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Agriculture & Industry Survey

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India's Leading Business Magazine for Agriculture

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CONTENTS

Make life easier for farmers, villagers!

India is a great agricultural power, a great agricultural economy!

How many of the policy makers, occupying key positions in the power structure of Delhi care to respond sympathetically?

Yes, when do these securely positioned high and mighty think of farmers and rural people? Who has the time to think of the lost causes? Agriculture certainly seems to have become one such? Yes, it looks like!

Agriculture, when it has a high priority?

When we open our newspapers and see occasionally the headlines proclaiming the record harvest of food grains, specially the wheat and rice output in so many hundred tonnes. Ironically, today too, we read this season's food production targets reached!

So, this season too the government needn't worry too much about the agri sector's support for the government for doing what it is doing. Agriculture at the time of Corona Virus and farmers' protests prolonging! What an unfortunate coincidence!

Right now, the deadly Corona Virus has entered the rural hinterland and there is an unreported fear and anxiety among the otherwise largely carefree general public. But unfortunately the current goings have drawn in the very vulnerable and poor into the net and the immediate future looks very grim indeed.

Unfortunately, the Corona Virus has desired any left-over optimism about the future of the country and the economy.

The silence prevailing with the PM undertaking a daily ritual of online international hasn't lifted our spirits with what the government's perceived setback in the W.Bengal Assembly elections.

The over-zealous pursuit of the Assembly elections in Bengal, with the PM undertaking a record 11 trips for campaigning had created a new kind of sensation and the pursuit of other projects like building a new Parliament and a palatial house for the Prime Minister's residence hasn't gone down well with the public and the media has been less enthusiastic.

The media, especially the foreign media has been very critical. The Indian counterparts have been what is called "cautious", the Indian media is known for its own choice of words and expressions when it comes to express their own timidity in the place of media freedom. Our media reforms must address the typically lopsided structure of the media industry.

The international media, more so such organizations like the "reporters without borders" have exposed how we behave in times of national crisis. Thus, this time when mistakes were committed we continued to hide ourselves behind a fig leaf!

There must be equity and justice in promoting the media in the development segments. The Pandemic has created an uncertain future for the country and no one knows what the coming days and months would bring into our lives.

The Prime Minister for his part has become lately into a silent mode as far as many other issues as well. There doesn't seem to be any breakthrough in the government-farmers confrontation. Yes, when it comes to farmers' issues there doesn't seem to be any warm feelings between the government and the farmers who too after prolonging their demands, the critical demands being the total withdrawal of the three laws that were introduced without wide debates and passed in an arbitrary manner and they have struck in the minds of farmers as a betrayal of their faith in the government's attitude towards the farming community.

Agriculture is an universal issue, agriculture comes into any nation's economic policy making except for a few countries with small geographies food production is a basic economic activity and either you produce the food yourself or important food and this becomes a major trade policy issue.

A vast land mass and varied seasonal activity and thus every major region has an agricultural space and the changing seasons, rains and the related natural cycles make India a great agricultural power.

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WHY AGRICULTURE MATTERS?

Agriculture in a time of climate change, erratic rains, natural disasters etc!
For every one, individuals and people alike?

Yes, such questions are not asked everyday and everyone at that!

For the simple reason we live at a time when the rest of the world is preoccupied with more self-related questions. Money earning, job securing and running about our own day to day issues like personal happiness or personal anxieties and concerns.

Right now of course we are caught in the life threatening Corono Virus and its many much more mutant variants and we can't wake up and feel relaxed or secure in the day when more bad news come long with the many issues grappled with by our leaders's own prognosis for the day or days ahead.

Unfortunately, our leaders and policy makers are not so reassuring, given their own limitations, limitations brought about also by everyday narrow concerns. Of course, the time is a democratic time and there are issues with a world that in the name of democracy has led to an anarchistic ways for doing things and solving the issues.

As we write there are Wars and destructions in Congo, Syria and Afghanistan and elsewhere, right now in the Israel-Gaza fronts and it becomes frightening to see so much bombing and fires and much else.

There is a latest report, on the internal displacement of peoples within their own countries and, large and small.

Even within China there is such an unprecedented displacement of people inside the country.

There is a latest report from Geneva, from the Internal Displacement Monitoring Centre(IDMC), according to which, in its latest annual global report a record of 55 million people within China, are now living away from their homes! Within their own countries there are floods, storms, protracted violent storms and floods new conflicts and natural disasters.

The Geneva-based Norwegian Refugee Council oversees the IDMC and while IDMC looks after the vulnerable people, the IDMC is also committed to the plight of the other vulnerable people who are exposed to mass movement of the refugees and other migrants, among whom we have to put other vulnerable groups.

The director of IDMC director Alexandra Bilakk says it is about all else the problems of climate change is the villain which creates so much instability and the intense cyclonic, storms lead to so many disasters and destructions which arena quite a familiar occurrence almost many times a year.

It is the explorations of natural resources that lead to the climate change and warming of the planet.

In India one of the main reasons for the climate change is the over exploitation of natural resources, be it oil, water or coal and other natural resources.

As we are seeing in the Corona Virus Pandemic the people at large, the general public are totally indifferent and insensitive and we don't care for the diminishing water resources or other such valuable resources.

One such diminishing resource is food!

Many International agencies, not just the UN agencies alone, have warned of the diminishing food resources, we are warned, a fifth of it is lost to climate change alone!

The UN's World Food Programme warns of a looming catastrophe the agency further warns that about 34 million people on the brink of famine!

These background information, the latest on the world's famed Cornell University Journal, Nature, Climate Change, warns.

How far the Indian policy makers know of the seriousness on the Indian agriculture front?

There are many reasons to feel unhappy without policy makers.

What new policy initiatives we have heard recently from the Indian establishment?

None, none at all!

Instead we see the prolongation of a massive farmers's protest hanging fire for months! Is this policy making for a sector that had made India proud. We are today the world's number one rice producer and exporter! Yet, our per capita income is only one eight of the China's farmer!

However, we see so much disregard for the feelings of the poverty-hit farmers community.

The problems of the Indian farmers are too many and it is not the place here to discuss them.

Indian has perhaps the largest small, micro farmers who own the minimum per head acres of farm land.

We need radical ideas and sciences to lift our farming standards to world levels.

Highly qualified persons, in knowledge and experience, more and more high committed individuals must be put in charge of the Krishi Bhavan.

Let us hope there is a very fast change of heart to meet the kissed and lift up their spirits. Jai Kisan, Jai Jawan!

Indian farmers expect to harvest record wheat, rice crops this year

India is expected to produce a record 108.75 million tonnes of wheat this year, the farm ministry said in its third forecast for the crop year to June 2021, marginally lower than its previous estimate of 109.24 million tonnes.

Rice output in the world's biggest exporter and the second largest producer is estimated at a record 121.46 million tonnes compared to a forecast of 120.32 million tonnes in February.

The farm ministry forecast this year's total grains output to be at a record 305.44 million tonnes, up from its previous estimate of 297.5 million tonnes. The efforts of India's farmers, scientists and the government has paid off, said Agriculture & Farmers Welfare Minister Narendra Singh Tomar.

The government had lowered its oilseed output estimate to 36.57 million tonnes from 37.31 million tonnes forecast in February.

Rapeseed production is estimated to be at 9.99 million tonnes this year, down from the previous forecast of 10.43 million tonnes, the farm ministry said. Similarly, soybean output is expected to be at 13.41 million tonnes, lower than the 13.71 million tonnes estimated in February.

The farm ministry pegged peanut production to be at 10.12 million tonnes in 2020/21, lower than its earlier estimate of 10.15 million tonnes. Production of pulse is likely to be at 25.56 million tonnes this year, up from the 24.42 million tonnes estimated earlier.

Sugarcane production is estimated to be around 392.80 million tonnes against 397.66 million tonnes forecast in February, the farm ministry said. It added that cotton output is expected to be marginally higher at 36.49 million bales of 180 kg each from 36.54 million bales estimated earlier.

The farm ministry said farmers are likely to harvest a record 30.24 million tonnes of corn against 30.16 million tonnes forecast earlier.

By Mayank Bhardwaj

Source : https://www.agriculture.com/markets/newswire

Just 2% farmers use mobile app in field; little IoT post-harvest

As India looks to scale up use of technology in agriculture, a recent study has found that with just 2 per cent of the cultivators in India using mobile applications for farm-related activities and real-time alerts, adoption of tech solutions such as Internet of Things (IoT) remains at a nascent stage. It also found almost 90 per cent of the existing start-ups and tech-based companies have solutions that are focused only on pre-harvest operations and not on post-harvest which has a higher investment potential due to the presence of big companies.

In post-harvest operations, the study, Titled, IoT Adoption in Indian agriculture, that was conducted by industry body Nasscom along with Cisco India among more than 180 enterprises and 40 agritech start-ups found that unclear Return on Investments (RoI) is a big stumbling block for adoption of tech solutions like IoT.

The report showed that at between 27-37 per cent, IoT adoption is significantly low across the agriculture value chain which is further hampered by unclear benefits and longer time to scale.

"Lack of IoT advantages in pre-harvest stages stems from low farmer incomes and large-scale tenant farming; while in the post-harvest stages, with more organized companies and higher investment potential, unclear Return on Investment (RoI) is a stumbling block," the report said. The study also found that the current state of IoT deployment in Indian agriculture is very nascent and disparate, both

YET TO TAKE OFF

- More than 90% IoT adoption in Indian agriculture is in pre-harvest operations
- More than 180 firms and 40 start-ups found that unclear RoI is a stumbling block for adoption of tech solutions
- IoT adoption is low across agriculture value chains due to unclear benefits, long time to scale and high cost
- This is despite the country having more than 450 agritech start-ups and even big firms providing tech-based farm solutions
- Globally, IoT adoption in agriculture is projected to grow three times between 2019 and 2027

in available solutions, and in the initiatives taken.

"I think, given the state of Indian agriculture we don't have enough people who make that kind deeper commitment to be able to invest in pre-harvest technological solutions and given that return on investment in post-harvest technological solutions in farming is low we feel that it here that government and industry should come together to provide a sort of 'uberisation' of tech solutions like IoT etc," Sangeeta Gupta, Senior Vice President, and Chief Strategy Officer, Nasscom said.

The study found that awareness and use of IoT solutions in the pre-harvest stages of agriculture is limited to basic sensors, RFID, and limited IoT devices, while in post-harvest stage the most widely used technologies are sensors and RFID devices which are heavily used in processing operations, packaging, storage, and logistics.

Detailing the reasons for low adoption of cutting edge technology in both pre-harvest and post-harvest operations in agriculture, the Nasscom report said that workforce resistance as one of the main reasons for low adoption, along with, high cost of the solutions, limited proof of the technological solutions in reducing cost of farming and unwillingness to change as being the prime reasons for low adoption of tech.

The Nasscom-Cisco report recommended establishing local presence by tech companies along agriculture clusters by giving them access to government, industry, local NGOs and Farmer-Producer Companies (FPCs).

"Within farmer groups we found that response about technology solutions is mixed with some who are more adaptable to new options, but again cost of technology and the impact it can make on them remained a big question mark," Gupta said. She said findings of the report will soon be shared with the Central and state government for further action.

The report further advised that work should be done on establishing agriculture corridors on the lines of industrial corridors with PPP-mode development and farmers' equity.

Source : www.business-standard.com

Farmers understanding benefits of price-locking at sowing time with options trade

Confident of derivatives trade picking up in agricultural commodities, officials said farmers have begun understanding benefits of the options trading by locking in their price at the cost of sowing of the crop in a big way. A special 'options familiarisation programme for FPOs (Farmer Producer Organisations)' has also helped farmers learn a technique to take care of the price risk and concentrate their efforts on increasing the yield of their crops, an official said.

"The success of the programme will most likely encourage them to participate in similar contracts in other agricultural commodities as well," he added.

The programme was launched by commodity bourse NCDEX in November 2020 wherein FPOs registered as clients with members of NCDEX were eligible to buy a put option and lock-in a price in two commodities -- chana and mustard seed facilitating the farmers/ FPOs to manage the price risk.

The premium cost up to Rs 300 per quintal to purchase put options was reimbursed by NCDEX out of regulatory fee foregone by the market regulator Sebi.

According to an official, more than 40 FPOs participated in the programme and locked in the price on behalf of farmers for a sale quantity of 1,030 metric tonnes of chana and 1,980 metric tonnes of mustard seed. The premium cost of buying put options of more than Rs 80 lakh was subsidised under the programme.

This helped farmers to have the comfort of the price and concentrate on the production of the crop. Prices of produce worth around Rs 15 crore could be hedged between the sowing and harvesting period.

In order to encourage farmers/FPOs to trade on the commodity derivatives exchange, Sebi decided to forego the regulatory fee and allowed exchanges to utilise such forgone money for the benefit of farmers and FPOs by reimbursing mandi tax, charges like assaying, cleaning, drying, and put option premium for incentivizing their participation in the contract of options in goods. A put option gives a right but not an obligation to the holder to sell at a specified price at a specified date. The farmer or FPO buying a put option is protected from the downward price risk while also retaining the upside benefit. In this case, the premium for buying put options on chana and mustard seed was borne out of the regulatory fee forgone by Sebi, thus making it almost cost-free for farmers or FPOs.

"Since the minimum price was assured at strike price of the put option bought, farmers were able to concentrate more on increasing their yield," the official said.

"Naturally, the minimum price locked-in by FPOs was higher than the cost of production," he added.

"It was also heartening to see that FPOs understood the features of this product as they themselves decided the strike price and expiry date of the put option to be bought and managed their positions, either by squaring off or holding till expiry. This indicated that FPOs have learned about the product and were comfortable using it," an exchange official said.

Price protection through the put option also enabled FPOs to avail finance at a reasonable cost as lending institutions like banks and financial companies have certainty about the minimum price that would be realized by farmers for their produce.

Source : economictimes.indiatimes.com/

How digitalization can help improve dairy farming

India is the world's largest producer and consumer of milk. Milk production in the country is expected to continue to report strong growth in the foreseeable future. Milk demand too is expected to rise to 266.5 million tonnes by 2030, according to a study by the National Dairy Development Board (NDDB)

Our per capita milk consumption is well below other major producers, and the cattle yield is also among the lowest. Enhancing yield is one of the key challenges in the Indian dairy sector. In my opinion, it is also a major responsibility so that dairy farmers or milk producers can receive better compensation for their efforts.

This is, however, easier said than done. There are an estimated 96 million dairy farmers in India and the daily production of 440 million liters of milk. Most of these farmers have 3-5 cattle and many of them even fewer. Enhancing milk yields requires improved cattle feed, better cattle health, milk extraction equipment, veterinary facilities, and a host of other factors. Considering the sheer numbers of farmers and bovine cattle, increasing milk yields is a daunting task, to say the least, but the country is on the right track. Efforts are being made to enhance cattle productivity, and the results should start becoming visible in the near future.

Along with improved yields, the major challenge for the Indian dairy farmers is the lack of adequate milk cooling infrastructure. A delay in chilling leads to an estimated three percent or around 5 million tonnes of milk getting spoiled, causing heavy losses to the farmers. Even otherwise, the delay causes a rapid increase in bacterial load, affecting milk's quality and reducing its potential shelf life. The currently available solutions are inadequate to achieve the desired quality standards. The absence of a continuous and reliable power supply during chilling is also an issue in many villages. A majority of milk collection centers also do not have cooling infrastructures such as chilling centers, cold chains, or bulk milk coolers.

While these are huge challenges, the other way of looking at them is that they also present a huge opportunity for the dairy sector. Solutions to instantly chill milk at the source are available, and efforts must be made for their higher adoption.

According to projections in the government's National Action Plan, there is a requirement of 8,80,000 rapid milk chillers in India, and this translates into a $3 billion opportunity.

