deseases. For an open and bleeding wound, they would cut open a fruit of an orchid (Dendrobium fimbriatum) species and apply the powdery seeds over the wound. Miraculously, the wound would heal soon. I have tried to document some of these these medicinal properties of orchids and other plants in my books. Even for a bone fracture, they used to isolate some orchid bulbs (Phaius tankervillae), macerate and put it on injured area and plastered. Orchids and some select plants have immense medicinal properties.

Orchid flowers are amazing. Many are ornamental. They have a long shelf life. Some are shaped like butterflies, bees, scorpions, lizards, Doves, lady's schoe, some inflorescences look like a fox's tail, pine-apples, dancing girls or other exotic shapes.

There are 27,000 kinds of wild orchids in the world. From these, orchid breeders have developed about 2 lakh varieties of orchid hybridss. Sometimes these flowers stay fresh for 20 to 30 days or more in cut condition.

Orchids are in great demand in international flower trade. We have to develop tissue culture labs for production of large varieties of orchids. We must train our farmers for the production of orchids.

The Chinese have been smuggling our wild orchids which have high medicinal value, for a few hundred rupees. Our national wealth is being smuggled out because the locals of the area are not aware of its immense benefits. As a result, wild orchids are becoming rare. Hence tissue culture propagation and the production of seedlings is very important to reduce pressure on wild populations.

### **Training For Self Help Groups**

We conducted many workshops to train people regarding how to identify, propagate and cultivate orchids. We formed Self Help Groups of women to cultivate and harvest orchids for sale to the hospitality industry. Now these orchids are valued even more.

For some time I worked as a Project Director at the Centre for Orchid Gene



I am now engaged in publishing research papers on Indian orchids, reviewing papers for various journals, Identifying orchid species collected by the scientists of India and other neighboring countries, evaluating Ph.D. theses, delivering lectures in Seminars and Symposia as invited speaker etc. We have about 1350 species of orchids in India, out of which about 900 species are in North-East India. In the South, we have about 200 to 300 varieties of orchids. We can find about 200 species of orchids in the jungles of Northwest Himalayas (mostly Uttarakhand). We have to document all our floral wealth or it shall be lost Fresh students from universities are to be encouraged with more number of Research Fellowships by UGC, DBT,DST, MoEF etc. on Study of Orchid Flora in so far unexplored areas in N.E. & N.W.Himalayas, Eastern & Western Ghats, before their disappearence from wild due to fast rate of deforestation.

Conservation of Eastern Himalayan Region( COGCEHR) at Hengbung in Senapati district of Manipur under the sponsorship of Science and Engineering Research Board, department of Science and Technology, government of India, New Delhi.

Apart from establishing orchid gene banks as a part of ex situ conservation, we undertook Cytological, Anatomical studies, Cryopreservation, Breeding, Micropropagation through seed and tissue culture, DNA finger-printing of orchids, molecular study, chemical analysis to find out their medicinal properties. Some species of orchids are very beneficial even as anti-cancer drugs. In 'Ashtavarga group" of Ayurveda medicine four orchid species (Riddi, Vriddi, Jivak and Vishabak) are included. In the making of chyawanprash, orchids are used along with some other ingredients.

Orchid flower designs are so fancy that at times they are replicated by the designing industry. The breeding of orchids is a highly specialized task. We can increase their flower size, bring different colours It has to be done in a highly scientific manner and keeping various critical factors in mind.



### PADMA SHRI DR MODADUGU VIJAY GUPTA, WINNER OF WORLD FOOD PRIZE 2005

### PIONEER OF THE BLUE REVOLUTION

n the early 70s, when I moved into the field of aquaculture research with ICAR, there were very few people specializing in this field. We had plenty of fish from the sea and rivers, but we were exploiting these resources more than could be sustained. Just like agriculture, we needed to adopt aquaculture in an organized manner.

When we conduct research in elite institutions, we expect farmers to adopt the same models. But they do not have the same conditions. Also, I found that it was important to undertake scientific research and also learn from traditional knowledge.

Till 70s, the production in research institutions was 3 tons per hectare per year. With sustained experiments, the production went up to 5.5 to 6 tons per hectare. This was achieved using agriculture by-products like rice bran and cow dung. When such high yield was achieved, people started using the term aqua-plosion. This was the blue revolution that we were able to initiate in the country.

### **International Accolades**

In 1976-77, the United Nations (UN)



requested GOI to provide an expert for fish breeding in Laos. My name was recommended to the UN, and I moved to Laos. Earlier, experts from China and Korea had tried to breed Chinese carps and other fish there, but they were unsuccessful. I was able to breed Indian carps there within three months of arrival. This laid the foundation for aquaculture in Laos. From there, we developed a number of projects including a training school, projects for development of fisheries in reservoirs etc. It is important to train the locals, because they are the ones who finally take the initiative forward.

In Thailand, USA was starting a project in fisheries. They wanted me to move from Laos to Thailand. It was desired that Indian carps should be intro-



### **PADMA SHRI AWARDEES**



duced in Thailand too. We are able to breed the fish successfully in these areas, and later in Cambodia. In this way, we were able to introduce the fish breeding technology and fish farming in four countries. In this way, I spent about nine years in different projects.

### Economic Method Of Freshwater Fish Farming

Around this time, UN Development Program (UNDP) wanted to establish a fisheries research institute in Bangladesh. They sought my assistance for the project. We set up a Fresh Water Fisheries Research Station. I was engaged with it for three years. Then I moved to the International Centre for Aquatic Fish Management, funded by USAID.

This project led to a revolution in aquaculture there. Despite abundant water resources and about half a million small backyard ponds, fish production was low. I realized that this was a resource that had not been utilized. At times, these ponds at times dry up because they are shallow. We identified fish that can be grown under those harsh conditions. We were able to enable farmers to grow two to three tons of fish per hectare. The high market value of the fish brought good returns for the farmers. They were able to grow the fish for four to six months in shallow water.

With the involvement of about 30 NGOs, we were able to reach out to about 40,000 farmers directly. In addition, thousands of farmers would have benefited from the initiative indirectly. Farming of different types of fish was encouraged utilizing natural resources. The technology was disseminated all over the country.

Later I moved to Philippines as the Assistant Director General for World Fish Centre. Later, I also led the fish development program at Malaysia in one of the CGIAR centers.

Later, I was involved in very interesting work at the International Network For Genetics and Aqua Culture. Not much

### **The Gap Areas**

\* India has excellent research institutions and highly qualified manpower. We are second to none globally. Our research is not benefiting the development activities on the scale it should. We also require need-based research. Many institutions are trying to bridge this gap. We need to focus even more on transfer of research from development agencies to the grassroots.

\* Farmers are getting very low returns as compared to the middle man or those higher in the value chain. We must enable farmers to directly market their produce or add value to it so that they can get higher returns.

\* Fish consumption in India is low. The national average is 5 to 7 kg per capita per head per year. The corresponding global figure is 22 kg. We need measures to encourage higher fish consumption. We need to organize the marketing of fish and also encourage by-products. India's poultry sector has seen wonderful growth. The fish sector must grow similarly.

GOI has set the target of increasing per capita fish consumption. This way, demand shall increase. There shall be more employment opportunities. The aquaculture sector current engages about 9 lakh people. GOI wants to double the figure. We are exporting fish and fish products worth Rs 46K crore approximately. By 2025, GOI wants the figure to increase to Rs 1 lakh crore. This will create about 15 lakh additional jobs.



work had been done in this sector. We had a network of 12 countries and 12 international organizations, and I was the Research Coordinator.

### Alternate Solutions to Future Food Crisis

In 2005, World Fish Centre nominated me for World Food Prize. This was the first global prize for the Fisheries Sector. It was a huge honour for the fisheries sector and also for our nation. In 2015, a philanthropic organization in South Korea chose me and another gentleman for a prestigious award for food security, which is considered equivalent to the Nobel Peace Prize. The award carried prize money of USD 1 million. We both shared the award.