There is a lot of focus on strengthening the milk cooling infrastructure during the collection and distribution stages by the government and the cooperative or private sector. Still, similar efforts are needed at the farmer's doorstep to reduce milk wastage if not completely prevent it.

The value added to milk products in India is also significantly lower than other major producers, and this is also a challenge and an opportunity. According to the government's estimates, there is a potential to add more than 115 million tonnes of additional processing in the value-added dairy products segment in the next five years. This, too, has the potential to attract thousands of crores of rupees in investment and must be tapped.

Talking about digitalization, it is already playing a vital role in the dairy sector and is expected to become a critical aspect in the near future. From farm management, which includes using technology to monitor cattle health and productivity, to milk procurement, comprising automatic milk collection systems and bulk milk collection systems, digitalization is everywhere.

Digitalization also has applications in milk testing for evaluating the quality, screening adulteration, and ushered in greater transparency and traceability throughout the dairy supply chain. The opportunities for digitalization are immense, and even more so because of the greater adoption of emerging technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and Cloud.

As a leading dairy technology company, working at the ground level for nearly three decades, the resilience of Indian dairy farmers still amazes us. If India can transform itself from a milk deficient country into the world's largest milk producer in a matter of a few decades despite all the challenges, we can imagine where our dairy sector can be in the next 10 years if we empower our dairy farmers with the necessary tools and infrastructure, and extend them the support they need. In such a scenario, the sky is the limit for the Indian dairy sector.

Source : www.indianretailer.com

Online Meetings @ www.agricultureinformation.com

Upcoming events

JUNE 9, 2021

5:00 pm
Dr. V. Vani on "Post harvest management and value addition of mango and other horticultural produces"

JUNE 10, 2021
3:00 pm
Dr. Parameswaranaik J on "Entrepreneurship Development in Sericulture Industry"

05.00 PM
Mr. Rajender Kumar on "Soilless leafy and herbs under retractable roofs"

JUNE 11, 2021
05.00 PM
Dr. Priya P. on "Integrated nutrient management in field crops"

JUNE 14, 2021
3:00 pm
Mr. Deepak Kumar on "Proper guidance from soil testing to market linkage to increase income"

05.00 PM
Dr. Satendra Kumar on "Integrated fish farming system models for viable rural livelihood"

JUNE 15, 2021
3:00 pm
Mr.Vimal Panjwani on "Renewable energy for agriculture / farmers"

05.00 PM
Dr. Amit Mandal on "What is Biofloc Technology: How it helps to enhance aquaculture productivity "

JUNE 16, 2021

3:00 pm
Mr. Akash Gupta on "The organic ventures in providing services in processing, trading, livestock, input, wild harvest "

05.00 PM
Dr. Anandkumar Naorem on "Spineless cactus: An unconventional yet intriguing dry land fodder"

JUNE 17, 2021

3:00 pm
Mr. Yogesh Thite on "Spirulina processing and marketing"

05.00 PM
Major Ved Prakash Sharma (Retd) on "Food Forest Model – For high density natural precision farming"

JUNE 18, 2021
3:00 pm
Ms. Kranti Choudhari More on "Direct marketing of farm products by farmers to consumers"

05.00 PM
Mr. Rajkumar Chandrasekar on "Revolutionising aquaculture with latest technology"

JUNE 21, 2021

3:00 pm
Dr. Jyoti Dhakane-Lad on "Utilization of agro-biomass for green packaging and hometextile"

05.00 PM
Dr. Basavaraju Pu'alingaiah on "Agro-forestry: Scope and Sustainability"

JUNE 22, 2021
3:00 pm
Mr. Nilesh N. Jadhav on "My experience in starting and successfully running a nursery project"

05.00 PM
Mr. Prakash Francis on "Banana fiber extraction process"

JUNE 23, 2021
3:00 pm
Mr. Yashpal Morey on "Irrigation system designing and water management in agriculture"

05.00 PM
Mr. Arvind V on "Mango softwood grafting for be'er yield"

JUNE 24, 2021
3:00 pm
Mr. Amarendrababu Chekuri on "All about Sandalwood plants"

To participate in these online meetings please visit www.agricultureinformation.com and click on BECOME PREMIUM MEMBER

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Recently Completed Meetings

Mr. Narayanan Alwar on "Vertical axis wind pump for small irrigation"

Mr. Narayanan Alwar is the GM Solutions in VodafoneIdea Limited, Pune, Maharashtra. His interest is sustainable agriculture , windmill, vertical axis wind pump for small irrigation and concentrated solar energy for agriculture use.

Mr. Narendra More on "How we produce high quality dutch roses, red rose, pink rose, white rose and gabriel rose"

Mr. Narendra More is the Proprietor of Jaibadi Bijasani Rose Nursery in Pune, Maharashtra. They are Manufacturer and Supplier of all kind of roses plants all over India. Jaibadi Bijasani Rose Nursery is famous for Crop Production of Dutch Rose Plant, Red Rose Plants, Pink Rose Plants, White Rose Plants and Gabriel Rose Plants. These products are highly admired for their long shelf life, and high freshness features. Offered products are grown using top grade ingredients as per the set industry standards and norms. To know more view https://bit.ly/3tysyU0

Mr. BK Menon on "All about turmeric and curcumin"

Mr. BK Menon is the Proprietor of Green Planet Agri in Bengaluru, Karnataka. To know more view To know more view h!ps://bit.ly/3w2VDIz Mr. BK Menon says curcumin is the main active ingredient in turmeric. It has powerful anti inflammatory effects & a strong anti oxidant curcumin boosts immunity. Curcumin in turmeric has been studied by NIH – National Institute of Health Baltimore-USA and Johns Hopkins Medical College Hospitals USA as a beneficial herb in Cancer treatment.

Prof. (Dr.) Kumaraswamy S on "Integrity of Soil Ecosystem Services: Social-Construct Perspectives"

Prof. (Dr.) Kumaraswamy S is the Professor and Dean(Faculty of Agriculture) in Sri Sri University in Cu&ack, Odisha. His interests are Soils & Human Ecology; Regenerative Agriculture; Agro-ecology and sustainability: Water and soil resources services in agricultural landscapes, Shifting cropping landscapes and their impact on the rural economy, Controlled environment agriculture and technology Interventions, Precision farming, Regenerative agriculture; etc.

Mr.Yogesh Kumar Verma on "Subsidies and cultivation of olive farming"

Mr.Yogesh Kumar Verma is the Deputy Director at Agriculture Department , Government of Rajasthan in Jaipur, Rajasthan. His interests are olive cultivation, protected cultivation and fertigation. Rajasthan Olive Cultivation Limited runs under the brand name Rajasthan Olive Cultivation is owned by Yogesh Kumar Verma located at S.I.A.M. Campus Agriculture Research Institute, Durgapura, Jaipur, Rajasthan. Mr. Yogesh Kumar Verma says a pilot project on Olive cultivation was conceived after the visit of team of farmers and agriculture experts to Israel to study technical feasibility and economic viability of the Olive cultivation in Rajasthan.

Dr. B.J. Pandian on "Water Management conservation in agricultural crops"

Dr. B.J. Pandian is the Princiipal of Kumaraguru Institute of Agriculture, Erode, Tamil Nadu. His interest is Water Management. To know more view https://bit.ly/3eAmMuL

Dr. Deborshi De on "Role of integrated radical farming in sustainable agriculture"

Dr. Deborshi De is the CEO of Smart Management Consultancy in Kolkata, West Bengal. His interest is Food and Agriculture. Dr Deborshi De is a food-technologist, scientist, an educationist and a social entrepreneur. Running several startups of his own along with his own research areas in food technology and sustainable agriculture. He is leading awareness campaigns on the over usage of chemicals, developing on farm composting techniques, integrated pest management solutions by traditional Indian methods, process counselling, certification system implementation and creating access to market of several agro-commodities especially for medium, small scale and marginal farmers. To know more view https://bit.ly/3dKI0qs

Dr. Priyabrata Das on "How smart devices, AI/ML will revolutionize modern agriculture"

Dr. Priyabrata Das is the Co-Founder and CTO of Napuor Organics in Bangalore, Karanataka. His interest is IoT inagriculture. To know more about Napuor Organics view https://bit.ly/3tn0JOn

Dr. Vijay Kumar Arora on "How to manage soil health for beer yield"

Dr. Vijay Kumar Arora is a Consultant Faculty at Maharana Pratap Horticultural University in Karnal, Haryana. He has worked as Assistant Professor (1982-1995,13 years), Associate Professor (1995-2003, 8 years) in CCS Haryana Agricultural University, Hisar. Dr. Vijay Kumar Arora has carried out research on soil science and water management for 38 years.

Mr. Venkataswami Reddy Surasani on "Our experience -Agri retail space with Hub & Spoke model of supply chain"

Mr. Venkataswami Reddy Surasani is Co Founder & Director of Kissan Agri Mall Pvt Ltd, Kurnool, Andhra Pradesh. Mr.Venkataswami Reddy Surasani interests are Retailing is one of the traditional business operations, which has repercussions in all the sectors of the economy. The huge potential of the rural market along with the benefit that can be accrued by organizing the existing fragmented market has led to the concept of organised agri input retailing or 'one stop shops'

Mr. Priyanshu Jain on "How hydroponics (soilless farming) is changing the dynamics of Agriculture in India and globally"

Mr. Priyanshu Jain is the Founder of Agri Joy LLP in Agra, U$ar Pradesh. His interests are Hydroponics and Sustainable Agriculture. To know more view https://bit.ly/3gthMdQ

Mr. Rajender Kumar on "Profitable vegetable cultivation in tropical dry regions"

Mr. Rajender Kumar, Business Development Manager-South & East Asia, Cravo Equipment Ltd., Canada. The retractable roof production system or RRPS has been developed by Cravo over the last 35 years, to help growers create superior results using a system that combines the benefits of climate optimization, nature and protection. They have built up substantial experience through research and by partnering on projects across 6 continents in the fruit, berry, vegetable, flower and reforestation sectors. To know more view https://bit.ly/3kJeymi

Dr. N. Inayathullah on "Recent technology & development in aquaculture industry and how it fulfills human needs"

Dr. N. Inayathullah is thw Founder & CEO of Shrimp Care Solutions in Pondicherry. He says, application of scientific knowledge and technology always help mankind to transform life at ease and paved way for a be)er future. Technologies applied in aquaculture are also not an exception to it. Rapid development is implemented for the last few decades in aquaculture industry that satisfies the protein requirement of human across the globe; besides ensuring employment opportunities and foreign exchange for many underdeveloped and developing countries.

Mr. R. Dinesh on "Guidelines for good on-farm shrimp feed management"

Mr. R. Dinesh is an Assistant Professor (Aquaculture) at Mandapam Centre for Sustainable Aquaculture of Tamil Nadu, Dr. J. Jayalalithaa Fisheries University in Ramanathapuram, Tamilnadu. His interests are Aquaculture, Aquaculture Nutrition, Aquatic Animal Health Management. To know more view https://bit.ly/2QJcKir

Dr. Yugraj Yadava on "Improvements in value chain in the fisheries sector"

Dr. Yugraj Yadava is the Director of Bay of Bengal Programme Inter-Governmental Organisation in Chennai, Tamilnadu. His interests are sustainable development of marine & inland fisheries; safety at sea of small-scale fishermen, improvements in the value chain in the fisheries sector and sustainable development of shrimp farming in the country.

Mr. Upendra Singh on "Eco-Tourism - A Step towards doubling the farmer's income"

Mr. Upendra Singh is the Co-Founder of Farm Trip Private Limited in Jaipur, Rajasthan. His interest is agriculture. To know more view https://bit.ly/3tiEoR6

Mr. Malik Kumar Meena on "Agritech startups in India -Different categories, problems they are solving and their operations"

Mr. Malik Kumar Meena is the Manager at Sickle Innovations, Gandhinagar, Gujarat. He has done MBA from Institute of Rural Management Anand (IRMA). To know more view https://bit.ly/2PKgznA

During this meeting, Mr. Malik Kumar Meena will give a brief overview of Agrietch startups in India. It will include information about starts working in different categories, what problems they are solving and about their operations. It will be useful for the students , people in agritech industry to know about startups and for farmers to find suitable solutions related to crops they are producing.

Ms. Rishya Pankaj Kapil on "Technological advancement in the field of agriculture by taking the example of the smart farm of IFFCO Kisan in Bijnor"

Ms. Rishya Pankaj Kapil is Senior – Executive at IFFCO Kisan Sanchar Limited in Moradabad,U-ar Pradesh. Her interest is technological advancements in agriculture. To know more view https://bit.ly/3dEE6y5

Ms. Simone Strey on "A digital end-to-end solution to support sustainable small-scale farming"

Ms. Simone Strey is the Co-Founder and CEO of Plantix , Indore, Madhya Pradesh. Her interest is Plantix – grow smart. To know more view https://bit.ly/3gzCetC

Mr. Kalle Sreenivasulu on "Date palm cultivation - economics & marketing details"

Mr. Kalle Sreenivasulu is the Managing Director of Vikas Biosciences Pvt. Ltd. in Hyderabad, Telagana. His interest is Date Palm (Khajoor) Cultivation. Date Palm is the highest income crop among all Agriculture/Horticulture crops. Mr.Kalle Sreenivasulu says in India many farmers earn good income through date farming and it is majorly grown in Andhra Pradesh, Telangana, Karnataka & Tamilnadu in South India apart from Gujarat, Rajasthan and other North Indian states. To know more https://bit.ly/39JPFDd , https://bit.ly/3fFexjc

Dr. Chandra Kiran Sant on "Realistic perspective of Indian Dairy Industry"

Dr. Chandra Kiran Sant is the Dairy Advisor at Livestock Management Centre in Mumbai, Maharashtra. He is also associated with

* Gomati Cooperative Milk Producers Union, Tripura as Expert Dairy Development for improving the milk quality & quantity as well as oversee installation of 40000 LPD Dairy Processing Plant. To know more view https://bit.ly/3dAjWqq

Dr. Probir Kumar Pal on "Monk fruit (a non-caloric new natural sweetener) cultivation details and market demand"

Dr. Probir Kumar Pal is the Principal Scientist at CSIR-IHBT in Palampur, Himachal Pradesh. His are of interests are:

- Development of agrotechnology for medicinal and aromatic crop to increase the productivity and quality.
- Natural sweeteners (Stevia, Monk Fruit)

To know more view https://bit.ly/3dIp2AU

Mr. Balakrishna Nadhubeu on "Cashew plantation - Cultivation, harvesting, processing and marketing"

Mr. Balakrishna Nadhubeu is the Managing Partner of Sudha Electrical Contractors in Puur, Dakshina Kannada District, Karnataka. His interests are cashew plantation; cultivation, harvesting and processing of cashew; cashew nut processing and cashew apple processing.

Mr. Kirtisingh Rana on "My experience in developing a Kesar mango orchard"

Mr. Kirtisingh Rana is a farmer from Vadodara, Gujarat. They grow kesar mangoes which are ideal for the soil and weather conditions in his place. Mr. Kirtisingh Rana says kesar mangoes start to flower in December and they are able to start harvesting the fruit from April. Weather plays a big part in mango because of the 6 month period between flowering and end of fruit picking. Any inclement weather and thunderstorms could ruin the crop.

Online meetings are available only for Premium Members

TALKING TO

Dr. Bir Singh Negi

Former Advisor, APEDA

Schemes and Programmes for Food Processing and Value Addition of Fruits and Vegetables

Dr. Bir Singh Negi is the former Advisor, APEDA and has worked in various capacities to earn his wide experience in horticulture, post-harvest management, food processing, and organic farming. He was Director Horticulture with Government of Uttarakhand, Director Tea Board, Director Herbal Research and Development Institute, Government of Uttarakhand, and retired as Additional Commissioner, Ministry of Agriculture and Farmers' Welfare, Government of India.

Dr. Negi talks about various incentives under schemes and programmes for food processing and value addition of fruits and vegetables in India as follows.