Currently, I chair some research advisory committees of ICAR. I am also associated with some universities and work closely with farming communities.

### THE GLORY OF INDIAN AGRICULTURE FOUR PADMA SHREE AWARDEE FARMERS SHOW THE WAY



### Shri Tula Ram Upreti

Sikkim's 98-year-Shri old Tula Ram Upreti, from Assam Lingzey village in Pakyong district, has been associated with organic farming for the last eight decades. He has been a pioneer in the cultivation of paddy and other vegetables organically without using chemical fertilizers. Even in his nineties, Shri Upreti is carrying forward with the legacy his forefathers, when most of his family members have stopped regular farming for health reasons.

Prior to Sikkim's annexation to India, Shri Upreti used to trade with Yatung in Tibet in the 1940s and 1950s. He had also served as a local panchayat member from Lingzey ward under Assam Lingzey Gram Panchayat Unit for 25 years. He was also a two-time panchayat president. He retired from social service in 1996. Tula Ram Upreti studied till the fifth standard at Tashi Namgyal Higher Secondary School (now TN Senior Secondary School). Shri Upreti has eight sons and seven daughters, and over 100 members in his family. One of his sons, Mr KN Upreti, served as a minister and legislator from the Rhenock Assembly constituency from 1979-99.

adma Shri awards 2023 were awarded to four veteran farmers who made stellar contributions to the field of agriculture. Shri Tula Upreti

won the award for his concept of organic farming. Shri Cheruvayal Ramam was conferred with the coveted award for his indigenous rice seed conservation. Shri Nekram Shrama won the Padma Shri for reservation of indigenous seeds. Shri Patayat Sahu won the coveted award for growing the medicinal plants. Agriculture Today congratulates these four awardwinning farmers. Here is a note on their achievements.



### **PADMA SHRI AWARDEES**

### **GUTS AND GLORY**

### Shri Nekram Sharma

Shri Nekram Sharma is credited for reviving up Himachal's traditional 'Nau-Anaj' intercropping system in the state. Nau Anaj is a natural and chemical-free method that improves the fertility of land and reduces water consumption by about 50 per cent by allowing nine crops - a combination of lentils, cereals, vegetables, legumes and creepers — to be grown on the same land.

A resident of Karsog in Mandi district, Shri Nekram's belief in Nau Anaj strengthened when he realised that the soil fertility of his land had deteriorated due to use of chemical fertilisers and monoculture. Sharma started natural farming in 1995 by keeping a backup of harvested crops in case the experiment failed due to climatic conditions or pest attacks. He decided to go chemical free and selected nine carefully assorted crops that aid each other's growth.

Switching to organic farming overnight was not possible, so he did it gradually and by the mid 2000s got rid of the chemical fertilisers. He also maintains a bank of about 40 indigenous seeds, which he distributes for free to the farmers associated with him.



### Shri Patayat Sahu

A resident of Nandol village in Odisha's Kalahandi district, Shri Sahu has been tending to as many as 3,000 medicinal plants spread across 1.5 acres of land in his backyard. This 65-year-old farmer has planted and developed the garden without the intervention of chemicals and fertilizers.

His garden is home to rare species of plants like Ashoka, Lodhra, Bidanga, Sambarsingha, Rasnajadi, Tihudi, Bhin Kakharu, Maeda, Sarpagandha and Shatavari.

Shri Sahu started learning about traditional medicine as a hobby and started working on the medicinal garden 40 years ago and added new species with time. His grandfather, a Vaidya (traditional healer) taught him healing practices. Today, he prepares medicines from the plants and herbs and helps in treating people without asking for anything in return.

Prime Minister Narendra Modi, while addressing the nation in the 81st episode of his monthly radio programme 'Mann Ki Baat', praised Shri Sahu for his contribution to developing natural healthcare products.



### **Cheruvayal K Raman**

India's lone surviving paddy gene bank is maintained by Shri Cheruvayal K Raman, a tribal farmer from Wayanad district, Kerala who has made collecting and conserving paddy seeds his life's mission. Credited with preserving over 50 local varieties of rice, Shri Raman uses the farming techniques handed down to his community through generations.

Unlike the common practice, Shri Raman does not sell these seeds to other farmers but gives them away for free on the condition that they return the same amount to him after harvest. He has been preserving these heritage seeds for the last 17-18 years, of which some have been passed down through generations and are almost 500 years old. Besides paddy seed preservation, Shri Raman conducts studies on soil, water as well as paddy seeds and their growth patterns. Over the years, Shri Raman's work towards preserving these indigenous seeds has been widely recognised with several honours. Recipient of the Genome Savior Award, Shri Raman strives to preserve seeds for the future generations.

### **EVALUATE: BOOSTING FINANCE AND TRADE IN THE AGRICULTURE SECTOR**

ndia being an agrarian economy still faces a shortage of effective scientific storage solutions in comparison to the agricultural yield of the country. The storage capacity available in India as on 31st March, 2021 stood at close to 166 million tonnes. India needs to amplify its efforts towards a robust regulated warehousing ecosystem for easy finance and trade at the warehouse level.

### **The Importance Of Warehouses**

The focus of GOI is on bringing warehouses under the regulatory regime of WDRA to enhance liquidity, trade and data of storage and dissemination in agriculture. This will make scientific warehousing a common standard and digitize the warehousing ecosystem through the usage of electronic Negotiable Warehouse Receipts (eNWR).

eNWR is slowly turning into a high potential financial instrument. It guarantees transparency in storage process and brings greater flexibility and ease of business to depositors, warehousemen and associated parties like lending institutions, buyers, etc.

### **Benefits of eNWR**

The introduction of eNWRs has benefited farmers and all agri value chain participants like warehouses, assayers, Banks, Insurers, Exchanges, Spot / auction platforms etc.

eNWRs provide an efficient and secure way for depositors to access working capital finance. Traditional warehouse receipts were often paper-based and could be lost or damaged, making it difficult to use them as collateral for loans. With eNWRs, farmers and depositors can access loans easily and quickly. The digital format makes it easy for banks to verify authenticity of the receipt and reduces turnaround time. RBI has advised bBanks to lend against eNWR and has increased Priority Sector Lending (PSL) limits for loans against eNWR to [175 lakh and kept the PSL limit of Physical receipts up to [150 lakh per borrower.

### **Reducing post-harvest losses**

eNWRs help to reduce post-harvest losses by providing farmers with a way to store their commodities in a warehouse. eNWRs help reduce the need for farmers to sell their crops immediately after harvest, which can often result in lower prices. This can help to increase farmers' incomes and reduce multiple handshakes before reaching end users.

eNWRs can help to reduce volatility in prices by offering scientific storage facilities and increasing liquidity in the market. This can help to improve stability of the agricultural sector. GOI offers the interest subvention of 1.5% to KCC farmers availing the loan against eNWR. This subvention is not available to any other form of warehouse receipt.

### **High Market Penetration**

Currently, over 50 national, regional and local presence banks are financing loans against eNWRs. National E-Repository Ltd. (NERL), a leading repository that issues eNWR, has witnessed over E4000 Cr. worth of loans being financed against eNWRs on its platform. NERL's market penetration, as of December 2022, was more than 8500 re-mat accounts opened, and over 2700 accounts were opened by farmers.

More than 4.8 lakh eNWRs were issued and over 45 lakh MT of stock was managed amounting to over 17,500 Cr. worth of eNWR. eNWR has users in 16 states in India. The instrument has seen significant growth and acceptance amongst its value chain participants over the past five years. WDRA has made it

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### WHAT IS AN eNWR?

eNWRs are recorded and managed in repository accounts, which is more or less similar to holding funds in bank accounts. Transfer of ownership of eNWRs is done through simple repository account transfers. This method does away with all the risks and hassles normally associated with paper receipts. Consequently, the cost of transacting in a repository environment is considerably lower as compared to transacting in physical warehouse receipts.

eNWR is a regulated instrument with fiduciary trust that can be used as a collateral for loans in India and is a title document for completing the trade (buy or sell).eNWRs are managed by Repositories which are regulated by the Warehousing Development Authority (WDRA) of India.

An eNWR holds the electronic balances of quantity, quality, and value declared by warehousemen.

mandatory for all registered warehouses to only issue electronic warehouse receipts and completely discontinue physical receipts.

### Improve transparency, traceability of agricultural supply chain

eNWRs helps to improve transparency and traceability of the agricultural supply chain. eNWRs is a digital record of life cycle of produce stored in warehouse. It begins with deposit, withdrawal, revalidation, finance and trade (partially or completely) with complete audit trail.

eNWR digital record is available in a public domain regulated by WDRA and government for any market intervention to correct the market.

Presently, the government and agri participants don't accurate information of stock availability in the country. WDRA aggregation of warehouses and its storage recorded in a centralized record keeping will improve the decision making process of government and agri participants.

### **Future Possibilities**

Regulated repositories provide access to monitoring stock and available space in registered warehouses. This can turn out to be a great breakthrough which has been identified by GOI. Government agencies like Food Corporation of India (FCI), National Agricultural Cooperative Marketing Federation of India (NAFED), etc. can benefit from access to such information on real time basis. This can Transforming the agri-warehousing industry of the country is the need of the hour and eNWR carries the undeniable potential to do that. The domino effect of this revolution can indeed change the business of agriculture in India

improve the public distribution system (PDS) of the country and minimize wastage and logistical costs. Taking calculated decisions on movement of stock at a central level can be a possibility in the near future.

Agricultural warehousing is becoming a lot more conscientious with having to adhere to better warehousing practices under the aegis of WDRA. The repository ecosystem has opened new avenues for market linkages, turning warehouses into marketplaces. This gives them a better business proposition and growth opportunities. The ecosystem can effectively connect the depositor to the derivative Exchanges regulated by SEBI, Spot / auction platforms as well as eNAM.

### Role Of WDRA In Strengthening The Ecosystem

Warehouse Development and Regulatory Authority (WDRA) plays a crucial role in implementation and regulation of electronic negotiable warehouse receipts (e-NWRs) in India.

WDRA is responsible for the registration and regulation of warehouses in India. It regulates repositories that records and manages the eNWR. It ensures that warehouses meet standards in terms of infrastructure, safety, and security. The WDRA also sets standards for issuance of eNWRs and ensures that warehouses comply with them.

A major responsibility of WDRA is to register warehouses and warehouse operators. This involves conducting inspections to ensure that the warehouses meet the required standards, and warehouse operators have necessary qualifications and experience. Once a warehouse is registered, WDRA issues a license to the warehouse operator, which allows them to issue eNWRs.

### Vital Role In Implementation And Regulation Of eNWRs

WDRA also plays a role in ensuring the integrity of the eNWR system. This includes monitoring the movement of commodities in and out of warehouses and ensuring that eNWRs are issued and redeemed in accordance with rules and regulations. WDRA is an appellate authority and authorized to take action against warehouse operators who do not comply with rules and regulations.

Another important role of WDRA is to provide oversight of the pledge financing process against eNWRs. It conducts regular audits of pledged stock to ensure that it is stored in a fair and transparent manner.

WDRA plays a vital role in the implementation and regulation of eNWRs in India. Its efforts help to ensure that eNWRs are a safe and secure way for depositors to access working capital finance and store their commodities in all WDRA registered warehouses.

Transforming the agri-warehousing industry of the country is the need of the hour. eNWR carries the undeniable potential to do that. With the focus on promoting the use of eNWR, the stress on increasing the hygiene in the agri-warehousing and marketing comes as an outcome and the domino effect of this revolution can indeed change the business of agriculture in India.

### FINANCING A NATURE-POSITIVE AGRICULTURAL ECONOMY

he challenges in mobilizing capital for climate solutions in agriculture are similar to those in other nature-based sectors. These include high risk perception by investors as solutions are often based on unproven concepts or technologies.

Further, the largely asset-collateral driven bank lending culture in India makes it tough for climate/ESG-focused startups/SMEs, with limited operating histories to get credit for highrisk, nature-based ventures. High dependency on externalities, and the multiple variables involved, also pose a challenge to meet expected cash flows. This is especially a risk in adaptation solutions, where a lack of standardized quantification and monetization processes impede investments.

> The issue of long gestation periods in nature-based solutions is also an obstacle for investors looking for quick returns. Further, most of these projects start producing cash flows only after a few years, requiring long-term patient capital. In addition to all of this, the overarch

ing challenges, the lack of expertise to develop niche financing solutions for restorative interventions in agriculture, beyond the traditional products, is yet another constraint in securing finance.

At another level, financing solutions for individual farmers with small land-holdings is not feasible, as FIs look at volumes and economies of scale when financing projects. Similarly, for multilateral and bilateral agencies too, large-scale impact remains a cornerstone of funding decisions. This can be difficult to achieve and measure, making climate projects in small farms less bankable/ unbankable.

### **Opportunities**

Notwithstanding the challenges, a slew of financing solutions are coming up, to create sustainable rural livelihoods on the back of naturepositive solutions. Blended finance is fast emerging as an effective financial structure. By deploying public or philanthropic capital strategically, blended finance improves the riskreturn profile of transactions, thereby catalysing private sector investments for less conventional sectors.

This allows investments from

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### THE BLUEPRINT



various actors with different objectives to come together for a common project. For example, the AGRI3 Fund is a blended finance initiative led by Rabobank, UN Environment, FMO development bank and IDH (Sustainable Trade Initiative), to facilitate investments for sustainable agriculture in Central and South America, East Africa and South Asia.

The Fund provides partial loan guarantees to commercial banks, covering 30%-50% of risk exposure, for sustainable agricultural production and value chains. In this way, the Fund contributes to a low-carbon agricultural landscape and improved rural livelihoods. Similarly, credit enhancements, concessional debt in the form of interest-subvention, waivers on down payment or longer repayment periods, public-private partnerships (PPP) based on hybrid annuity financing models, P2P or PAYG models are also coming up to mainstream nature-based solutions for agriculture.

### The Utility Of Green Bonds

Debtissuances, such as green bonds, are useful to crowd-in private investments. With use of proceeds mandated for environment-positive projects, green bonds are instrumental in mobilizing finance for mitigation solutions. The success of Samunnati's green bond for climate smart agriculture in India is suggestive of the immense potential of capital markets to enable a sustainable agri value chain. Recent indications from the National Bank for Agriculture and Rural Development (NABARD) to issue green bonds would provide a muchA systemic approach, on the back of concerted efforts from all quarters is a pressing priority to harness the climate mitigation and adaptation potential of the agriculture sector. An effective strategy to actualise this would allow meeting global climate and development goals in a localized manner at speed and on priority

needed push to the sustainable finance market for agriculture in India.

Institutions have also shown interest in climate resilience bonds to support more efficient irrigation systems, information technology and advisory services to small-scale farmers. Impact bonds have also shown potential in other emerging markets. In countries like India, where the success of the proposed interventions are often uncertain or untested, these type of outcome-based financing instruments may be a practical route to raise private capital, if supplemented with robust monitoring and evaluation plan.

### **Innovations Empowering Us**

With innovations abound in the agritech segment, there is tremendous potential for India to drive a low-carbon, nature-positive development. The segment is a whopping US \$24 billion opportunity, and witnessed 4X growth in investments, capping at US \$1.6 billion, in 2021-22 alone. The Union Budget 2023 announced the 'Agriculture Accelerator Fund', which largely indicates an enabling policy environment for agritech startups. Furthermore, aggregating and

positioning these ventures with a direct climate or carbon linkage, would also allow finance to flow in from ESG and impact-focused investors that are making headway into the agriculture sector. Co-investment through de-risking and bundling small projects, with the support of supranational green funds, like the Green Climate Fund is also another opportunity.