India has a vast land area of 2.97 million sq.km with a population of 1.30 billion and is one of the most stable democratic countries. It has freshwater reservoir of 15 million hectares. India is the third largest food producer in the world after China and USA and is second largest producer of fruits and vegetables after China with 310.45 million MT. The government had launched a flagship scheme during 2004 - 2005 to double the horticulture production from 150 million MT including fruits, vegetables, flowers, spices, plantation crops, medicinal and aromatic plants, mushroom etc. India is the largest producer, consumer, and exporter of spices. More than 50 types of spices are cultivated. Pepper, cardamom, ginger, garlic, turmeric, cumin, fennel, coriander and chilli are the major spices. India is also the treasure house of medicinal and aromatic plants. India processed food market include about 34 % grains and pulses, 32 % Beverages & others, 15% dairy products, 9% meat and marine products, 8% oils and 2 % fruits & vegetables.

India has many major food processing industries, both global and domestic standards. Nestle, Pepsi, Coke, Delmonte, Kellogg's, Unilever are some of the global industries. ITC, Dabur, Britannia, Parle, and Amul are Indian multinationals along with domestic companies like Reliance, Bharti, Wipro, Tata, and Dabur.

There is a huge unexplored opportunity underlying in food processing industry. Food processing sector comprises of mainly three segments– primary segment includes fruits cleaning, cutting, sorting, grading etc . The second segment includes preparation of pulp, flakes, and paste, while the third segment is all about preparing final products like jam, jelly, juice, bakery products, oils and drinks.

Dr. Negi points out that Maharashtra is a leading State in production horticultural products. In fruits (banana, grapes, pomegranate, citrus fruits) and vegetables (onion, tomato, beans, brinjal, and cauliflower etc). It is followed by Andhra Pradesh, Gujarat, Tamil Nadu, Uttar Pradesh, West Bengal, Bihar, and Madhya Pradesh in production of various horticultural products.

Dr Negi says that India has many advantages such as:

- Proactive government policy with attractive fiscal incentives
- Investment in logistics, ports, and supply chain infrastructure
- Rich demographic dividend with high focus on skill development
- Availability of skilled personnel
- Opportunity for investors across the food processing supply chain

The country is ranked number 1 in the world in terms of production of milk, buffalo meat, ginger, okra, banana, papaya, mangoes, and guavas. It is ranked 2nd in the world in production of green peas, potatoes, tomato, sesame, and other commodities. It ranks 3rd in total food production next only to China and USA. The country stands 1st in terms of employment generation in food processing sector and number of factories, and 3rd in terms of output. There are 37,175 registered food processing units with fixed capital of USD 24 billion and output of USD 114 billion. The country has been witnessing higher growth in agriculture and manufacturing sector due to the strategic geographical location and proximity to food importing nations such as Middle East.

Processing of various sub segments of food in the country is very low as compared to other developed nations. Wastage in other perishables is also high in India. According to ICAR, due to lack of modern harvesting technologies and cold chain infrastructure, processing levels of fruits and vegetables in India stand at 2% while other countries do more than 60%. Processing of perishables fruits and vegetables is only 2 %, marine products 23%, poultry 6%, meat 21%, and dairy products is 35 %.

FDI regulations in the food processing sector:

Dr. Negi points out that India permits 100% FDI for manufacturing sector under automatic route. FDI is applicable to retail trading sector, and 100% FDI under approval route permitted for food products manufactured or produced in India, such as floriculture, horticulture, cultivation of vegetables and mushroom. FDI is also permitted 100% for plantation crops under automatic route for rubber, tea, coffee, cardamom, palm oil and olive oil.

Dr. Negi says that export has tremendous opportunity in India. On an average every year, about 23.10 million MT of agricultural products valued at Rs. 1.31 lakh crores are exported. Total 3.59 million MT of fruits & vegetables, such as mangoes, walnuts, grapes, banana, pomegranate, onion, okra, chillies, mushroom, and potatoes have been exported to countries like UAE, Bangladesh, Malaysia, Netherland, Sri Lanka, Nepal, United Kingdom, Saudi Arabia, Pakistan, and Qatar. There is a remarkable increase in horticultural products and progress in area expansion for higher production.

Indicative opportunities in food processing:

Dr. Negi says that the opportunities in food processing include:

- Fruits and vegetables processing
- Cold storage
- Reefers
- IQF
- Packhouses
- Ripening chambers
- New packaging technologies for increased shelf life, retaining taste and texture
- Easy to hand and space efficient better storage facilities and logistics
- Energy efficient technologies
- Food testing labs
- R & D infrastructure

In 2018-19, processed food such as mango pulp, dried and preserved vegetables, processed vegetables and fruits, confectionery, cereal preparations, animal products, alcoholic and non-alcoholic beverages, and other miscellaneous preparations worth USD 4.60 billion were exported to countries such as USA, Vietnam, Iran, Saudi Arabia, and UAE.

The key incentives for food processing:

- 42 mega parks at a cost of Rs. 98 billion
- NABARD has special fund of Rs. 2 thousand crores for food parks and processing units
- Loan facilities to processing units and cold chain under priority sector lending
- Preconditioning, precooling, ripening, waxing, retail packing, and labelling of fruits and vegetables exempted from service tax
- Concessional customs duty for imported equipment
- Income Tax deduction on capital expenditure for cold chain or warehouse
- 100% income tax exemption for new food processing, preservation, and packaging units for the first 5 years and 25 to 30% thereafter.

Dr. Negi points out as key fiscal incentives the following:

- Paradigm shift in government strategy
- Focus on catalysing private investment
- Reforms in agriculture marketing to help processing sector
- Food and safety standards act to prescribe the quality and safety standards for food products

Vision Document of Ministry of Food Processing Industries (MoFPI) talks about trebling the size of investment in processed food sector by increasing the level of processing of perishables from 6% to 20%, value addition from 20 to 35% and share in global food trade from 1.5% to 3%. The outlay proposed for government support for food processing sector has increased from Rs. 650 crores in 10th five-year plan to Rs. 15077 crores during 12th five-year plan.

The MoFPI is working in close collabo-

ration with food industry capacity and skill initiative sector and skill counsel in food processing. FICSI targets training under PMKVY. NIFTEM and IICPT have regular program on skill development for farmers, self-help groups, and industry with the help of National Institute of Food Technology Entrepreneurship and Management. The Spice Board works on developing and promoting Indian spices.

Dr. Negi also talked about the schemes of MoFPI. The flagship scheme -SAMPADA is launched for implementation of mega food parks, integrated cold chain, preservation infrastructure, creation and expansion of food processing and preservation capacities, infrastructure for agro-processing clusters, creating backward forward linkages, food safety and quality assurance infrastructure, and human resources and institutions.

About incentives under SAMPADA, Dr. Negi points out that subsidies @35% for general areas and 50% for North-eastern areas and hilly areas are available for creation of Backward and Forward Linkages scheme subject to maximum of Rs 5 crore. For Operation Greens, for Price Stabilisation Measures- 50% cost of transportation & 50% cost of hiring appropriate storage facilities provided as subsidy at time of harvest. For Integrated value chain development projects- Grant-in-aid @ 50% of the eligible project cost in all areas, subject to maximum Rs. 50 crore per project. For FPOs it would be 70%. For Mega Food Parks subsidy is @ 50% in general areas and @75% in North-eastern and hilly areas with an upper limit of Rs. 3 crores. For Cold chain and value addition infrastructure subsidy is @ 35% for general areas and @ 50% for North-eastern and hilly areas. Similarly grant in aid for irradiation facilities subsidy is available @ 35% for general areas and@ 50% for North-eastern and hilly areas. Creation of new unit of food processing unit's subsidy is @ 35% for general areas and @50% for hilly and North-eastern areas with a limit of Rs. 5 crores. Infrastructure grant-in-aid @ 35% of project cost in general areas and @ 50% for hilly and North-eastern areas with a maximum of Rs. 10 crore per project. Subsidy is also available for schemes on Food safety and quality assurance, human resources and institutions.

Dr. Negi talks about APEDA which offers promotional schemes for exports. 40% subsidy is available for eligible projects with a limit of Rs. 1 crore for setting up of post-harvest handling houses, pack houses, refer van, VHT, HWT, and cable systems. Assistance for missing gap like upgrading and quality development get 40% of the cost with a limit of Rs. 35 lakhs. Market development and dissemination of market intelligence, trade fairs, and events are also supported.

Ministry of Agriculture & Farmers welfare also implements Scheme viz Mission for Integrated Development of Horticulture (MIDH) focussing on setting up of processing units:

- Credit linked back-ended capital investment assistance of 50% of the cost with ceiling cost of Rs. 8 crores per unit
- For smaller units 50% of the cost with ceiling cost of Rs. 26 lakhs per unit.

The venture capital schemes of SFAC aims at supplementing the financial gap, providing 40% of promoters' equity up to Rs. 50 lakhs, venture capital repayable after repayment of term loan, credit linked capital subsidy for micro,

small, and medium industries with subsidy of 15% of investment and maximum Rs. 1 crore in plant and machinery.

Post Covid, what are the changes that going to take place about exports, food processing and food products to EU, because the regulations have become tough and there are negotiations to make it easier for Indian exporters to EU? We find that we predominantly export to Middle East and USA and export of turmeric has trebled. What are the changes we should understand?

There have been many mercantile exports that have been affected but agriculture and allied activities have not been affected much during COVID-19. APEDA has been providing all assistance to exporters during the Covid period. This year obviously organic products have a huge demand along with medicinal and aromatic plants and nutraceuticals. EU are coming up with new regulations with effective from January 2021. There are some problems with issue of Letter of Permission, and they are also going through LOQ for 0.001%. Our capacity is 0.01%. I do not see any problem as our export to gulf countries are good. There are challenges. Canada is posing a problem stating that they were earlier checking organic and LOP certified products, but they have their own standards now. Not only India, but all exporting countries are facing problem.

We have started integrated farming with organic fruits and medicinal plants. We want to increase the shelf life of the products, and we plan to set up cold storage and ripening processing centre. Also, we want to ensure safety to other farmers nearby. Is there any scheme or subsidy for this? Also, we want the other farmers to get nominal price for their produce.

There are lots of schemes for creation of post-harvest infrastructure, cold storages and integrated pack houses, and refrigeration units. MIDH offers 50% of the cost for plant and machinery and technical civil work in case of eligible projects. The National Horticulture Board has schemes for promotion of horticulture through cold chain. Ministry of Food Processing Industries has schemes for cold chain for bigger projects. APEDA provides 40% subsidy to exporters with maximum of Rs. 1 crore to export oriented projects. There are various schemes. You should approach state horticulture department and in some cases food processing industry department. You can check the websites of APEDA, Ministry of Food Processing Industries and Ministry of Agriculture & Farmers welfare for more details. The Government of India is keen on improving and increasing the infrastructure in agriculture sector by allotting Rs. 1 lakh crore.

We are in Maharashtra and growing sugarcane. We want to start a unit for manufacturing jaggery on a larger scale. Will it be considered as a food processing unit?

Yes. Visit the website of Ministry of Food Processing Industries and check the guidelines. They have schemes for setting up of new units or upgradation of the unit for cereal and other allied products. When the shape of the product is changed, it is value addition to the product. You can contact state food processing departments that work for implementing the schemes. It could be agriculture or horticulture or food processing department.

We want to process jowar flour, but it is not considered as a food product. How do we proceed?

Recently, as a part of Atmanirbhar Bharat Abhiyan, the Ministry of Food Processing Industries (MoFPI) is implementing a new Centrally Sponsored Scheme "Prime Minister Formalization of Micro Food Processing Enterprises – (PMFME)" to promote the unorganized food processing sector in the country. You can give the proposal to the state government and it may, in discussion with government of India food processing department, be considered.

For medicinal final product what is the outlook for export? Which countries are best to export and how to channelise?

Post Covid, there is a huge demand for immunity booster products like medicinal, aromatic, and nutraceutical products such as Aloe vera, Ashwagandha, Giloy, Tulsi, Ginger, Turmeric etc. Western countries have also understood the value of our Ayurvedic medicines. You must be part of APEDA, register yourself and you can export the produce through APEDA affiliated packing houses after sorting, grading, and packing. You should also ensure that the residue level is within the permitted limit. USA, Canada, EU counties and Switzerland have huge demand for these products.

This is an excerpts from an online meeting conducted by agriculture-information.com in October 2020.

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Sudhir Choudhry

Founder, Family Farmer NGO
Jaipur

Having hailed from an agricultural family, the struggles of a farmer are nothing new to Mr Sudhir Choudhry. "The work out in the field is always remarkable but the returns are painful and frugal."
When at the crossroads of life after having completed his BSc in Agriculture, Mr.Sudhir decided to take up the initiative of bringing farmers together with the vision of helping them better their income.
"I am all for profitable and sustainable farming than merely organic farming promotion. Through the duration of my education, I understood the place that technology holds in the field of agriculture. But we aren't using them optimally today."
It is high time that India begins focusing on the quality of food we produce.

Switching over to organic farming

The switch over to organic farming cannot be done overnight. It takes three years until a farmland can turn completely organic. We have been into agriculture since hundreds of years in Rajasthan. It is a myth that organic farming cannot reap benefits.

If a farmer wishes to convert 1 acre of land into an organic field, the first step is to use pesticides and chemicals on the farm. Next apply to a local certifying agency declaring that he wishes to convert to organic farming. There are specific organic products and oils that is prescribed. When you apply, only apply with government agencies so that the charges are nominal and procedures are kept simple.

We have to utilize resources like owning a cow etc to make organic farming simpler and effective. All organic inputs like jeevamruth etc can be made at your own place at zero budget. We teach farmers to make organic fertilizers so that they can keep their cost of cultivation low. People always focus on the output of farming. But when we compare organic and inorganic farming, there are a lot of input costs involved in inorganic farming. Organic farming is always about preventive measures. You need to be focused and approachable. For organic farming, care must be given proactively. We have to keep ready all the fertilizers, etc. The procedure is of course lengthy, labor intensive etc but the output is more gratifying. Additionally, you are keeping your land replenished and fresh.

Among 11 Cr 83L farmers, there are only 8L 35K into organic farming. Chemical fertilizers are used to churn money out of the market place. Market is about demand and supply. Demand of organic produce is also great. People are willing to pay 5 times more for organic produce.

Today wheat gets sold at Rs.1500 per quintal. But an organic farmer gets Rs.6000 per quintal. Moreover he gets the buyer coming to pick up stuff from his farm. My mission is to create better farming practices, better farmers, better food grains in India.

The concept people follow is more produce = more money. But this is not the case. We should understand the concept of demand and supply. If you take mustard for instance, demand is low and so the price is low. Adding to that, supply is surplus. On the other hand, if you observe any progressive farmer, you will realise that apart from the regular farm work, he would be doing something exceptional. That is how they generate profits. This is a reality for them because they know the demand and supply graph.

How does your organization help farmers?

We have, till date, been successful in getting 20,000 farmers organically certified. All of these farmers have been reaping benefits. As much as it is true that there are farmers dealing with poverty, it is true that there are many farmers reaping benefits from agriculture.

When it comes to prices, there are many who are willing to pay a good price for quality products. My vision is to encourage every youth to be participative in the agricultural field. They must put their education to better the agricultural sector. This will ensure that farmers get better exposure to technology and better cost effective methods of farming which will impact their profits positively.

Why do you think there is a resistance among farmers to convert into organic farming?

1. Lack of awareness and guidance. Our organisation provides all the guidance and practical experience that farmers need to switch to organic farming. We do this to boost their confidence and knowledge level. This comes free of cost. Our mission is to produce progressive farmers.

2. We get to hear that middle men eat up a lot of profits in the agriculture. Consumers are much focused. Middle men project what the consumers need because they are aware of their needs.

3.We help farmers get educated, technically feasible, advanced.

Initially converting to organic farming may feel as though it has pulled your yield down. But that is very similar to a withdrawal symptom - an outcome of

stopping artificial and harmful preservatives etc. In a matter of 3 years you see your farm flourishing due to improved soil and environmental conditions. This change is here to stay long-term.

Where is the market for organic products in India?

Our organization works towards getting a good market for organic produce. In urban cities there are many clients who are willing to pay premium price for good produce. They are willing to pay up to 5 times that they pay for inorganic produce. But they ask for high quality produce in return.

We can guide you to get an organic certification at a minimal amount. For that first you must stop chemical abuse on your farm, if any. We can get you a better market, clients etc. This is true of farmers anywhere in the country

Are there agents who certify farms - how does it work?

There are 20 certifying agencies issued by the Government of India. There are agencies in every state. For example, in Rajasthan, there is Rajasthan Organic State Certifying Agency. This is a State Government agency which offers services at a minimal amount.

Organic produce has very low shelf life - what can be done about that?

There is always an alternative that comes up. About a year ago, we didn't have organic herbicides. But now, we do. When it comes to things like spots on coconuts, etc. it can be treated by organic methods.

Now, unlike chemically treated produce, organic produce is very real. They are not artificially treated and so will last only according to their natural ability. We cannot play around their shelf life.

We can employ better storage and transportation facilities but do not try altering shelf life using chemicals. The whole purpose is then lost.

What can be done about rats and monkeys eating our produce. How can we counter these things?

Prevention is better than cure. It is best to check how best we can prevent these animals from entering the farm. Neem oil there is an excellent solution. Contact me for further details.

Kindly elaborate about the problems when it comes to organic farming.

The quantity of produce will initially go low.

If farmers are illiterate and do not have much guidance on organic farming, then the first thing they think of doing is withdrawing and getting back to chemical farming. So, having someone as a guide is utmost helpful. Organic farming is also labor intensive and organic farming requires more focus. The farmer, in organic farming, has to be indulgent at every phase of the farming process.

In organic farming, it is important to foresee and prevent plants from countering diseases. Observation is a key skill that organic farmers need.

As a consumer, can I be assured that a produce with an organic label is indeed organic?

Yes, that is correct. Today all products are standardized by Food Security Standards of India, NPOP, APEDA, Chrysil etc. These products are regularly checked and scrutinized. The adulteration chances, I admit, are still there but if you are buying form a renowned source, it cannot go wrong. You can also run these products through a lab and get reports. The charges are nominal. But you can get transparent about what you are buying.

How do you link farmers to market their organic produce?

We are well connected to many businessmen and market sectors. We have a network of people and organizations that demand organic produce for the working of their business. we are not mediators. But we can help farmers connect with genuine buyers using our networks.

How do you ascertain if the produce is genuine while entrusting this connection between farmers and your network?

We always check the lab reports of the produce before connecting farmers with our connections.

Why do you need to have an NGO for this initiative - why not just help farmers directly?

There are many regulations to be maintained. If we are representing any farmer/buyer, we need to be organized and regulated. That is why we are an NGO as well. A farmer would trust me more as an organization rather than as an individual. This is the same with the buyers as well. It helps build the trust better.

Any last piece of advice before we close the meeting?

Family Farmer NGO has developed 162 acres of land exclusively for field demonstration. Farmers are free to visit this farm any time. It is 15minutes away from Jaipur airport. We have medicinal farming, vermi composting etc. We have formulated organic farming at that place. People can witness how things can be done.

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Kalidas Raj

Partner of Agrri Unlimited, Bangalore, Karnataka

Mr Kalidas Raj, partner of Agrri Unlimited, Bangalore, Karnataka, offers a wide range of planting materials for growing Chrysanthemum flowers. He says that chrysanthemum flowers, both traditional and imported hybrid varieties are quite easy to grow and maintain. The plant grows in protected and open areas as well all through the year with varied growing practices in many locations.

The flowers are mainly used for pooja and decoration purposes. The plant is grown predominantly in South India. Normally they will fetch Rs. 100 per kg. Total turnover may be about Rs. 8 lakhs, out of which traditional variety plants costs Rs.3 and the upcoming new varieties will cost Rs. 5 per plant. The farmer will incur a total expense of about Rs. 3 to 4 lakhs and get a net profit of Rs. 4 lakhs.

The traditional varieties like poornima etc is seasonal and harvested before summer. The hybrid varieties are grown round the year, which are different from the traditional ones by size, quality, and production. He is working on improved varieties from Netherlands by different breeders . They are more useful as cut flowers and also as loose flowers. Some of the imported varieties introduced and grown are Grand Kineria,Aishwarya,Bushkin, Bhagayashree,Gompy yellow,scent white and scent yellow etc.

The main advantage of growing the plants round the year is to meet the market demand during Sankaranti, Ugadi and the wedding season in may and June. The plants need long days for growing and short days for flowering. The traditional varieties are planted before summer and are grown naturally. Where as the imported varieties are planted round the year.The plantations during June to December, requires artificial lightning, The flowers produced during summer fetches good prices,almost double ranging from Rs. 250 to Rs. 300 per kg. By providing additional light, farmers can grow the flowers in off season too and get good price during wedding season. Currently there are about 12 varieties available India. These flowers are exported to Gulf countries, Malaysia, and Singapore.

Mr Kalidas Raj says that they get about 20 to 25 varieties every year for trial production,these varieties are tested for adaptability,disease resistance,production and market acceptance.This year 4 varieties are been introduced,Mila cream variety, Gerono yellow,Gerona white and deoni pink. These plants can sustain rain, nematodes, and adverse weather conditions. Mr. Kalidas Raj offers his help to the farmers with all the technicalities. He has already documented the type of soil, pH requirement, and planting density. They can plant 18 to 24 thousand plants per acre in the winter season and in other seasons 12 to 16 thousand plants.

These plants are affected by caterpillar, mites and thrips which need to be controlled at the right time. The first three months will be the vegetative Phase and then plants start flowering which will last for next three months. The plant cycle is six months. The cuttings supplied are taken from the imported mother plants for better quality and vigour. The Mother plants are maintained well, protected from pests and disease. They can easily get sizeable quality flowers of about 500g per plant. If they maintain the plants well, they can expect more yield. The Mother plants are replanted every year

Farmers can provide temporary artificial lighting system to the plants from June to December at a cost of about Rs. 50 thousand per acre.

Tell us about land preparation.
Mr. Kalidas Raj says that sandy loam soil is best suited for these plants. He has seen many farmers opting for crop rotation for chilli in Vijayawada which is ideal for chrysanthemum. Farmers can add FYM when preparing the bed which is generally about 1 meter apart covered with mulching sheet. Drip irrigation has to be done. There should be a gap of 30 cms between each plant and 40 to 50 cms between the rows.Before planting is done, basic fertilizer along with neem cake should be applied on the bed.

Which is the best season for chrysanthemum flowers?
The best season for traditional variety is February to May. Artificial lighting is not required for this type. If the farmer wants to grow between June to December, he must provide artificial lighting both in open and polyhouse condition . Chrysanthemums can be grown as alternate crop for capsicum etc as crop rotation.This will help to control nematodes.

Can you throw some light on forcing?
Once the pinching is done, the plants start giving branches.After getting the required height and canopy,can spray growth retardants to initiate bud formation.

Can we have some details on pest management?
In open cultivation, immediately after rain, the plants will face attack of caterpillars which needs to be attended immediately. During bud formation, the plants may get attacked by thrips and mites. You may also see blight or leaf curling. The plants will show wilting symptoms due to fungal and bacterial infection. It can be controlled by getting good planting material from genuine mother plants. Organic pesticide can also be applied which will control the pests. B9 or Alar that are available in the market can be used as growth retardents. These sprays will help in improving the number of flowers and uniform opening.

Is it advisable to grow marigold Chrysanthemum as tissue culture sapling?
Mr Kalidas Raj points out that he

has seen farmers finding it difficult to maintain the tissue culture plants. He usually gets the cuttings from the mother plants and give the rooted cuttings to the farmers. Growing the plants using tissue culture will be difficult to maintain during the initial stage of planting.

Can we plant together to prevent nematodes?
Nematodes can be controlled by following crop rotation with chrysanthemums. Planting together will not be economical. Mr. Kalidas Raj points out that chrysanthemum is a winter loving flower and has to be planted for every cycle,once the flush is over.

Tell us about harvesting.
Once the production starts, harvesting is done in 15 days interval for three months. It depends on the light availability and opening of the buds. To harvest the flowers, 10 people are

needed for one time in a single day.

Do you have special colour flowers?
Mr Kalidas Raj says deoni pink with cherry red colour in the centre, yellow colour with a different pattern, dark pink, purple and cream white are available, but usually it is yellow and white that are sold for making garland and other purposes.

What is the cost of the sapling and is prebooking needed?
Mr Kalidas says that they are taking booking for the new varieties from November. The new variety will be Rs. 5 per plant and the traditional ones will be Rs. 3 per plant. Yes, prebooking is needed. He also says that once the farmers take the plants from him, they can get consultancy over phone too. If they are near Bangalore, he can take up field visits. He does not charge any money for consultation from them.

Are chrysanthemum flowers commercially viable?
Delhi, Mumbai and Chennai has a big market requirement. Flowers from Bangalore are supplied to these places. Mr Kalidas points out that flowers grown in polyhouse can be exported. The firm has mandi agents and bulk buyers from different parts of the country, such as Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka. He opines that the varieties from Netherland can be grown here in favourable conditions. They may fetch good price due to non availability of chrysanthemum flowers from January. Traditional varieties can be grown only for limited months/ season. These flowers have medicinal value also. Small farmers are the main customers, and the bigger farmers go for crop rotation with a vegetable and chrysanthemum crop,which also controls nematode and fungal infection. Plant saplings for a minimum of 0.5 or 1 acre must be ordered from him.

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Corona pandemic powers growth prospects for online flower market

If Eliza Doolittle (of 'My Fair Lady' film were alive today, she would as likely be found pitching to investors for seed funding as shouting "penny a bunch" to passers-by in Covent Garden. Selling flowers, the occupation of George Bernard Shaw's Cockney heroine, is moving online, the latest disruption to a sector still dominated by thousands of independent operators.

According to Aron Gelbard, chief executive of UK flower and plant delivery business Bloom & Wild, UK the fragmented nature of the sector and its lack of tech savvy is making the shift painful. "Flowers are an emotional product and, as an industry, we're doing a terrible job," he said.

Bloom & Wild last month announced the takeover of Dutch rival Bloomon, for an undisclosed sum, creating what it claims will be the biggest online player in Europe. But its forecast £200m revenue will still be less than 1 per cent of the estimated £22bn total market.

As in other sectors, Covid-19 has pushed consumers online. Florists were closed to walk-in customers during lockdowns and in the early stages of the pandemic supermarkets diverted selling and distribution space to essentials. Meanwhile, homebound consumers splashed out on brightening and greening their homes.

John Hackett, chief executive of flower fulfilment company Arena Flowers, said many customers forced into online purchases had "found it a better experience than they expected. We expected Middle England to move online but much older people, who we assumed would not buy online, adopted really quickly." Newly formed online habits will put more pressure on traditional florists, he added, which "probably have even less runway now than they thought".

> **We expected Middle England to move online but much older people, who we assumed would not buy online, adopted really quickly**
>
> John Hackett, chief executive of Arena Flowers

More than 600 high street florists have closed over the past six years, according to the Local Data Company. Interflora, which has been arranging flower deliveries among its member florists since 1923, was sold to a US company in 2019 for $59.5m. That is comfortably less than the £75m that Bloom & Wild raised in its last funding round even though Interflora still accounts for a significant chunk of UK flower orders.

Bloom & Wild, launched in 2013, is typical of a new breed of florist. Most of its expertise lies in website coding, data capture, analytics, marketing and search optimisation — skills and resources that Gelbard says are well beyond the average high-street operator.

It operates a slick website with beautiful imagery and was one of the pioneers of subscription flowers delivered in flat cardboard boxes through the post.

The flower arranging is all outsourced to Flamingo, a low-profile UK-based wholesale florist that grows flowers in Africa and ships them from dedicated warehouses in Europe. Its customers include almost all of the UK's big supermarkets.

It is the same at Moonpig, the greetings card and gifting company that recently floated in London. Around a fifth of its £340m annual revenue comes from bouquets — all processed, shipped and delivered by Arena Flowers, which buys direct from growers.

The supermarkets spurred the industrialisation of floristry in the 1990s, according to Arena's Hackett, when they began to develop national distribution capability for flowers.

Around the same time flowers from Africa, which can be grown outside year-round, began to disrupt the traditional European supply chain. "The costs of production fell, packers were able to cut prices and many wholesalers vanished," said Hackett.

The new modus operandi cut timelines as well as costs. "With traditional florists, it can easily take five or seven days between flowers being cut and being on the customer's kitchen table," said Bart Troost at Bloomon. "For us it is roughly 36 hours."

Gelbard and others maintain that airfreighting flowers from Africa is less environmentally destructive than consumers imagine.

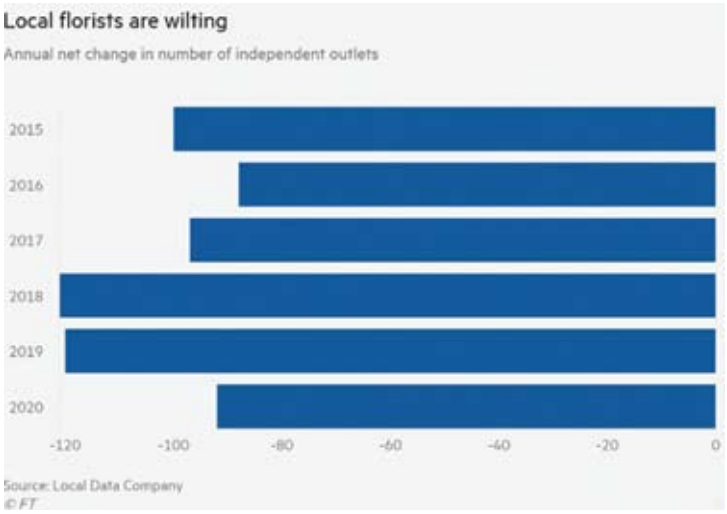
"When you grow a flower in Kenya, which has the right climate, it has about one-sixth of the climate impact compared to when you grow it in a heated greenhouse in northern Europe."

Subscription business models, which generate recurring revenue, customer data and predictable demand patterns, have been a big growth area, but the on-demand market still has huge potential, according to Troost.

"We actually shifted our focus away from subscriptions to on-demand two years ago. It's now roughly 70 per cent of our business, down from 90 per cent two years ago and it will be maximum 30 per cent in the long-term.

Not everyone thinks traditional shops are doomed. Caroline Marshall-Foster, a third-generation florist and editor of The Florist website, expects weaker operators to close just as ailing store chains have, but not for there to be a sector-wide implosion.

"Will florists survive? I'm pretty sure the good ones will," she said. "Local florists are still the only ones that can do funerals and weddings and they are the only ones that can do same-day services."



They may not have the purchasing power of an Arena or the tech wizardry of Bloom & Wild. "But they offer a very personal service — and for many people that still matters a lot."

The pandemic was difficult for many local florists; the lucrative wedding market all but closed, the wholesale price of flowers shot up and productivity was reduced because they had to operate from behind closed doors. But lockdowns have spurred plant and flower purchases.

Researchers at Mintel expect that over the next five years, flowers will become more of a day-to-day treat and less of an event-driven purchase.

Marshall-Foster said the power of flowers "has never been appreciated as much as it is now…they can be used to say anything: I love you, I miss you, I'm thinking of you".

By Jonathan Eley and Patricia Nilsson

Source : www.ft.com

Madhusudan H V Iyengar

Project Manager
SayTrees Environmental Trust, Bangalore

Amidst all the mad rush, the price analysis, the lip services about the multitude of issues, the divine sends across messengers, not to preach, but to action. Afterall, actions speaks louder than words.