### Meeting Global Climate And Development Goals

While financing does remain a faultline in mainstreaming climate solutions in the agriculture sector, legislation and market facilitation, in order to attract long term private sector investment, is also needed for a robust ecosystem. The financial sector is at an influential position to steer this on the back of conducive policies to attract private capital. A systemic approach, on the back of concerted efforts from all quarters is a pressing priority to harness the climate mitigation and adaptation potential of the agriculture sector. An effective strategy to actualise this would allow meeting global climate and development goals in a localized manner at speed and on priority.

### AGRICULTURE FINANCE CHALLENGES, SOLUTIONS

etail Agri-lending has been an asset class that has eluded financial institutions around the world. Collateral based lending and transactional credit (receivable finance/warehouse receipt) has made some inroads. However, these have not been effective in improving the lives of small farmers in the same way as retail consumer credit and home loans have impacted the middle class. The question is why?

### **Industry profile**

There are about 120 million farmers in India producing commodity crops, horticulture and agri-allied activities such as dairy, poultry fisheries etc...from 375 million acres. The estimated financing requirement for this is roughly Rs 30-35 lakh crore. Against this total farm credit reported by commercial banks, RRB's and co-operative banks for FY 2021 was 11 lac Cr (as per NABARD data) Informal credit contributes another



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10-11 lac Cr (As per The Hindu Business Line newspaper analysis of the NSS data of Dec 19) 50% of informal credit is trade credit i.e, inputs sold on credit by input retailers and advances from commission agents. The remaining portion of informal credit is from money lenders, friends, and family. This still leaves us with a credit gap of 10-12 lac Cr.

### Why is the formal sector not so enthusiastic about lending for agriculture?

What are the challenges they face? Prima facie lending to farmers is a 'high risk' and 'high operating cost' affair. Due to fragmented supply chains and cash dominated ecosystems, there is lack of information to assess farmer creditworthiness, to monitor the end use or application of funds and high cost of collection in deep geographies. The average cost of acquisition of an Agri loan is upwards of Rs 25,000/- and the annual cost of servicing the loan is upwards of Rs 7000/- per loan p.a. Considering low average Kisan Credit Card (KCC) loan size, approx. Rs 2.9 lacs coupled with low interest rates, viability remains a challenge for banks.

Collection cost can be better understood from the fact that a thinly staffed rural branch has to reach out to 400-500 farmers spread out over 30-40 villages in a 50km radius, during a 45 day harvest window to collect cash to keep loans regular. This is a difficult task leaving many borrowers remaining uncollected. Risk and operating costs are interwoven.

Agri loans are mainly in the form of working capital where the farmer has to only service interest every crop harvest (6 months), further loans become non performing (NPA) after 365 days (not 90 days like other loans), that is after collection opportunity of three crop cycles, It is highly unlikely to have three continuous crop failures so how come such high levels of NPA's.

We can conclude from this that the main reason for such high NPA's is that the sector is not viable enough for lenders to deploy adequate manpower for collections. In other loans only borrowers with bounced payments need to be followed up with roughly 10%-15%. However, in Agri-lending every single borrower has to be contacted every time to collect because supply chains are settled in cash.

Further, banks are unable monitor the end use of funds (i.e. inventory stock statements and cashflow statements as done in other business loans are nonexistent). Funds diversion to other purposes is another major cause of NPAs in the system especially with larger farmers. However, another major problem is long term application of short term loans.

### Why do farmers rely so heavily on informal sector at exorbitant rates despite increased accessibility to formal sector?

The fact remains that increase or decrease in produce, yield and market prices have a significantly higher impact on farmer P&L accounts as compared to interest rates. A 1% change in yield or market price corresponds to approximately 3% change in interest rates.

Accordingly, we can conclude that interest rates are more elastic in the hands of the farmers compared to Yield or Mar-



Lending to farmers is a 'high risk' and 'high operating cost' affair. Due to fragmented supply chains and cash dominated ecosystems, there is lack of information to assess farmer creditworthiness, to monitor the end use or application of funds and high cost of collection in deep geographies

ket prices. Accordingly, farmers are willing to pay more for financing.

### Some Solutions We Can Consider

In order to increase access to finance to small and marginal farmers we need to organise and digitise local ecosystems without disturbing them but enhancing them. This can be made possible by the following solutions.

1. Co-opting local entrepreneurs / lead farmers (similar to a milk collection agent / society) already providing services to a set of farmers and upgrading them.



2. Organise finance to set up the required infrastructure i.e Silo's, Silage baling machines, etc... that facilitates efficiency and transparency and provide them with operating support. (a model similar to ATM's, Sourcing, AMC & cash management can be looked at )

3. Agri-expertise: Understand the nuances of agriculture production and trade to collect, monitor the analyse relevant data to measure risk and productivity on an on-going basis

Intermediaries facilitating the above require all round agri expertise, banking expertise and should be prepared to have lots of boots on the ground in the initial phase. They in turn will provide the banking sector reach as a BC (business correspondent) / Loan service provider (LSP) or co-lender as an NBFC. This process will have a ripple effect including Insurance which is plagued by high transaction costs and moral hazards. implementation of solutions for environmental sustainability and climate adaptation with the ability to monitor and measure this then throws up the opportunity for carbon finance.

### BUDGET 2023 ANALYSIS ROUND TABLE CONFERENCE BY ATG



n February 2, the Agriculture Today Group organised a round-table conference to analyze the Union Budget 2023. A host of eminent individuals and experts in diverse areas of agriculture participated in the conference. The session was moderated by Dr MJ Khan, Chairperson, Indian Chamber of Food and Agriculture.

Dr Khan initiated the discussion by analyzing the budget implications, challenges and opportunities. He addressed four challenges which are threat to sustainability but were not emphasised enough in the budget. These challenges are nutrition security, climate change, right price for produce and export. He added that India is the second largest country in production and at the eighth number globally in export. Dr Khan highlighted that the government should come up with policies to bridge the gap.

Dr Khan spoke about the emerging opportunities in the sector. He said that the Agri Accelerator Fund can boost IT sector and start-up ecosystem to achieve digitization in agriculture. He also spoke on bio-fortification, which can help the country to accomplish nutrition security. Mr Deepak Pareek, Advisor & Mentor for agri tech start-ups said that this was a progressive Budget which has missed the opportunity. Sharing his analysis, he said that the government has not reduced the subsidy on urea as much as it is reduced for other fertilizers. He called this as a contradictory step for GOI thrust on natural Farming.

Mr Pareek said that establishing the Centre of Excellence for millets and encouraging R&D will be a holistic approach. Providing agri credit for dairy and fisheries is a small step but a crucial step, he said. Mr Pareek said that linking



5G with precision farming is a commendable move, as innovation for precision farming was required at grass root level.

Mr Neelam Gupta, Head Agriculture, JB Boda Insurance and Reinsurance Pvt Ltd., said that increasing credit target to 20 lakh crore will directly benefit farmers through PM Fasal Bima Yojana and will increase insurance coverage. He said that Agri Accelerator Fund shall encourage start-ups and boost agriculture. Mr Gupta said that launching PM Matasya Sampada Yojana is a great initiative to enhance animal husbandry and fisheries sector. He appreciated the assistance amount given to the drought prone areas of Karnataka.

Mr Durgesh Chandra, Secretary General, Croplife India welcomed the government's move to launch the Agri Accelerator Fund. He said this will help industries and start ups to develop better technology. Talking from agrochemicals and crop protection industries' perspective, Mr Chandra said that GST and input duties could have been reduced on inputs to make farming a profitable business and double farmers' income. He added that a robust ecosystem needs to be established to achieve nutrition security and sustainability.

Dr Anand Zambre, ED, NCPAH, emphasised upon the importance of protected cultivation, green houses and micro irrigation. He said development and establishment of hydroponics and vertical farming are essential to increase farmers' income. He appreciated that GOI has provided sufficient funds for boost to micro irrigation. He added that Agri Accelerator Fund is a great initiative to introduce better technologies and help in farmers' empowerment and security. He lauded the initiative to promote natural farming.