It must be at such an instant at some point in time, not that long ago that Mr Kapil Sharma who was then doing a day job in Bangalore could not stop himself from thinking that gardens were being cut away from the Garden City. Hailing from Raipur, this periodical activity of eliminating trees left sad notes within him owing to the fact that places like Raipur were deprived of trees and had scorching high temperatures in abundance.

He felt the need to replant and went about planting trees one after the other individually. Seeing and hearing about this many like-minded people began doing this. They began planting trees on weekends. And so the group grew and before you know SayTrees was born.

Mr Madhusudan H V Iyengar, Project Manager at SayTrees says, "I come from Sadashivnagar, Bangalore. I remember back in my school days between 90s and 2000s we had a huge forest and my school is built on a forest. We did not have traffic lights back then. We had circles with trees in them. Today we have no circles, parks or trees. It is all becoming red traffic lights. So, we are trying to bring back one forest at a time.

SayTrees is a non-government organisation based out of Bangalore and through SayTrees we visualise hundreds of acres of natural forests in years to come. Our aim is to create plenty of Miyawaki forests in urban and rural areas."

Till date, SayTrees have created more than 70 Miyawaki forests. It is a mix of small, medium and large Miyawaki forests in Karnataka, Maharashtra , Tamilnadu , Haryana, U.P, Delhi, Madhyapradesh, and Telangana.

What is Miyawaki Forests?

Miyawaki is the name of a Japanese scientist/ botanist who showed the technique to grow dense and native forests. I call it native because we have been creating forests in multiple different regions across India. We have been receiving requests to do this outside of India as well. Saplings used in a forest will be native to the region we are developing the forest. So, native is not just native to the country but also the region where the tree is planted. These forests grow fast and they are 100% maintenance free after 3 years. Saplings in Miyawaki grow 10 times faster and the forests are 30 times more dense. It is also 100% native and organic. Planting native saplings are not just easy to maintain, they do wonders to support the local eco system and are less vulnerable to pests and diseases. Native plants also attract a lot of birds, wildlife and butterflies providing diverse habitats and food sources.

The saplings are raised from pedegree seeds and they are non-grafted. They are insect-repellent free. We use cow dung, jeevamrutha, neem cakes etc. to support the sapling growth.

Benefits

Miyawaki forests are highly bio diverse. There are more that 60 species of native saplings in the forest and they occupy 4 layers of the forest making them very dense.

These forests cool the temperature around the place. If in a non-miyawaki place if the temperature is about 30 degrees C, in the adjoing miyawaki forest there will be a recorded 1.5 – 2.5 degree temperature drop. Further, the forest regulates the temperature by evapotranspiration and by providing shade. It helps curb the urban heat island effect. The drop of temperature within a miyawaki forest is:

1. because of the thick canopy

2. the soil there is always moist and the fertility of the soil is intact

3. the rain water is captured efficiently and also there is no soil erosion.

In the Miyawaki forest we do something called soil enrichment process because of which the saplings grow faster and gives optimum microclimate and nutrition for plants to grow better. The organic matter and manure that we provide helps the soil worms to aerate the soil and helps roots to penetrate deeper.

In Bangalore we have seen the temperature drop, water table rising by

50-60ft over 8-10 years of time. Nowadays architects come to us and ask for a Miyawaki forest to be a part of their design. There is a lot of R&D going on creating Miyawaki forests, not in terms of changing anything within the forest but to create an insulating layer to keep city noise out even though you are within the city. That is if a Jakkur or Ulsoor Lake is barriered with a Miyawaki forest, the walkers can experience a different ecosystem, the place starts cooling down etc.

Plants, as you all know, consume CO_2 and give out Oxygen. Miyawaki forests are lung spaces in cities like Bangalore, Chennai and Hyderabad. Every empty space is a potential Miyawaki forest for us. We have also tried and brought in stakeholders from varied space to try and make sure that each and every sq inch that is barren gets a green touch.

We have planted more than 3.5L saplings, till date.

How do you maintain these forests or do you not have to?

It is maintenance intensive for the first 3 years. After that it becomes sustainable. We have a full time gardner in every forest that we plant. We monitor the forests on a regular basis. Growth of saplings and forest density is evaluated. We monitor the soil and local micro-climate. We are NGO Trust. We come under Life on Land and Climate Action. We do compensatory CO_2 emission, engage employees in tree plantation and align with sustainable developmental goals of the UN.

Can this concept be adopted for the horticulture crops as well?

We get such requests. Yes, Miyawaki works when the bio diversity is high. So, we cannot do a Miyawaki with 5,10,15 types of saplings and saplings cannot be just fruit yielding or timber yielding. It should have a good mixture of fruiting, flowering, timber and all of it. It should have fruits and plants. When we do Miyawaki, we also plant hibiscus, jasmine, champa, etc as well.

People do very often come to us asking if they can do monoculture with Miyawaki forest. We understand where you come from but please understand that two things are key to a Miyawaki forest - bio diversity and native plants. Another thing is monoculture is not Miyawaki so we simply cannot do it. There is a kind of trend in the kind of questions we get like, 'can we do a food forest / fruit forest using the Miyawaki concept. A fruit forest/food forest is a long process. It cannot be done in a 5 year span. It is a 10-12 year project.

Do you help develop private lands as well?

We do. But please bear in mind we are a not for profit organisation. So, we will not be able to do it under the SayTrees band. When it comes to private land, the maintenance is on the property owner and the cost that is incurred will be as per actuals and will include a GST component because being part of an NGO we operate out of corporate CSR funds.

What is the economic viability of this project?

With respect to evironmental sustainability, economic viability is zero. We do not do this for economic profits at all. There is no returns in terms of monetary benefits from Miyawaki projects. It is purely for bringing back the lost ecological balance. All these days wherever we have created Miyawaki forests, they are open lands - lands where anybody can walk in to get fresh air. People are allowed to pluck fruits and cherish it. The idea / intention behind building a Miyawaki forest is to help nature recuperate itself.

As far as my knowledge goes, nobody has created a Miyawaki forest for economical benefits. In certain cases, there are a few resorts /sanctuaries who try to create Miyawaki forests and in between they try to have their rooms or lodges. Maybe that can be termed as economical benefit. But that again comes under private land holdings and not under government or not for profit act.

Do you claim Carbon credit?

We are starting with the carbon credit system. We need to first audit, file it as a project and monitor it. Carbon crediting happens only after 5 years. In the first 5 years, carbon credits are not considered. It is only after 5 years since plantation that we can even think of mapping how much of carbon have we consumed / oxygen have we given out yet. That is in the pipeline and we are engaging two research organisations. One of them is more like an auditing firm to whom we are talking to to conduct the carbon credit system.

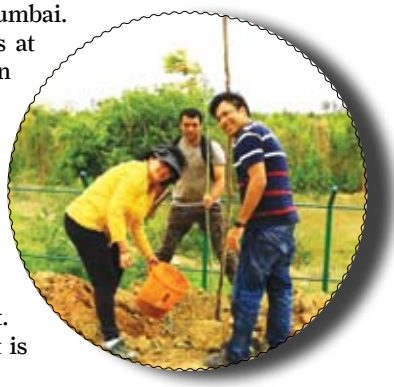
Do we have a list of tree varieties that are suitable for the Tamil Nadu region?

It is not like a menu card with a ready list. It doesn't work that way. It is not a set of saplings. Anything that is native and grows in your region can be planted. It has to be a mixture of plants, first level trees, trees and canopies. Please do not plant one variety in large numbers or 5-6 varieties in large numbers.

That is not a Miyawaki. A Miyawaki has to have at least 40 plus species.

Any suggestions for getting Miyawaki in Hyderabad?

We have done many Miyawakis in Bangalore, Chennai, Noida and even in Mumbai. We have done it in two locations at Hyderabad as well. But yes, we can definitely do.



Do you think to do a Miyawaki forest, one should also have a suitable ambiance? Does it need environmental compatibility?

No, not at all. Any region can be converted into a Miyawaki forest. The only thing we always look at is

ample sunlight. We can even do it in between buildings. One more thing is because it involves a lot of heavy machinery work, we need accessibility to the location. In cities like Bangalore, Chennai, Hyderabad, where we have been creating Miyawaki forests haven't been large space of land - definitely not!

What will the approximate cost be for an acre?

Cost per acre depends on the soil condition. If I give any value right now, it won't be justified if the soil type changes. I can give an approximate figure without maintenance. On a private property, it may cost you about 20-25lakhs per acre without maintenance.

Do you organize any kind of training programmes?

No, we don't. There are no training programmes.

Would you have any last words of wisdom before we wind up?

As a part of the SayTrees project, there is one very important project that we have been doing in the last couple of years. I feel it is a lot related to this forum. Hence, the introduction of this project. If anyone is interested, kindly revert to me.

We have been conducting a project called Agroforestry and we work very closely with farmers. We work with farmers at a very personal level. We identify farmers - local farmers who have their own land and who are not able to grow a lot of cash crops / do not have much of an investment to bring out much of an economical benefit or those who cannot sustain a living from their land. We work with those farmers. We give them fruit bearing saplings and these are grafted saplings because they want economical benefit. We consider this as a symbiotic project where we believe that it increases the greenery of the region plus the farmer will have a parallel source of income. Cash crops may yield 1 or 2 times a year. But the rest of the time the land is empty. In regions from Ananthapur, Hindapur, Bagaipalli, Chintamani, Chiglludatta we have identified farmers with whom we work with. We give them cashew, orange, tamarind, amla, mango, guava, chikku etc kind of saplings that grow in their lands. In between, they can grow their regular crops too. Twice a year or thrice a year they will have their usual cash crop. But annually, starting from 2nd and 3rd year, they will get a regular annual income from the saplings we give them. The only commitment we need from the farmers are that they need to bid for the saplings, plant them and maintain them themselves. There wont be any maintenance component in it because we get CSR funds for this, I need to show survivability. I need to show how many saplings have survived by the end of the second year. If I can show an 85% survivability by the end of the 2nd year, it becomes an on-going project, which means we can add more farmers to the project.

Last year, we have planted more than two lakh saplings with 800+ farmers and we have started plantion with have started as we speak for the current year.

The only thing we look for while working with farmers is, we need an on-ground point of contact. We do not work with individual farmers. Wherever we go, we work with an entire farmer group. It will be a group of at least 50, 25, 100 or 150 farmers who come together and they all report to one person, who can bring them all together and can be a farmer himself, no issue. This person needs to co-ordinate with us and we can drive this in a very large scale.

We want to take this forward as one of the biggest projects because it is the only way we can penetrate into rural market. There are so many pieces of land which is not receiving what is due. While people have migrated from villages to cities looking for job opportunities, we are going back into villages looking for job opportunities.

So, those who are interested please get back to me with farmer communities. We want to help more farmers and add more greenery.

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Dr. T N Balamohan

Former Dean and Professor (Horticulture)
Horticulture College and Reserach Institute
Peryakulam

Dr.T N Balamohan, though retired as Dean and Professor, from Horticulture College and Research Institute, continues to be on top of all information when it comes to farming.

Speaking about banana cultivation he says, "Banana is considered the fourth global food which is highly nutritious and rich in carbohydrate, minerals and vitamins. In India around 8.3 lakh hectares are under banana cultivation from where we produce almost 298 lakh tonnes of banana. We have four ecosystems in India where banana grows very well.

The common system is Garden land cultivation and it is still the most popular globally. Here cultivation is taken using well/bore-well water, otherwise using under ground water.

Another system is wetland cultivation wherein river or canal water is used. The mode of cultivation is quite different where watering is through trenches. This system is practised in those areas where river/canal water is surplus.

Of the four, the very unique systems is called Padughai,which is highly predominant in river banks of Tamil Nadu. This is a perennial cultivation, where planting is done once and the crop remains in the field for many years often more than a century.

The rainfed cultivation is common in hilly areas. In hilly areas artificial irrigation is difficult to bananas due to slopeness of land where banana is raised as intercrop/shade crop for coffee. Here rain is the only source of irrigation.

Then, there is polyclonal system which India is known for. It is nothing but growing two or more varieties of banana on a commercial scale. In Tamil Nadu itself there are about 12 -14 varieties of banana grown on a commercial scale. Likewise, Kerala grows about 20 varieties of banana. In few areas, farmers grow a single variety otherwise called monoclonal system."

Precision Agriculture

Precision Agriculture, also known as satellitic agriculture, is practised in developed countries. It ensures that crop and soil gets exactly what it needs and in the amount that is in demand. This method employs information technology for farm management; thus, ensuring that the crop and soil receives exactly what it needs. This methodology aims at achieving:

- Profitability
- Sustainability and
- Environmental Protection

In this methodology:

- Sensors, like satellites and drones, provide real time images of individual plant
- Gadgets are employed to measure soil data like nutrients, moisture, temperature, air quality etc.
- Images are processed and integrated with sensors and other data for immediate and future decisions.
- Agronomic recommendations are be made based on data.

Indian way of precision farming

Due to fragmentation of land, precision agriculture couldn't be possible in India in a full fledged way. However,few of the technologies are integrated and followed.

1. Field Preparation

Use green manure is useful to prepare the soil and level up the land. Banana is neither shallow rooted nor deep rooted. It penetrates for up to about one metre into the soil and sideways. It is hence essential to open up the soil. The best method for this is Chisel ploughing. It ensures opening of earth, better drainage, aeration and root growth. Post ploughing is done to levell.

2. Map your field: Mapping helps in understanding the nutrient level in the soil across the field. For example, from the figure we could understand the nitrogen content in the soil across that field. The blue color indicates nitrogen rich spaces while the orange represents low nitrogen spaces.

Mapping helps us determine the nutrition that needs to be given as inputs etc. Likewise, for all nutrients such mapping can be done.

3. Mulching with plastics: A very important activity. Normally if you irrigate one acre of land you will use not less than 35000 litres per day. But with mulching the requirement will fall down to about 4000 litres of water through micro-irrigation. It is a practice highly recommended to save and use water effeciently. Additionally it controls weeds and improves soil microbial activities.

4. Ensure good saplings for your cultivation. For banana, tissue culture saplings are preferred.

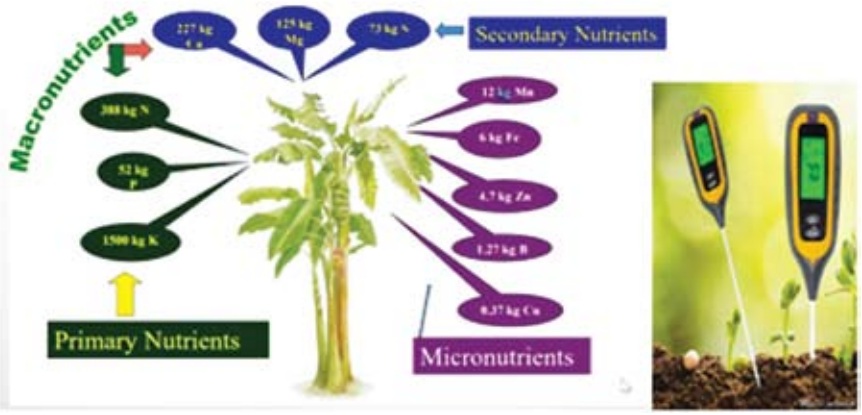
Depending on the cultivation systems the planting may vary:

- Wetland system - Feb - April
- Garden land - Jan - Feb and Nov - Dec
- Padugai cultivation - Jan - Feb and Aug – Sep
- Hill Bananas - Apr - May and June – Aug

Nutrient uptake

Today there are cost effective gadgets that can measure soil moisture, nutrient content, pH, etc.

Nutrient uptake by Banana (from one hectare)



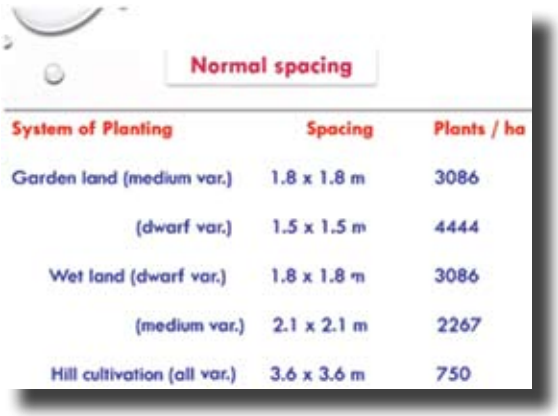
This may be slightly costly – Rs.10-Rs.15 per piece. But, it is genuine and the outcome will really very fulfilling.

Banana can be planted throughout the year. You can choose when you want to plant it depending upon:

- availability of canal irrigation
- weather factors like cyclone and
- market conditions - to match lean periods for better pricing.

Spacing

Ensure that saplings are planted at sufficient spacing:



Normal spacing

System of Planting	Spacing	Plants / ha
Garden land (medium var.)	1.8 x 1.8 m	3086
(dwarf var.)	1.5 x 1.5 m	4444
Wet land (dwarf var.)	1.8 x 1.8 m	3086
(medium var.)	2.1 x 2.1 m	2267
Hill cultivation (all var.)	3.6 x 3.6 m	750

If you dissolve nutrients in irrigation water and supply it to the crop, it can save a lot of nutrients. The difference between the traditional fertilization and fertigation is that in traditional method you need to apply fertilizers 3-4 times in a span of 5 months. In fertigation, you will be giving this input 40-45 times. This is more effective because it provides extended nutrients.

Banana is a delicate herbaceous crop. They usually carry 35-40 kg fruit. Sometimes even 50-60 kgs. Hence, it may need props. For places with lower wind velocity propping with ropes are sufficient but in places with higher wind velocity, you need to use sticks as props.

Pest and disease management

The latest trend is to manage diseased crop with spraying remedies using drones.Then there is bunch care that is to be administered. Bunch covers are used to ensure no harm befalls the skin of the fruit.

Harvesting

The harvesting time is determined based on the time of planting and the maturity of the fruit. This varies from variety to variety. The bunches are then harvested and taken to the processing unit.

Can you throw some light about the value-added products that we can utilize from bananas?

There are 14 varieties of banana that are being cultivated on a commercial scale. Among these, the Nendran is highly recommended for value addition. Nendran is used for making chips, weaning powders and so many other products.

The next is making banana fig. Banana fig is dehydrated banana dipped in honey. Grand Naine ideally suited for pulp preparation. Elaichi is used for making fig. There are 16-17 varieties each of which is very ideal for one or the other product. Banana skin oil is used in the cosmetic industry etc.

What is the demand and supply ratio for bananas in India?

The export seems to be very meagre. Only less than 2per cent is being exported. Most of the bananas are consumed in India itself. To some extent, very low price becomes an issue. When the price falls below Rs.10 or 7 per Kg things get very difficult for the farmer. I will say that there should be a mechanism to sync the area under banana cultivation across the country and we need to signal farmers to stop planting bananas. The present 83 lakh hectares under cultivation seems to be very huge. There is a huge quantity coming from a big country. There should be some system that needs to come in wherein there is forecasting done for farmers. At the moment the data we have is not too precise and not dependable.

As a farmer if one wishes to map the soil on one's field, how do they go about it?

You have to fragment your land into 5 acres. You should draw a sample from each acre and analyse it. Based on the data you can develop a map. In developed countries, based on the soil color the level will be assessed and accordingly it is easy for the satellite to understand at what level is the nitrogen, potassium and phosphorous. All the root crops are potash loving plants. If you can prepare a map at least for potash, you can reduce the application and thereby cut by costs. So, an NPK map will help you a lot.

Which are the agencies who do satellite mapping?

This type of initiative should stem from the National Horticulture Board or National Research Centre for banana. Every now and then the prices keep fluctuating. This is all because of predictions. If there is a systemic forecasting, it will be very useful for farmers. This is being achieved in developed countries like Japan. But unfortunately we do not have predictions for this in India.

What would your advice be to someone who would want to do intercropping with banana and mango in a very limited manner?

Intercropping in banana can be done with short duration crops that do not exceed 60-120 days. After that the land will be covered by banana leaves. Since, banana is susceptible to nematodes, crops like mustard, onion, marigold, etc, can be raised as inter crops/catch crop which reduce the population of nematodes in the soil. Hence, it is a double benefit. Whole doing so, the intercrop should not disturbed the main crop

Can we do banana as an intercrop in an existing mango orchard?

Then it is better to go for leaf production rather than fruit production. I am not sure if banana leaf production is a commercial venture at your place. Down South, there are bananas grown exclusively for leaves. All fruit trees require plenty of light, so shading will affect the yield. So, if the intercropping is for fruits as an outcome, I wouldn't recommend. But if it is for leaf cultivation, it is a good choice.

Can we plant bananas during any part of the year?

Planting can be done round the year provided water is available in plenty. Normally the performance will be better if planted during the monsoons. Most of our underground water used for irrigation used to be loaded with salt. So, after planting if there is follow-up rain, the growth will be better. This is why we recommend June-July and Sept - Oct planting. If there is any assistance from natural rain, the growth will be fantastic.

Also, one should consider the amout of monsoon rain before planting.If it is too heavy rain, it should be done after monsoon. If your monsoon rain is low or medium, the planting should be done ahead of monsoon.

Please tell us about Elakki banana.

Elakki or Ney Poovan is a very delicate diploid variety. This is the one that has long shelf-life. Even after the skin changes to black color, the inner content of the fruit will be intact and edible. This is the only commercial variety with white pulp against yellowish pulp in other types. It is a very sturdy one with moderate duration.

Are bananas and plantains different?

Yes. Normally banana denotes edible types. They are consumed after ripening. Plantain are consumed before ripening otherwise cooked and consumed. In some places people do not differentiate between them. Across the world, banana scientists use the name Plantain only to refer Nendran.

What is the pH requirement of land and water?

pH between 7-7.5 is highly ideal. The plant can tolerate upto a pH of 8.

How long before can we harvest the plant?

The duration is normally one year. There are 10 months duration crops. There are also 14-16 months crops. For example, nendran is a 10 to 11 months crop in Tamil Nadu. Karpooravalli takes 14 months to 16 months. The duration hence varies depending on the variety.

What is the reason behind the low export figure?

Most of the indian bananas are easily perishable. Down south, it is all yellow bananas with thin skin. They do not stand for long storage even though they are sweeter. The only variety which is ideal for long storage is Grand Naine. You can store it for 3-4 months through cold storage but you should know when to harvest. A 75-80 per cent matured bunch is ideal for long storage. Outside the country our banana is not preferred much. The best banana in Tamil Nadu is called Rastali, internationally termed Silk. It is a very sweet variety but cannot be exported as it is very poor keeper. Taking all this into consideration, only few varieties are ideal for export. Among them Grand Naine is the best.

Is leaf cultivation different from fruit cultivation?

Yes, it is. For leaf cultivation,varities are different and there could be 4-5 suckers in one mat whereas for fruit cultivation it used to be one plant per mat. Best results have been realized under shade especially under coconut.

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DR.ANITHA KARUN

Director

ICAR-Central Plantation Crops Research Institute

Central Plantation Crops Research Institute, founded in 1916, is headquartered at Kasaragod, Kerala. It has regional stations at Kayamkulam (Kerala) – for research on root(wilt) disease, and at Vittal (Karnataka) - focused on cocoa and arecanut. Besides this, it has Research Centers at Kahikuchi in Assam, Mohitnagar in West Bengal and Kidu in Karnataka. The centre at Kidu hosts International Coconut Genebank for South Asia and Middle East (ICGA-SAME) and contributes substantially for production of elite planting material in coconut.

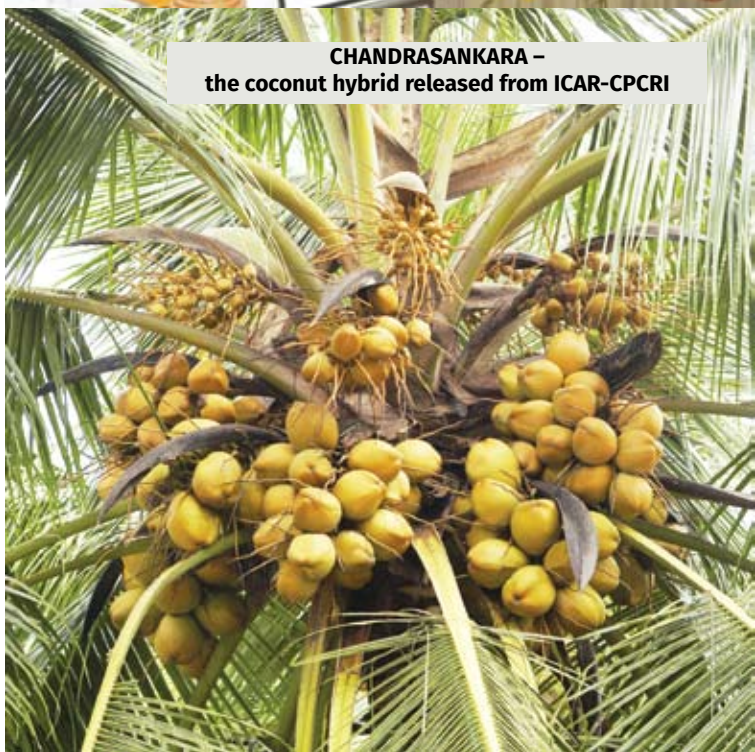
Dr.Anitha explains, "The institute produces around 5 lakh planting material of our mandate crops - coconut, arecanut and cocoa, every year. These materials are distributed to the farming community. In addition to this, limited number of planting material of coconut is being produced by over 30 Centers of All India Coordinated Research Project (AICRP) on Palms at different states"

How are the coconut plantations doing in general?

India stands first in the production of coconut in the world. Coconut production in the country during 2018-19 was 21384 million nuts (i.e., 31.5% of the world's share) from an area of 2.17 million ha. The average productivity of coconut in the country is around 10000 nuts/ha, which is more than double the productivity of other competitive countries. During the past two decades, the coconut production in the country is showing an increasing trend at an annual rate of 4.02% and proclivity is increasing at a rate of 2.81%. Major areas of productions are in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. Kerala accounts for 35% of area and 36% production. Among the major coconut producing states, productivity is highest in Tamil Nadu.

The domestic market provides much scope for coconut as the lion share of production is being consumed within the country. However, in the recent past, exports of India's selected coconut products are gaining momentum. Important export destinations of coconut products from India are UAE (fresh coconut, coconut oil, and desiccated coconut); other Middle East countries (fresh coconut, refined oil); Malaysia (dried coconut), Sri Lanka (shell charcoal) and EU (activated shell charcoal). Indian coconut export has to compete with established world exporters like The Philippines, Indonesia and Sri Lanka.

Till few years back, copra and oil were the only value added coconut products made in India besides of course coir products. But in the recent years many small scale industries were started in the country to produce many novel coconut products such as Virgin Coconut Oil (VCO), desiccated coconut etc. At CPCRI, we have developed processing protocols for VCO, coconut chips, and many other value added products. The Kalpa Agri-Business Incubator functioning under the Institute support entrepreneurs to make use of these technologies and also promoting entrepreneurship in



CHANDRASANKARA – the coconut hybrid released from ICAR-CPCRI

the sector. Farmers and other interested persons can utilize the incubation facilities to get trained, make their product of interest at pilot scale for test marketing on gaining confidence can start their own manufacturing unit.

There are number of products that can make from different parts of coconut. More than 20 million people make their livelihood out of this cultivation. It is a versatile crop that grows in many kinds of soils ranging from sandy to heavy rainfall zones.

Are there different varieties of coconut?

Mainly there are two types of coconut; tall and dwarf. Distinct varieties for economic traits like copra, tender coconut, fibre etc. can be seen in coconut. Varieties are also characterized for the colour and shape of nut and many other specific traits. The hybrid vigour observed in a cross between the local tall and the local dwarf by Dr Patel was a significant landmark in the history of coconut improvement research and paved the way for successful breeding programmes for improving yield in most coconut growing countries of the world. Through intensive breeding and evaluation, 21 improved coconut varieties were released from CPCRI. Out of which six are hybrids by crossing specific tall and dwarf varieties. The high yielding varieties are capable of yielding 3.12 to 6.28t copra/ha annually, as compared to 2.96t in West Coast Tall local.

Tell us about coconut breeding.

Enhancing productivity through the cultivation of improved varieties including hybrids is one of the major strategies envisaged from the day of the start of coconut research in India way back in 1916. Widening the genetic base with the introduction of germplasm within and outside the country, selection of parents and progeny and exploitation of hybrid vigour is the approaches followed for crop improvement in coconut. Coconut germplasm collection in India began in 1924, and over the years, the Institute has collected 478 coconut accessions from India and abroad (making it the largest collection in the world) and are being conserved in the field gene bank at Kasaragod and Kidu. Coconut breeding is very tedious and time consuming. The main reasons for slow progress are:

1. long juvenile period
2. long interval between generations
3. heterogenous nature of palm
4. lack of vegetative reproduction
5. long period of experimentation and
6. large area required for experiments

For how long does a coconut palm last?

If maintained well coconut tree can give yield for even more than 100 years. However, economic life of tall coconut varieties is around 60 years and for dwarf 35 to 45 years. Coconut is monocotyledon; once the growing meristem is damaged, the plant will die. The growth stages of coconut can be classified as juvenile phase (first 3 to 8 years depending upon the variety – dwarf will start yielding by third year of planting); initial yielding phase of 5 to 8 years (where yielding will show an increasing trend); stable yielding phase and yield declining phase.

What can we do to ensure good productivity?

There are many factors deciding the coconut productivity. As mentioned earlier, coconut is a perennial crop and has an economic life of over 50 years. Hence the most important factor to ensure productivity is planting of seedlings of high yielding varieties. Planting material should be collected from known sources. Alternatively Farmers can produce quality planting material themselves from selected mother

palms in their region. Under rainfed condition, palms producing every year 80 nuts (should not be small nuts) can be selected for collecting seednuts. Under irrigated condition, palms yielding more than 120 nuts may be selected. Mother palms should be free of pests and diseases and not showing any biennial pattern of bearing. One year old seedlings are used for planting. Seedling selection is also important; vigorous seedlings preferably with split leaves and more thickness at the collar region may be selected.

Can I use the quality coconuts I get in my home garden to plant saplings in my farm?

You can use it of course. Be careful though. One should make a selection from a garden maintained uniformly. Just because a tree grows well in your home garden doesn't mean that it is an excellent choice as mother palm. Coconut grows well when cared especially with few palms. Palms near to home may get more water and nutrient thereby giving high yield. Seedlings from such palm may not yield well under regular management conditions.

What are the other factors of productivity?

In many coconut growing region, appropriate spacing is not followed. For optimizing productivity, a spacing of 7.5 x 7.5m

is recommended. If perennial fruit crops are intended to cultivate in the interspaces, spacing may be increased (say 10 x 10m). Seedlings are planted in pits of size 1 x 1 x 1m filled with the top soil up to half the depth.

Though coconut can be grown under different climatic zones, the most suitable regions are in the humid tropics with average temperature 27oC and RH >60%. Soil should have water holding and cat ion exchange capacity. In the absence of well distributed annual rainfall of 200cm or more, irrigation is a must for proper growth and yielding. The crop is well adaptive for drip irrigation (32 to 60 litres a day)

Integrated nutrient management from the very first year of planting should be adopted for proper growth and early bearing. Both organic and inorganic fertilizers are required to be applied. Soil test based fertilizer application is most desired but if not, general recommendation is 600g N, 1200g P and 2000g K for palms of age 4 years or more. It is observed that many coconut growing soils are having enough P (i.e., >20 ppm) and in that case its application may be skipped. For the first year only 1/10 of the recommended dose for adult palm need to be given. In the second and third years, respectively 1/3 and 2/3 of recommended dose should be given. Customized fertilizers for Kerala soils are now made available by CPCRI (i.e., Kalpapaoshak for juvenile palms and Kalpavardhini for adult palms).