Mr Neeraj Chaudhary, Group Head – Finance, Absolute, welcomed the move of digitization, Agriculture Accelerated Fund and the emphasis on natural farming. He said that digitization in agriculture can enhance the transparency in funds utilization and shall help farmers. He added that emphasis on natural farming can encourage start-ups and industries, and ensure sustainability and security.

Mr Ajay Kakra, Managing Partner, JU Agri innovation Venture praised the GOI initiative for Agriculture Accelerated Fund. He said this can provide the muchneeded financial support to start-ups. He added that easy access to data is a longstanding gap in the sector. Creation of Digital Public infrastructure will help in increasing the accuracy.

Mr Kakra felt that that the budget this year is a 'Non Directional Budget'. He

said that important aspects of agriculture have been neglected. He added that there is no focus on insurance, irrigation, sustainability, previous schemes, climate, trade finance, export and warehousing. He appreciated though that through this budget, cooperatives will be streamlined, commercialised and boosted.

Dr Prafull Gadge, Principal Scientist & CEO, Biome Technologies Pvt Ltd welcomed the initiative of Agri Accelerator Fund. He said that this shall boost the agriculture sector through new ideas and innovations. Dr Gadge said that encouraging natural farming is a good initiative. He added that skill development, knowledge empowerment and R&D should be encouraged to achieve the goal. Dr Gadge emphasized upon market linkages for natural produce to make it more profitable for farmers. He highlighted the importance of diversification to achieve viability.

Mr Sanjay Sethi, ED, PFBIA expressed his satisfaction with the budget by rating it 8.5 on a scale of 10. He highlighted some areas which could have been given more emphasis. Mr Sethi said that new varieties need to be introduced and need higher R&D, which should be encouraged. He added that we should try to minimise import of edible oils and increase indigenous production.

### TRADITIONAL COARSE GRAINS ARE HEALTHY Vital Role in Horticulture

cademia and Industry are two strong pillars of the economy. A continuous and collaborative engagement between the two will help the economy to grow fast in all the parameters such as GDP, Export, Employment, Quality of Goods and Services, etc. It will also benefit both sectors immensely. All the stake-holders viz., institutions, industry, students and society stand to gain, as it can be a 'win-win' partnership.

The success of any organization depends on the quality of entrepreneurship, which in turn depends upon nurturing quality thoughts and creative ideas. The convergence of Academia and Industry is expected to identify areas where research inputs will help promote industry requirements. Innovative changes are required in the education system to build a research mindset among the students. Focus on research early on, in universities will aid in creating an environment based on research and lead to an industryready and skilled workforce.

### Partnership For Horticulture Sector

Horticulture is increasingly recognized as a sunrise sector, owing to its potential to raise farm income, provide livelihood security and earn foreign exchange through export. Besides, this sector has also started attracting entrepreneurs for taking up horticulture as a commercial venture. Horticulture production in India has reached 342.33 million MT continuously outpacing Food grain production.

• The two sides can cooperate to share infrastructure and

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**AGRI VISION** 

industries while developing long-term ties with research institutions to address the issue of inadequate funding.

• In order to put ideas to the test and confirm their relevance, academia must collaborate with other stakeholders in agriculture. This will also highlight the need for players in academia and industry to develop their capacities through training and internships. The development of profitable university courses for both students and their prospective employers will be aided by this synergy.

 Industry should be cautious while implementing innovations and inputs to ensure that they will be accepted in the future. Furthermore, stakeholders must make use of current knowledge and have greater long-term objectives.

• The democratization of science must continue. There are already various programs that support this. To avoid duplication, it was suggested that a public database of study findings be made available.

To overcome the above and strengthen the industry academia partnership, following points to be focused

1. Boosting of working environment

 Corpus funds maintenance with industrial aid and salary enhancement of the faculty

 Provision of incentives/royalty to the academician by the industry for innovative technology transfer

### 2. Facilitating right skilling through Experiential Learning Programme (ELP)

• Establishment of center for excellence (COE) at the institute level and training of students under skill development with the assistance of industry through interns, as an integral part of enhancement of placement opportunities. The output of COE will be owned by industries, as a base of win: win situations.

3. Institution-Industry linkage for conducting basic and applied R & D programmes

 Erection of interface structures for applied research within the academic premises with significant industrial part-



Academia can be considered as the 'heart' of the core, and industry as the 'brain'. When considering a future career path, agriculture/horticulture is perhaps one of the most important industries one can choose to pursue

nership

• Sanctioning of startup project programme to the academician by the industries for encouraging the novel ideas. The end user of the significant achievements might be the same industries by paying royalty to the academician.

### 4. Enhancing mobility of science and technology professionals

• From academia to industry: The young and senior faculty could be given



Dr Janakiram loves to listen to old songs, spend time with his mother and play with his pet cat Lucifer

internship programme for short or long period in industry to enable and impart more practical knowledge to students connecting to industry.

• From industry to academia: Regular visits of experts from industry to address students and staff for sharing their experiences, highlight overseas opportunities and need of industry

5. Dissemination of technology from academia to industry for market expansion

• Academician catalyzes knowledge driven industrial development and ensures flow of technology to market place

Thus, academia and industry are complementary to one another and strengthening of the partnership is dire strait for improvement of both the sector and economic growth. Both these sectors should work hand-in-hand as it is not possible to increase the growth of one sector without the improvement of the other sector.

If academia is considered as the 'heart' of the core, then obviously industry must be consider as the 'brain'. When considering a future career path, agriculture/horticulture is perhaps one of the most important industries one could choose to pursue. To acquire this, the degree in agriculture/horticulture is mandatory and collaboration of institutes and industry is also the need of hour for benefit of stakeholders. Therefore, Industry-Academia-partnership (IAP) is highly beneficial for the national economy.

### Our Soil is Unwell SEEKING URGENT ATTENTION



n February 2016, Prime Minister Modi announced an initiative to double farmers' income in six years i.e. by 2022 when India turns 75. This target was meant to increase average monthly farm income of Rs 8050 in 2015-16 to Rs.21146 in six years.

We have not achieved the target. Instead, remuneration from farming continues to be inadequate with every passing year. We must remember that this sector employs over half of India's working population, contributes 17% to the GDP. It is in everyone's interest that the farmer is gainfully employed and remains interested in farming to feed the rest of us.

Farm income is a function of multiple variables which include quality and cost-effective farm inputs, timely and adequate monsoon, farm insurance, availability of credit in fair terms, supply chain network and the market prices of the produce at the time of selling. The difference between the cost of inputs and realization from the sales of the produce determines the profit or loss a farmer will make at the end of the season. Does a farmer control any of these factors? Not really! However, the farmer has control of the land he tills and the health of the soil under his feet.

### About the **AUTHOR**

Mr Rakesh K Chitkara is an expert in public policy and regulations. He has managed public policy and regulatory practice for many large multi-national corporations

### **Soil Health Is Deteriorating**

Over a period of time, soil health is gradually deteriorating in all countries where agriculture constitutes a significant part of the economy. The declining health of soil prompts farmers to resort to the use of more inputs like fertilizer and irrigation resulting in higher vegetative growth. While this may not result in better output, it surely promotes more infestation of insects and pests leading to overuse of pesticides. All this adds to higher input cost without translating into proportionate output impacting income.

### **Major Source Of Concern Globally**

Soil degradation is drawing the attention of policy makers and think tanks world over. The World Economic Forum (WEF) estimates that in 50 years, there may not

### THE GOOD EARTH



### Goal To Make India Land Degradation Neutral By 2030

About 30% of India's geographical area is affected by land degradation. PM Modi has committed to make India land degradation neutral by 2030, a very aggressive goal announced in 2019 at the UNCCD. This will be possible only if everyone participates along with government initiatives and make this as a movement. Without inclusive efforts, this announcement will meet the same fate like 'doubling the farm income' initiative.

be enough soil left to grow food to feed the world population.

With our high population, the concern for soil health must be of high for India.