What are the options for application of organics?

For an adult coconut palm, nearly 50kg organics are to be incorporated in its basin of 2m radius. There are many options for production of organics in the garden itself. The coconut leaves available in the garden can be converted into vermicomposting for which the technology is standardized at CPCRI.

The specific earthworm for this purpose can be sourced from the Institute. Growing of leguminous crops in the basin and later incorporating in the basin can meet one-fourth of N requirement. Mulching the basin with husk and leaves is a good practice to conserve soil moisture and will also serve as a source of organics. A farmer following these methods need not spent money for purchase of Urea – the whole requirement of N can be met from organic recycling and growing of leguminous cover crops in the basin.

Which is the best soil for coconut cultivation?

It grows in wide range of soil types. It grows well in red sandy loamy and laterite soil as well. The root area should have some loose soil. That is important. Also the pH should be between 4 and 11. It is a widely adaptable crop.

Can you tell about some coconut products?

Many coconut products are developed at the Institute. The first novel coconut product from the Institute is coconut chips. It is thinly sliced coconut kernel subjected to osmotic dehydration. Another product is Virgin Coconut Oil (VCO). It can be made from coconut milk either by hot processing or fermentation processing. The milk residue can be dried and used as low fat desiccated coconut powder. It can also be used to make extrudated products. Recently we have standardized a protocol for foam mat dried coconut milk powder.

One of the popular products from CPCRI is the KalparasaTM; it is the unfermented coconut inflorescence sap. The Institute has developed a chiller-box for its collection. In all other method of collection, the sap is observed to be get fermented to have alcohol content in it. Fine quality coconut sugar can only made from KalparasaTM. Coconut sugar is much superior to cane sugar and can be used to produce premium products like chocolate bar/drink. Another product with coconut sugar is the vegan frozen delicacy with constituents as tender coconut pulp and coconut milk.

The institute is successful in transferring these technologies to entrepreneurs. More than 250 licenses were issued to entrepreneurs on CPCRI technologies. Technology support for them is provided by the Kalpa Agri-Business Incubator of the Institute.

When is there likely to be training session at your institute?

You can write to the Director of CPCRI to get information on that (directorcpcri@gmail.com). Owing to the COVID scenario, we have suspended all trainings. Having said that, we do impart trainings on demand. We do make arrangements for online training programmes as well.

Do you have a center in Tamil Nadu?

No, we do not. But we have the All India Coordinated Research Programme (AICRP) at Aliyarnagar and Veppangulam.

Are there people who can help us plant these coconuts in Hyderabad?

Yes, of course. We have scientists from that area and we help. Ours is a national institute. We strive to work for the entire nation.

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Vethaiya Balasubramanian

Freelance Consultant
Freelance Agri Environmental Specialists

With a Ph.D in Agronomy and Soil Science and a solid professional interest and wide experience in sustainable and conservation agriculture, Mr Vethaiya Balasubramanian has deep-rooted knowledge in soil quality and environmental health.

Mr Vethaiya has to his credit over 45 years of national and international experience in agricultural R&D and feasibility study, project design, management and evaluation, and training experience in Asia, Africa and the Caribbean.

"Soil health is a serious issue not just in India but also in many developing and developed countries around the world. Soil health is intimately connected with environmental and human health. We need to pay great attention in managing soil health."

He highlights that except carbon, hydrogen and oxygen, all other nutrients are derived from soil, which along with water are the most vital for plant growth and productivity and for our own survival. We need to, hence, conserve soil and water. "It is essential for productive and resilient agricultural systems and it plays a critical role in the mitigation of climate change risks." He explains that soil is not inert; it is a complex living ecosystem. A gram of soil contains more than a billion bacteria, fungi and other micro organisms. It is equivalent to 11,250 kg/hectare of biomass of bacteria and other organisms. Soil microbes decompose organic materials and bio wastes, promote nutrient cycling, improve soil aggregates and soil structure and suppress pathogens that cause plant diseases.

Soil is the key to many ecosystem services we enjoy:

1. Carbon sequestration and cycling - we have excess carbon in the atmosphere where we do not need it in such quantities and less of it in the soil, where we need it

2. Promotion of nutrient cycling, particularly N and P cycling

3. Infiltration, filtering and storage of water underground

4. Modification of the atmosphere

5. Modification of habitats for soil organisms, thereby enhancing ghe biodiversity both flora and fauna

6. Modification of the medium for optimum plant growth and

7. Buffering of storms and droughts by capturing and storing rainwater underground

What, according to you, are the major issues that agriculture faces today?

It is mainly land issues and the change in land use patterns that constitute most of the problem.

Land availability issues:

- Limited land area
- Decrease in land area available per capita
- Degradation of land in many ways: declining soil fertility, physical damage, chemical degradation, soil pollution, waterlogging, soil drying due to groundwater depletion

Issues due to change in land

use:

• Deforestation, land clearing and over grazing

* Overgrazed Pasteurland

* Soil erosion, affecting almost 150 million hectares in India

* Loss of biodiversity and

* Loss of productivity

• Drainage of marshes, wetlands and peats - these pieces of land are extremely valuable as storehouses of carbon and water. Drainge of these vital hydromorphic ecosystems will cause:

* Irreversible damage to soils and water bodies

* Release of Greenhouse gases (GHG): CO_2, CH_4, N_2O

* Diversion of water courses

How can we prevent soil erosion?

There are many ways to achieve this:

1. On sloping land, create contour hedges and terraces

2. On flat lands, create windbreaks, riparian buffers, strengthened riverbanks, and adequate drainage in irrigated areas.

3. Practice regenerative agriculture:

a. Reduced or zero tillage

b. Longer surface cover with mulches and/or cover crops. Avoid mulching in areas where termites are a problem.

c. Practice diversified farming like crop rotation, intercropping, crop-animal systems, etc.

4. Stop burning crop residues

5. Enhance soil organic matter content by adding organic manures and composts

6. Alternate with deep and shallow root plants: This improves soil structure, reduces erosion and enhances soil stability.

7. Rehabilitate damaged lands: Excessive addition of organic matter or organicn wastes is the key to improve degraded lands.

Remember, nutrient poor, unhealthy soils create a vicious circle:

Unhealthy soils produce nutrient-poor foods which in turn results in poor human nutrition, leading to poor health, low immunity, and increased susceptibility to human diseases, like for example the COVID-19. As a result, healthcare costs mount at national level. Thus, soil and environmental health is closely connected to human health and thus, it is critical for a healthy population.

How do we tackle nutrient depletion?

Here are some best practices to make sure your soil stays healthy and even improves in quality:

1. Mulching: By way of mulching you:

1. Decrease the amount of irrigation water you require

2. Reduce weed infestation by half and

3. Recycle nutrients and organic matter

2. Make the most out of waste: Practice composting, vermicomposting, etc. Even human faecal waste can now be converted into pelleted organic fertilizers. Treated and dried faecal waste is mixed with composted municipal bio-wastes and organic nutrients to make pelleted fertilizers.

What is your take on the use of fertilizers?

'Fertilizers are bad' is a myth. Use of fertilizers in proper proportions help in maintaining soil health. The trick lies in efficient site-specific nutrient management.

Step 1: Understand the plants' need.

Step 2: Effectively use all the nutrient sources existing in the farm (Indigenous nutrients supply). It is important to understand your soil for this step.

Step 3: Fill up the deficit between the total crop nutrient need and the indigenous nutrient supply with application of fertilizers.

How do we balance out between inorganic and organic cultivation?

We recommend that all organic materials available on the farm must be used to feed the crops. This caters to 50-60 percentage and in some cases even 100% of nutrient requirement of crops on the farm. When it is not sufficient you can supply the deficit in the form of fertilizers. This can be supplied by using different fertilizer sources, and application methods.

Is there much difference between use of organic manure and chemical fertilizers?

Yes. The yield will vary. In case of land supplied with organic fertilizers yield will be same as long as you supply just enough for the plants to have sufficient nutrients. With organic farming, you also get better tasting produce.

Even if one chooses chemical fertilizers, accuracy of application is a must.

How can we improve turmeric plant yield?

First get your soil tested and find out the soil properties. Once you understand the soil, you will be in a position to better understand what kind of treatment / inputs the soil needs to increase the yield.

Ensure irrigation is optimum. Water is highly critical for any plant growth. Care should also be taken that you do not over irrigate. Water and nutrients are extremely critical to produce high yield. Both of these parameters can be determined only with a soil test.

Taking into consideration the decline in cattle, and hence cow dung, urine etc. how can we increase the carbon content in the soil?

This calls for segregated waste disposal. All bio waste should be collected by municipalities who can convert it into organic manure and sell it to farmers of the vicinity. This will prove effective in managing waste that is produced in cities and increasing the crop yield for farmers in the suburbs and villages.

Today, we have vermicomposting solutions etc. which is to a certain degree not affordable for most farmers. This is where the government should step in to make a difference. It is a win-win solution - it cleans up the urban environment and improves soil health as well.

What is your view on zero tilling?

Zero tilling usually works, increased mulching will help decrease weed population.

What is faulty irrigation?

Faulty irrigation is irrigation without proper drainage. Prolonged irrigation without adequate drainage will result in water seeping into the soil and then evaporating. Evaporation causes salts from the deeper layer to come up to the surface layer of the soil. This makes the land saline.

Is there a technology to easily convert farm organic manure into inorganic manure like material?

It is a difficult. We can enrich organic matter with certain micro nutrients and make it complete. That becomes multi nutrient fertilizer. It can be used in home gardens and also in small scale gardening. It is not suitable for large scale farming.

Please elaborate on site-specific nutrient management.

Site specific nutrient management is nothing but being precise with your nutrient management. Currently, we have a blanket approach for fertilizer application. For example, apply 120 kg per hectare of nitrogen fertilizer, split into three times. Farmers go by the number without stopping to analyze if it is helping.

In case of site specific nutrient management, system specific tools such as leaf color chart for N application are used to measure the requirements of plants before feeding them or the soil with inputs. The measurement of leaf colour charts should be done meticulously every two weeks. This way we are conscious of when the soil/plants need additional nutrients and it is fed when required. This way neither the crop is over fertilized nor the nutrients get wasted away.

Where can one find paper-based color charts to determine fertilizer deficiency?

It is available at all agricultural universities. I can also provide the email address of manufacturers of these color charts upon request. Here is the address for leaf colr chart:

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Rajender Kumar

Business Development Manager - South and East Asia Region
Cravo Equipment Limited, Canada

Having a roof over their crops only when required would be a farmer's wildest dreams. Cravo Equipment Limited decided to give it a shot and crack that dream into a reality and they did.

A roof over your crops protecting them from nature's hiccups, a roof that opens up when times are good for the plants to reach out for the sun. Cravo Equipment Ltd just does that and thereby helps agriculturists improve their production systems to increase their profitability.

Undeniably, they are the world leader in retractable roofs

Mr Rajender Kumar,a post graduate in Agriculture Economics has been associated with Cravo since 2014.

"We all know about green house of protective cultivation. This is a part of protective cultivation Technology which is normally used in the tropical and mild climate," says Mr Rajender

Like in the green house system, retractable roofs also are a part of Protective Cultivation Technology which is normally used in the Tropical and Mild climate.

Mr Rajender explains, "usually green houses have a permanent covered roof. In Cravo system, our roof is not permanently covered, it is retractable. When you have ideal farming conditions, during summer or during any part of the day, you can have these roofs remain open. It will close only when you have adverse weather conditions. For example more than 35 degrees C during the day and less than 10 during the nights, or during adverse weather conditions like haail, rains, snow etc, the roofs will close. It is highly ideal for growing and protecting your crops."

Mr Rajender explains that there are broadly 4 types of retractable roofs:

1. Retractable Roof Green houses: These operate best when heat is a more limiting condition than cold.These structures are installed 30-50 latitudes or at higher elevation where temperature is less than 10 c

Features:
a. Clear roof woven plastic with a life of 8-12 years

b. When roof is closed, the structure acts like a green house

c. Cultivators can tap daytime heat by closing roofs and walls before sunset

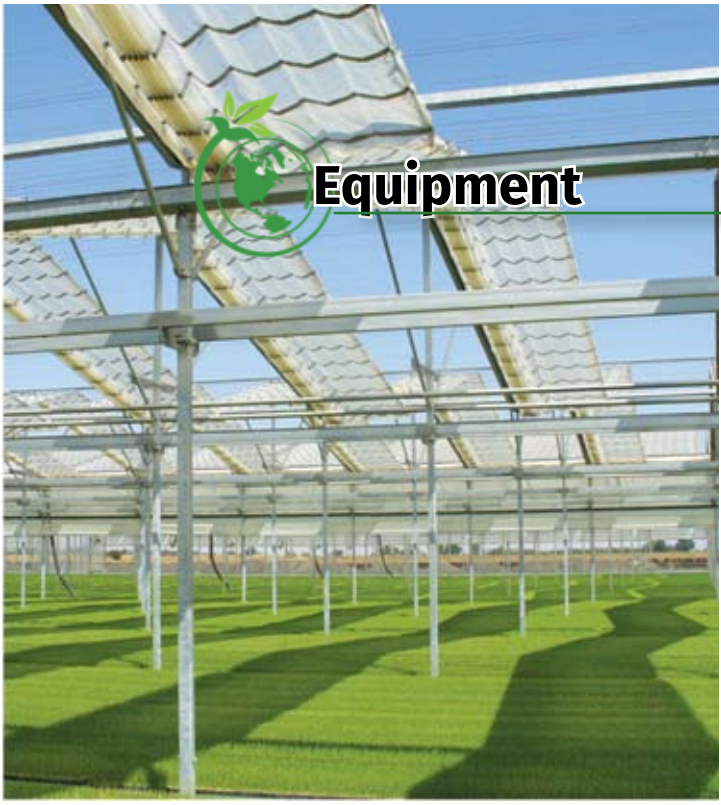
2. Retractable Roof Cooling houses: Recommended for 0-30 North South latitudes where summer temperature is 35 plus

Features:
1. Here, we use white cooling roof covers for hot climates.

2. With the roof shut, it resembles an umbrella or white cloud over the crop.

3. Retractable Roof Field covers: This is recommended for large scale installations. It helps cover crops that normally grows in open fields, but with added protection from harsh environments. We can provide either a greenhouse or cooling roof coverung, based on your requirement.

Irrespective of the size / shape of your land, this solution is practical.



Retractable Roof Orchard cover: This solution protects orchards from extreme weather conditions, optimizing growing conditions and minimizing risks. It also helps altering harvest times, to take advantage of best pricing conditions.

The structure follows the slope of the land which allows for coverings to be installed without grading. Like field covers, this too can be provided with either greenhouse or cooling roof covering.

4. Combination roof for extreme conditions
In some regions we do a combination roof. For instance in Delhi, we have extreme climate - summers are too hot and winters are too cold. Such places will need a cooling roof in summer and green house roof in winter.

Another point is when the roof is opened, we can be opening our crop to insects and birds as well. But we have a solution for that. We can either have a stationary insect net below the roof or a retractable one inside the roof. Normally in dry conditions, the roof is stationary. This can be employed depending on the need in your region.

Any type of crop can be grown beneath these roofs. Here are a few examples of the kind of crops we have helped shade so far. Berries, Avocado, Leafy and herbs, Tomatoes, sweet pepper, flowers, cannabis, apple, fig, cherries, nutraceuticals, nursery plants.

Apart from all this, it is even used for animal shelters as well.