Isha Foundation, a south Indian organization, in collaboration with the United Nations Convention to Combat Desertification (UNCCD) is promoting the global awareness on degrading soil and its impact. UNCCD is the key partner of the Save Soil movement, collaborating in the multiple areas like disseminating scientific knowledge, communication and the stakeholder outreach.

### Need To Cut Down On Excessive Tilling

One of the major causes of deteriorating the soil is excessive tilling. Many advanced countries have moved to notill or minimum-till agriculture. Some of the states in India have successfully experimented with this concept and results have been encouraging.

Farmers in Telangana, West Bengal, Punjab and Haryana have tried it successfully and improved yields, saving the cost of cultivation. No-till or min-till concept requires the stubbles of the previous crop to be incorporated in the soil while seeding the next crop. The stubbles becomes the organic manure over a period of time adding to the soil



paragliding is my passion

health and its binding capacity.

Further, tilling operations consume millions of litres of diesel and adopting no-till agriculture can help save precious national foreign exchange while cutting costs for the farmers. Multiple tilling also adds to climate change as the collateral damage from our age old cultural practices.

SAUs should consider bringing their agronomists, agricultural economists and government extension workers on the same platform to run a campaign to educate farmers by demonstrating the benefits of minimum tillage. North Indian states will be benefitted as farmers will not have to burn the paddy stubble to sow the wheat crop leading to the lesser pollution. The other key factor impacting soil health is the concept of intensive agriculture. This is driven by desire to improve the profitability from the farm operations. Shifting the farmers to remunerative crops, creating infrastructure for marketing and reducing postharvest losses will add to the farm income with reduced dependence on the intensive cultivation.

Overuse of fertilizers, pesticides and flood irrigation are the result of unawareness of the farmers. Indulgent use of these inputs impacts the cost of cultivation, soil health and results in leeching of chemicals into the sub soil water and hence these become the part of food chain.

Pesticide registration protocols (Central Insecticide Board) in India are one of the best, but we still have a notorious reputation of carrying very high pesticide residue in our food. The farmer, in a desperate need to protect the crop, ends up overusing pesticides and our soils allow them to leech down.

### Solutions we can examine

The critical link between the agricultural research stations, universities and the farmers the getting weak or broken. The extension eco-system has become very non-existent in many states and needs to be revitalised. Extension workers must be made accountable for effective transfer of technology to the end user. A dedicated fund needs to be created for awareness among the cultivators. And last but not least, we need to define the milestones leading us to 2030 for monitoring the results instead of revisiting PM's commitment to make India degradation neutral in 2030.

AGRICULTURE TODAY

### **CLIMATE-SMART AGRICULTURE**



e are depending on land and soil for livelihood, supply of food, fresh water and multiple ecosystem services along with biodiversity. Where, increasing stress on land due to climate change is intensifying present risk to almost everything we are depending upon: livelihoods, biodiversity, human and ecosystem health, infrastructure, and food systems. This information along with associated challenges is documented in the report Climate Change and Land, published by the Intergovernmental Panel on Climate Change (IPCC), which is authored by a global super group of climate scientists.

Land degradation is the outcome of Climate change due to human interference! As per the World Health Organization, land degradation is affecting human health through complex pathways. Those include risk of malnutrition due to reduced food and water supplies; increasing food-borne and respiratory diseases caused by polluted water, polluted air and atmospheric dust respectively. Infectious diseases spread because of inhabitants' migration.

### **Factors impacting land degradation**

Agriculture is one of the main causes of land degradation. Unsustainable agriculture practices: over use of fertilizers and pesticides, farm implements, alkalization or acidification of soil, soil salinization due to overuse of water and deforestation are leading to land degradation. Farmers lack knowledge of land

### About the **AUTHOR**

Dr Prafull Gadge is well-known agri-infopreneur, scientistentrepreneur, R&D strategist in the field of Agriculture. He has earlier served in several agrochemicals companies & provided several commercially viable strategies for plant protection and high productivity through eco-friendly biological approach conservation methods; mainly physical, mechanical and biological ones. This results in improper tillage operations, poor land management. These practices are also responsible for increasing pest and pathogen incidences affecting crop quality, crop yield and increased production cost. These practices are also referred to as degenerative agriculture.

But there are a number of sustainable agricultural practices based on the principle of working with nature called Regenerative Agriculture. Adoption of regenerative practices that have the ability to transform much of our agricultural land into fertile carbon sinks leading to topsoil regeneration, increasing biodiversity and strengthening soil health.

### Integration Of Good Agriculture Practices

As per the review by Newton et al: Front. Sustain. Food Syst., 26 October 2020 Sec. Agroecology and Ecosystem Services, regenerative agriculture uses some principle tools: soil fertility /carbon sequestering farming practices that include no till, cover crops, mixed crop rotation, mulch, compost raised beds, integrated pest management, advances in plant breeding, agroforestry, silvopasture: integrated crop-animal systems.

Many studies suggest that adoption of these regenerative practices could triple soil carbon content in less than 15 years and has been shown to reduce soil degradation. Convincingly, Regenerative Agriculture should then be called as integration of good agriculture practices for sustainable agriculture, climate-smart agriculture and agroecology etc.

The diversity and quantity of microorganisms that help to keep the soil fertile can decrease, and nutrients may wash out. Soil can be blown away by the winds or washed away by rains.

### Scientific Research And Evaluation

The collective benefits of regenerative agriculture are improvement in the ecological conditions of a farm, improved soil microbial health, sustainable diversi-

### In Western Maharashtra, "Hoy Amhi Shetkari Foundation" has transformed sugarcane farming with a similar approach. They have been successful to convince farmers holding land up to min 1000 acres for not to burn waste after harvesting with the help of phygital approach

fication, soil carbon fixation, decrease in run-off and leaching of soil nutrients, and minimization of practices that pollute.

Besides, regenerative agriculture needs more scientific research and evaluation before implementation as a policy. Particularly in India, attention should be given to development of region and crop specific practices due to variation in geoclimatic conditions. Much sustainable, agroecological regenerative innovations usually come from farmers themselves. These innovations should be brought into focus through scientific evaluations. Further, extension services need to be developed to build skills, knowledge and implementation. Expanded social learning, farmer to farmer extension, shared learning among innovators, farmers and academia along with increased support and most importantly financial support for new farmers will prove effective means



Travelling, photography and amateur astronomy are my hobbies. They help me to understand, experience and evolve for adoption of regenerative agriculture practices.

### **Vital To Educate Farmers**

Our agriculture system has natural limitations of area, varying geoclimatic conditions and technical human resource etc. Considering the influence of social media, a dedicated Phygital system that is integration of digital and physical extension is necessary to deliver knowledge of regenerative agriculture. When we will educate farmers, the farming will be more sustainable rather than telling them what to do.

Educating farmers for dangers of land degradation, agrochemicals literacy, climate smart agriculture using biopesticides and biofertilizers, detailing of crop specific physical and mechanical practices will naturally integrate regenerative agriculture into the industrial agriculture. In Western Maharashtra, "Hoy Amhi Shetkari Foundation" has transformed sugarcane farming with a similar approach. They have been successful in convincing farmers holding land up to min 1000 acres for not to burn waste after harvesting with the help of phygital approach.

Similarly, Krishi Rasayan Saksharta (Agrochemicals Literacy is Vital) Movement is making farmers aware towards application of chemical fungicides in the soil. Those farmers are now using microbial consortiums to convert waste into organic fertilizer, increase soil carbon, deliver plant protection and reduce air pollution too! Similar integration of regenerative practices with industrial agriculture through phygital extension may potentially solve air pollution problems in Northern India arising due to burning of stubble.

Regenerative agriculture practices may help us to withstand climate change. Development of scientific regeneration practices, farmer education, financial support and their integration with industrial agriculture have potential to transform Indian agriculture into the farmer friendly, consumer friendly and most importantly into the environment friendly one!

### **REGENERATIVE AGRICULTURE** THE RATIONAL APPROACH TOWARDS SUSTAINABILITY

s India celebrates the year of millets, we must all draw our attention to increasing challenges Indian agriculture faces. Climate change, degrading soil health, deteriorating groundwater quality, lack of crop rotation, declining yield response in various crops, excessive dependence on synthetic fertilizers, and declining nutritional quality of food – all these pose challenges and questions for farmers and the agriculture industry as a whole.

On World Soil Day, December 5, 2022, the Times carried an article titled "Over-exploitation over centuries has degraded 96 million hectares of India's land", drawing attention to declining soil health, largely due to chemical and nutrient imbalances and toxicants, deforestation, and unsustainable soil management practices. A 2022 research publication by the Indian Institute of Soil Science, ICAR, points towards the impact of excessive fertilizer practices on human health, the environment and the soil.

Imbalance In Fertilizer Subsidy

The country has been spending the highest amounts on subsidies on fertilizers in the world (subsidy budget for 2023-24 is USD 24 Billion), on macro (bulk) fertilizers, with disproportionate subsidies especially for urea, while ignoring other nutrients required for healthy crop growth. This policy exacerbates the imbalanced and injudicious use of fertilizers based on nitrogen and phosphorous, alone. The Russia-Ukraine War and COVID further created challenges for access to these fertilizers, increasing the cost burden, and further increasing these subsidies.

About 14% of emissions which contribute to climate change come from agriculture, largely due to synthetic nitrogen based fertilizers. Subsidizing the bulk fertilizers has promoted an unbalanced nutrition practice while ignoring the other nutrients. High yielding varieties along with intensive cultivation have led to loss of native soil fertility.

The Central Institute for Cotton Research, ICAR, states that cotton productivity is declining. There is a need to address this with targeted agro-ecology model with an aim to increase the yields.

There is a general lack of awareness among farmers growing staple foods on the requirements of other nutrients for a balanced input for harvesting quality crop production. More than 80% of Indians suffer from a micronutrient deficiency, and pregnant women consume less than 50% of essential nutrients.

### Multi-Faceted Approach To Sustainable Agriculture

Regenerative agriculture involves a multi-faceted approach to sustainable agriculture, including agro-forestry, crop rotations, stubble retention and biological breakdown, the use of organic and natural fertilizers, improving the topsoil and the water-cycle. One large scale policy driven directive and example is that of the Brazil Forest Code in 2012 which mandates preserving forests and natural vegetation on 20% to 50% of the cultivable land.

It is slated to prevent a net loss of 53.4 million hectares of forest and native vegetation by 2050, 43 million hectares of which are in the Amazon alone. As a result of this, Brazilian agricul-

ture

### **ABOUT THE AUTHOR**

Ms Komal Shah Bhukhanwala is Director R&D and IP at SML (formerly known as Sulphur Mills Ltd). Under her leadership, SML has developed a global patent portfolio of over 400 patent applications continues to thrive on rain-fed soils, even though several of these soils have been degraded and weathered, due to established agricultural practices and excessive cultivation.

A major challenge is the small farm holdings in India. FPOs can be the game changer in implementing such changes and become adaptable models for regenerative agriculture.

For regenerative agriculture to succeed, practices will involve adoption of inputs from various industries including green technologies from biofertilizers, high nutrient-use-efficiency fertilizers, biopesticides, microbial bioremediation for rejuvenation and restoration of soils and even water sources.

Nitrate contamination in groundwater is largely due to excessive synthetic fertilizer use based on urea and other ammonium based fertilizers. Most water sources will require cleaning through ion exchange units or reverse osmosis, to be usable by humans.

Another challenge for regenerative agriculture is to address deficiencies of nutrients which have been reported in more than 50% of the soils in India. While organic or biofertilizers or manure are natural and benign, they may not necessarily address the deficiencies in the soil, which are necessary to produce healthy crops. When soils are deficient and nutrients as required in balance are not made available, the crops are also more susceptible disease and pests.

In many cases, animal manure tends to be heavily nitrogen loaded, and may continue to worsen the nutrient imbalance in soils which are already degraded. Manures from farm animals which graze on soils which are deficient, are prone not only to be devoid of all nutrients required for healthy crops, but carrying undesired toxicants from pesticide use.

A growing challenge faced by regenerative agriculture is that of soil salinity. Saline soils occupy 44% area covering 12 states and one Union Territory, whereas sodic soils occupy 47% area in 11 states.

Various factors including weathering



In many cases, animal manure tends to be heavily nitrogen loaded, and may continue to worsen the nutrient imbalance in soils which are already degraded

of minerals, fossil salt deposits, salinization in coastal lands, transport of salts in rivers, over extraction of groundwater



My hobbies include trekking, cycling and ballroom and classical dance and over use of chemical fertilizers and amendments (including lime and gypsum) lead to soil salinization. Saline soils pose a threat to food and nutritional security.

For regenerative farms to become models and truly viable and sustainable, while addressing climate change, food security and nutrition security, an integrated approach is required. Various new practices and adoption of green technologies need to come together while correcting water quality, soil quality, nutrient availability, so that regenerative farms can actually be implemented in practice longer term.

Policies and provisions encouraging nutrition smart and ecological agriculture, solutions which address metabolite-free and and residue-free agriculture, must be strongly encouraged. Changes in allocation of subsides to other nutrients, mass farmer awareness programs about the need for such solutions and a collective effort between industry and government, can pave the way for the successful future of regenerative farming.

### THE GRASSROOTS

### **TRADITIONAL INDIAN AGRICULTURE IS REGENERATIVE AGRICULTURE**



ince the 1900s, the elder generations of my family have been practicing traditional agriculture. It is almost 120 years of success. In the traditional system, cattle play a major role. That is what we call "regenerative cattle -based agriculture".

We grow paddy, maize and coconut. Ours 20 hectares of land is divided into three parts. One part is for paddy, second is for maize and third is coconut. A single crop pattern is followed.

We keep our cattle in the field, not in the shed. Cattle are tied to a long rope with a 6 feet gap. Dung and urine get distributed uniformly in the soil. There are many advantages of Indian traditional agriculture.

1. Mastitis is a dangerous disease in cattle, by this India is losing 17% of cattle. As cattle are shifting to new places regularly, bacteria will not get developed thus our cattle are not affected with mastitis so far.

2. Weed is also a global issue. Applying weedicide for removal is a cause for cancer. Uniform distribution of urine acts as uric acid and removes weed naturally.

3. In coconut we keep our cattle near the root system. The dung and urine is added directly to the root system. This system is effective. It restricted "rugos spiraling white fly" which migrated from the USA.

4. Manpower is saved as no cleaning of shed is required. No shifting of dung, no power or water is needed. Thus time and manpower are saved.

5. Swachh Bharat is nothing but keeping the environment clean. Our cattle - they help us in achieving Swachh Bharat. We keep soil clean by means of dung and urine. If soil is clean, water also

### About the **AUTHOR**

Mr Satish Babu Gadde is an award winning farmer practicing traditional agriculture in Andhra Pradesh. Farming is their family tradition since 1900, growing paddy, maize and coconut, practising cattle-based farming

![](_page_55_Picture_15.jpeg)

remains clean. If soil and water remain clean, air also remains clean.

Out of 5 elements which are essential for living beings, three elements (soil, water, air) are controlled by cattle. Hence cattle should be kept in the portal of Swachh Bharat as brand ambassadors.

6. We leave whole milk for calves. From Day 1, calves are left with their mother. They learn everything, develop immunity and get pregnant at the age of 18-22 months. Every year we get about 16 calves and they grow up to keep the cycle going. We sell the oldest mother at third calving every year. That amount is enough to manage the farm.

Besides that, they give us milk, manure etc. It seems that we are not managing our farm, our cattle themselves are managing the farm. That is the greatness of traditional Indian agriculture.

7. If you observe cattle dung carefully, you will find holes in it. Pour water into those holes and you will realize that at least one litre of water will go into one hole. There are 10-15 holes per dung. When it rains, all the water going into these holes seeps into the ground.

When a plant needs water, the stored water by percolation adds water to its roots. This is our observation. So cattle help our future generations by increasing the water table.

8. We face ecosystem issues when the cattle are separated from agriculture. The youth that practices agriculture imbibe knowledge from social media and get drawn towards the western way of doing things, which have radically different climatic conditions from our land. Our land is too unique to ape things from other lands.

### Paddy

Single crop pattern. Standing crop from June-November. Later green fodder is grown for cattle. We get 76% of rice per quintal, very less brokens. In other practices it's only 58%. Additional 18% of rice with single crop pattern. Magic is single crop getting double crop results. The greatness of traditional Indian agriculture. When we compare with other

![](_page_56_Picture_10.jpeg)

![](_page_56_Picture_11.jpeg)

As a youth, Mr Gadde was part of the AP team in seven national tournaments, and captain for Andhra University in 1987 at South Zone Inter University Championship at Bangalore

fields, more than 5% weight is observed in 100 kg of paddy.

### Maize

Single crop pattern. Standing crop from Oct 20 to Jan 20. During this time no other crop will need manpower.

In the second crop pattern, maize is sown in January, harvesting in April. If we calculate man-days and working hours, in single crop pattern and double crop pattern, there is a difference of Rs 28,000 per acre. This is the profit of the second crop. Without growing second crop, getting the profit from two crops – magic of traditional Indian agriculture.

### Coconut

No inter crop is placed as cattle are kept for grazing. Stylo hemata, a grazing grass is grown which transforms calcium into soil and to coconut plant. When cattle are kept near the root system, dung and urine is left over. With watering, all get mixed. This will go through root system and act internally. Thus flower and fruit fall is not observed. So we have crossed 240 nuts (approx) / plant/annum as against 170 nuts by Coconut Board of India. As there is no inter crop, the trader pays Rs 2 more per nut because less manpower is needed. Additionally we get Rs 480 per tree at the rate of 50 trees, totaling Rs 24000. Traditional Indian agriculture stands high.

### Traditional Indian Agriculture Increases Nutrition Values of Crops

Nutritional value is falling due to continuous usage of pesticides, artificial fertilisers, multi-cropping, changes in forming methods etc. Mostly there is a decrease in different nutrients like proteins, calcium, phosphorus, riboflavin and ascorbic acid. There is an urgent need to increase the nutritional value of crops by increasing land fertility. Our experience reveals that it is possible with cattle only.

### **VEGETABLE OIL SECTOR FOCUS ON PRODUCTION, SUSTAINABILITY**

![](_page_57_Picture_2.jpeg)

alm oil has contributed significantly to economic growth and poverty reduction in palm oil producing countries through the production of large-scale plantations and millions of smallholders who rely on oil palm cultivation to improve their livelihoods and provide for their families.

Smallholders generally suffer from lower yields due to poor quality of planting materials and lack of awareness and training on best agricultural practices amongst other things. RSPO adopted a Smallholder Strategy in 2017 with clear objectives to improve livelihoods of oil palm farmers, make the certification process more inclusive and integrate them in the sustainable palm oil market.

Certification is a great tool to help

elevate farming practices, and certifying farmers as a group allows them to work more collaboratively, share experiences, and learn from each other. It helps farmer groups to implement good governance mechanisms to manage the production and trade of their produce effectively.

RSPO-certified palm oil producers experience higher and more reliable yields than non-certified producers. Fo smallholders, this means higher income

### About the **AUTHOR**

Mr Ashwin Selvaraj is Deputy Director, Market Transformation at the Roundtable for Sustainable Palm Oil, with a focus on India, China and Singapore. He is passionate about inclusive business and participatory approaches to sustainable development

which as a virtue of increased yields.

### Feasibility For Smallholder Farmers

Certification is often considered a costly affair for smallholder farmers. While there are costs involved in implementing sustainable and good agricultural practices, certification also plays a major role

![](_page_57_Picture_13.jpeg)

![](_page_58_Picture_1.jpeg)

### **Tremendous Potential In India**

In a critical market like India, RSPO sees tremendous potential for increasing the demand for sustainable palm oil. There is strong interest to engage with RSPO on how we can ensure that supply is actually sustainable and we look forward to seeing that percentage increase in the years to come. India imports almost 9 million MT of palm oil making it the largest importer of palm oil globally.

However, India's uptake of sustainable palm oil is still relatively low at 3%. Over 90 Indian origin companies are currently members of RSPO and together with the multinational companies that have a presence in India, RSPO's members who have operations in India amount to over 150. We are actively working with our members and partners in India to make the case for sourcing sustainable palm oil and playing a leadership role in transforming the global palm oil market.

in decreasing the overall input costs in the medium term while improving yields, which increases the overall profitability for farmers.

Typical activities that involve resources in the certification process include setting up a farmer group and establishing procedures to manage the group effectively, conducting trainings for the farmers in the group on environmental, social and best management practices to be adopted on the farm, conducting assessments such as High Conservation Value (HCV) assessments to identify and protect socially and environmentally valuable areas in and around the farm, implementing the use of Personal Protection Equipment (PPE) to prevent accidents while working on the farm, safe storage, handling and disposal of chemical inputs used on the farm etc. Once these practices are implemented, there is an additional cost component in the form of an external audit that verifies the effective adoption of these best practices on the farm.

RSPO recognises that these cost implications are a barrier for smallholder farmers to adopt greener practices on their farm. Therefore, we are increasingly focused on supporting smallholders through a range of measures, one of which is the establishment of the RSPO Smallholder Support Fund (RSSF). It allocates 10% of the income generated by the trade of Certified Sustainable Palm Oil (CSPO) to help palm oil smallholders around the world to get certified by RSPO, without incurring the associated costs. Through the RSSF, grants are provided to smallholder groups to help them overcome the initial investments that are required to change their practices before they can become self-sustainable. So

far, over USD 4 million has been directed by RSPO Smallholder Support Fund to thousands of smallholders across 12 countries since 2013.

In addition to the RSSF, there are other tools aimed at reducing the cost of certification for smallholder farmers. These include a mobile application for conducting some of the social and environmental risk assessments based on HCV requirements, and a virtual credit trading platform that allows smallholders to secure the premiums from leading consumer companies directly without the involvement of the rest of the supply chain.

The success of our outreach to smallholders has led to increased smallholder certification. Smallholders now account for 30% of RSPO's membership, equivalent to some 1.2 million families.

### Making Oil Palm Plantation Sustainable

Sustainable palm oil production comprises legal, economically viable, environmentally appropriate and socially beneficial management and operations. This is delivered through the application of a set of principles and criteria, and accompanying indicators and guidance measures, as part of the RSPO Standards.

Reviewed every five years, the RSPO Standards covers the most significant environmental and social impacts of palm oil production and the immediate inputs to production, such as seed, chemicals and water, and social impacts related to on-farm labour and community relations. It captures relevant, impactful and implementable requirements which are collectively discussed and agreed upon by the seven categories of our multi-stakeholder membership base.

The RSPO standards are organised into three impact areas according to the RSPO Theory of Change – Prosperity, People and Planet. This ensures a competitive, resilient and sustainable sector; sustainable livelihoods and poverty reduction; and conserved, protected and enhanced ecosystems that provide for the next generation. Regular Posting Date 27-28 Post Office: Lodhi Road DL(ND)-11/6128/2021-22-2023 RNI No. 68745/98

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### India Ka Pranam Har Kisan Ke Naam

The dedicated hardworking farmers of India deserve recognition. Year after year our farmers who battle great odds and adversities to make India self-sufficient deserve our salute.

### For the last 4 decades, Dhanuka Agritech Limited is working with farmers and moving forward together. During this journey, Dhanuka took a pledge to bring prosperity in the lives of these farmers using advanced tools and technology. Dhanuka's trained field force is empowering farmers with new age ways of increasing farm yields and crop production.

Dhanuka is committed to bringing a positive transformation to the lives of farmers. At Dhanuka, we believe every citizen of India will salute the farmers for their dedication, determination and grit.

![](_page_59_Picture_7.jpeg)

### **Dhanuka** Agritech Limited

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