Have you installed these structures in India?
In India, we have Namdhari Seeds that have adopted this technology in 2015, KBC farm (a subsidiary of Dabur)in Delhi in 2016, Berries project in Brindavan in 2018,Simply Fresh and Triangle Farm in 2019& 2020 in Telangana, etc. We have multiple projects outside India as well.

What is the cost analysis for these structures per hectare?
We have 4 different models. The price varies depending on the model, amount of land to be covered,crops to be grown etc. Besides that there are a lot of applications and customization also that the client may need. The price varies from $20 to $150 per sqm , depending on your climate, the crop you propose to grow, the area that needs to be covered. It is difficult to give a blanket price because it needs to be worked out based on the various parameters.

Do you have a website where I can see more details on your product?
Yes, please. It is essential to choose the right product based on the environmental conditions that you face. For example there was a 140km storm in Brindavan area, our structure withstood it although there were lot many damages that happened in and around the area. You may check out our website: www.cravo.com and feel free to contact me for any assistance or advice you may need. You may call or WhatsApp me.

Do you think this is a viable project for India where we have so may climatic and economic disturbances?
If the plan is for less than 5 acres in perhaps a rural area, may be it is not a viable project. But for areas beyond 10-15 acres it is very viable.

Do you do roof top projects?
We have done it in the past. But, again, it is sustainable only if it is a large roof.

Have you taken up any projects near Bangalore or Mysore in South India?
We have done a project for Namdhari. It was in the Tumkur area. This was 5 years ago.

Do we get subsidies for Cravo structures?
There were people who had approached the National Horticulture Board regarding this. They were told that subsidies can be obtained but the upper limit would be the same as that of the poly houses. The difference of amount should be borne by the clients themselves.

On an average what will the price difference be?
As I told you earlier, it is a very tricky question to give a price owing the various parameters. It is best that you get in touch with us with your crop, location and specification so that we can help you with a quote.Our structures are customized for each individual request.

Can we integrate solar energy to run it on a one acre plot?
This needs to be discussed with our engineering department.

You have given all estimate in dollars. Would there be any additional cost involved when we set it up in India?
Our manufacturing facility is in Canada and then transported to India and hence, the price quote in dollars. Beside this clianet has to bear import duty, installation costs, inland transportation, irrigation,fertigation and automation etc. The exception to this would be if the project here is exceptionally huge.

For example, we are now working on a project that involves 115 acres.

What is RCO2 and the benefit of using it?

RCO2 is name of the roof plastic. It is a cross laminated woven polyethylene. It has a life of 8-12 years. It even lasts for 15 years at times. Normally in a poly houses, poly film is used which only lasts for 3-4 years.

What is the minimum area of cultivation, that you think, is viable for retractable roofs?

Talking about minimum size, we can even do it for 1000 sq mt. But viability depends upon the location and crop. 1000 sq mt is good for research, nursery etc.

What is the material that is being used for your structures?

We use American standard pipe material. It is of high quality. We have only one manufacturing unit located in Canada. So the structure is shipped from there to many places like Australia, New Zealand, Chile, etc. We try to gear up a very robust design and our aim is to give a structure which will require minimun or no support from us after it is installed. So great care is taken to do our homework and keep our quality high.

We did our first project in India in 2015. In the last 5 years, we have not been contacted for any issue except for upgrading their software. Similarly in Philippines, etc. I am not claiming that our structure is perfect and error free. But we have a very good communication system. We have a maintenance section on our website. It has videos on what to do in most issues that you can face. We have made it very DIY.

For any major problems, I can be contacted directly on my WhatsApp number and I will ensure that we handle and smoothen out things. But this escalation has been nil or rare.

What will be the add on price percentage over a product coming out of such a retractable roof system in comparison with open field cultivation?

Cravo has a big role to play. Majority of fields in India is open fields and things are not stable, climate keeps changing. There are climate surprises etc. This is what we offer protection against adverse climate. Also, using Cravo systems, you can achieve an all-season production. This way, farmers can take advantage of the highprice windows.

What about grower success or builder success??

Any technology is considered as successful when we get repeated order from existing clients. Most of large orders we get from existing cliets. Cravo houses are being installed around the world, usually by people who never have installed a Cravo house before.

To ensure a smooth installation, we will assist our clients by providing a customized set of step by step installation instructions and set up a Microsoft Teams group or whatsapp group that will include everyone connected with the design and installation from our client side and technical team from our side.After completion of installation we support our client in growing to get best results.

Cravo's Definition of Success means "client has achieved the competence and confidence to independently operate retractable roof house to get the quality, yield and timing necessary to achieve their target return on investment."

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Tiny nanotechnologies are poised to have a huge impact on agriculture!

Science is about big ideas that change the world. But sometimes, big impacts come from the tiniest of objects. Nanotechnology might sound like science fiction, but it represents technologies that have been developed for decades. Nanotechnological approaches have found real-world applications in a wide range of areas, from composite materials in textiles to agriculture.

Agriculture is one of the oldest human inventions, but nanotech provides modern innovations that could dramatically improve the efficiency of our food supply and reduce the environmental impact of its production.

Agriculture comes with costs that farmers are only too familiar with: Crops require substantial amounts of water, land and fuel to produce. Fertilizers and pesticides are needed to achieve the necessary high crop yields, but their use comes with environmental side effects, even as many farmers explore how new technologies can reduce their impact.

The tiniest of objects

Nanotechnology is the science of objects that are a few nanometres — billionths of a metre — across. At this size, objects acquire unique properties. For example, the surface area of a swarm of nanoscale particles is enormous compared to the same mass collected into single large-scale clump. Varying the size and other properties of nanoscale objects gives us an unprecedented ability to create precision surfaces with highly customized properties.

Employing particles

Traditionally, applying chemicals involves first mixing the active ingredients in water and then spraying the mixture on crops. But the ingredients do not mix easily, making this an inefficient process that requires large quantities of water. To improve efficiency and reduce environmental impact, farmers need their fertilizers and pesticides to reach their crops and be absorbed into the plant exactly where they're needed — into the roots or the leaves, for example. Ideally, they could use just enough of the chemical to enhance the crop's yield or protect it from attack or infection, which would prevent excess from being wasted.

Custom-made nanoscale systems can use precision chemistry to achieve high-efficiency delivery of fertilizers or pesticides. These active ingredients can be encapsulated in a fashion similar to what happens in targeted drug delivery. The encapsulation technique can also be used to increase the amount dissolved in water, reducing the need for large amounts.

Current applications

Starpharma, a pharmaceutical company, got into this game a few years ago, when it set up a division to apply its nanotechnological innovations to the agriculture sector. The company has since sold its agrochemical business.

Psigryph is another innovative nanotech company in agriculture. Its technology uses biodegradable nanostructures derived from Montmonercy sour cherries extract to deliver bioactive molecules across cell membranes in plants, animals and humans.

My lab has spent years working in nanoscience, and I am proud to see our fundamental understanding of manipulating polymer encapsulation at the nanoscale make its way to applications in agriculture. A former student, Darren Anderson, is the CEO of Vive Crop Protection, named one of Canada's top growing firms: they take chemical and biological pesticides and suspend them in "nanopackets" — which act as incredibly small polymer shuttles — to make them easily reach their target. The ingredients can be controlled and precisely directed when applied on crops.

Existing infrastructure

One bonus of these nanotech developments is that they don't actually require any new equipment whatsoever, which is a tremendous advantage in the financially challenging agricultural industry. Farmers simply mix these products using less water and fuel to make efficiency gains.

Other agricultural uses for nanotech include animal health products, food packaging materials and nanobiosensors for detecting pathogens, toxins and heavy metals in soil. It wouldn't be a surprise to see the widespread use of these new applications in the near future.

As nanotechnologies take flight, this kind of productivity gain will be critical for farmers and a big deal for the rest of us, as the Earth's population continues to grow and the effects of climate change become increasingly obvious. Farmers will need to do more with less.

Source : World Economic Forum

- **The agricultural industry relies heavily on water, fertilizers and pesticides to improve their yields.**
- **Nanotechnology uses precision chemistry to achieve high-efficiency delivery of fertilizers or pesticides to a designated area.**
- **This maximizes the effect of these ingredients without creating waste**

Dr.S. Narayanan

Senior VP, Jain Irrigation Systems Ltd. Chennai, Tamil Nadu

Jain Irrigation Systems Limited (JISL), the pioneers in micro irrigation in the country has today successfully diversified into plant tissue culture, solar pumps, fruit and vegetable processing, ultra high density plantations, etc.,besides integrated irrigation solutions in Community Irrigation Projects.

Talking to Dr. S. Narayanan, Senior Vice President of Jain Irrigation Systems Ltd., Chennai, Tamil Nadu, we are insightful into the potential that drip irrigation can have on paddy and also we are awed at the diversification of Jain Irrigation as a company.

Dr. Narayanan started his talk throwing light into some basic aspects of rice cultivation.

"For every 1000 Litres of water used you get only 300 grams of rice. 45% of allirrigation water is used for rice production. 50% of this water is wasted due to percolation. We can save about 50% water through drip irrigation and productivity of Rice can be increased," says Dr.Narayanan.

Jain Irrigation has been working on drip irrigation for rice since 2007. In the last 13 years they have been taking this technology across India and different countries as well to create the awareness that rice can also be grown using drip irrigation.

There are a few components to this technology:

• Paddy is planted by direct dry seeding or transplanted from a nursery

* Dry seeding: seed first and drip irrigate immediately after

* Transplanting: Drip irrigate to wet the bed and then transplant.

• Spacing: space plants at 15 cm x 15 cm or 20 cm x 20 cm depending on the tillering ability of the variety.

• Follow a schedule: Set schedules for drip irrigation & fertigation.

• Weedicide application:

* Pre-emergence weedicide within 72 hours of planting.

* Post-emergence weedicide before 30-45 days.

• Crop inspection: inspect your crop daily and take pest control measures.

• Pre-harvest: Stop drip irrigation 15 days before harvest.

• Harvest after safely removing drip lines and keeping them on the side of the field.

Advantages of drip irrigation in paddy:

The major advantages here are:

• Higher yield

• Lower water consumption

• Scope for improvisation in crop rotation

Drip Irrigation v/s Flood Irrigation

The following graph shows the yield difference amongst various varieties of rice with respect to drip and flood irrigation. The red bars represent yield arising from flood irrigation and the blue ones represent that from drip irrigation.

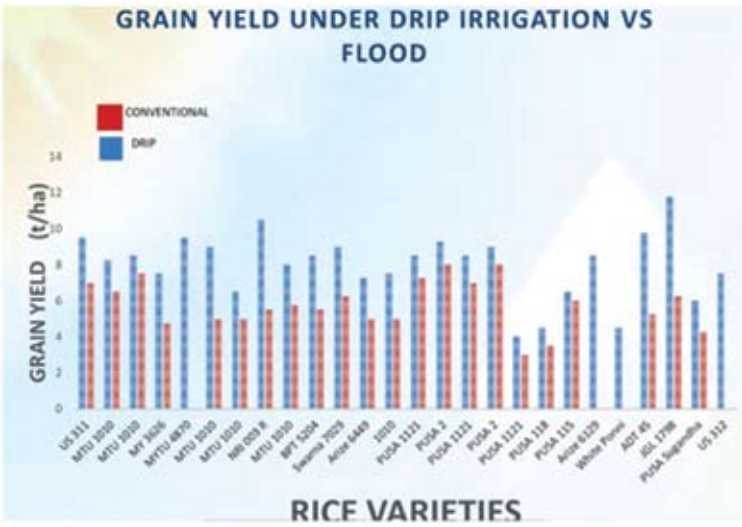
The water productivity of rice, using flood irrigation is between 100 - 150 grams per CuM of water whereas while using drip irrigation it is close to about 600 grams per Cu M of water.

Case Study

Let's talk about a farmer's experience to give you a real life case study. This is about Mr.Ravi Chandran from the Cauvery delta, which is the typical paddy growing area. He has tried drip irrigation in his paddy field, I will share his experience. This is in a village called Poonkulam in Tamil Nadu. He had taken up drip in one acre of paddy.

Initially, soil and water test was done on his field. Then we went down to the land preparation. Before ploughing, we did the sheep penning. He then ploughed his field two times and he ensured that his field was free of weeds by irrigating once with flood irrigation and allowed all weed seeds to germinate and removed them. Then, he went on for bed formation.

There is a water source, a bore well, with the submersible pump. The pH level of water in that area was 7.82. We



YIELD

S.NO	VARIETY & IRRIGATION METHOD	EXTENT (Ac)	YIELD /Ac (M.T)	YIELD /Ha. (M.T)
1	ARIZE NANO DRIP	0.50	2.455	6.137
2	CO 51 DRIP	0.50	2.169	5.422

opted for 1.20Metres of lateral to lateral distance because it was clay soil. Had it been loamy or sandy soil, this would have been lower. Also, we opted for a dripper to dripper spacing of 60 cm with a dripper discharge of 4 LPH. We also went for basal fertilizer application to start with.

This technology provides different options for seeding

1. Direct Seed dibbling on manually raised bed

2. Direct seeding by tractor drawn seed drill in flat bed.

3. Transplanting on manually raised bed

This is the one we adopted for this project. Here the drip system was allowed to run for 4-5 hours ensuring the bed was wet and then the nursery raised seedlings were transplanted. The rice variety planted by the farmer was CO 51 (105 days duration) and Arise Nano (120 days duration). Each of these varieties were laid on 0.5 acres each.

Once the plants got established, the drip system was set to an irrigation and fertigation schedule.

Fertilizer application was done through a fertigation mechanism. A venturi is fitted and the fertilizers are allowed to be sucked and taken into the system. Fertigation is also applied as per a set schedule.

WEED MANAGEMENT

1.Pre-Emergence (within 48-72 hours) - Top star 80 wp (oxadiaryl) 45 gm /ac

2.Post- Emergence(between 10-15 days) – Nominee gold (Bispyribac) 120 ml/ac.

3.Hand weeding one time at 30-35 days.

Weed Management

We also ensured plant protection against leaf roller and stem borer. Additionally, we had regular crop inspection by our agronomist. They give valuable advise in terms of field and system maintenance.

Once the crop is mature and ready for harvest, all the lateral lines were taken back and kept in between plants at right angles and the crop was harvested using machines.

What are the benefits of drip fertigation

There are many:

• You get at least 25%-38% enhanced yield.

• Higher water and fertilizer use efficiency

• Conserving energy use for pumping up to 52%

• Reduced labor requirement

• Absence of pollution from leached and washed nitrate

• Prevents methane emission

• Reduces humidity and lowers mosquito population and skin related issues caused due to standing water.

Were there any take-aways for you from this delta area drip irrigation project?

Of course! With every project your knowledge widens.

1. Land use efficiency increases with more area brought under drip irrigation.

2. Nutrient use efficiency increases as every plant gets its due share of nutrition at the right time.

3. Uniform crop stand.

4. In the delta area BHP often devastates rice crop under flooded condition. Owing to drip irrigation, land is left moist but water doesn't stagnate and BHP is a thing of the past.

5. In flooded conditions algae also suppresses the crop and inhibits tiller formation. In drip irrigation, tillering was profuse.

How many tills per hill did you get?

We got about a maximum of 22. On an average I would say about 14 to 15.

Did you only try one plant per hill?

We used 2 seedlings per hill. Ideally in the case of hybrid Arize we used only one. For CO 51, which is an average tilling variety, we used 2 seedlings. We used the same spacing for both but we learned that we could have given more spacing for hybrid variety. That could have given us more tillers. For hybrid the spacing should have been 20X20cms or 25X20cms.

What is the cost estimate for 2 acres of land drip irrigation?

The cost varies from state to state or region to region. It also varies from field to field. For a spacing of 1.2 mts between laterals, the approx cost should be Rs.40,000 per acre. This is again a ballpark figure because a lot depends on the site and the water source. If the water source is far off, the cost will again rise.

Do you offer support in other states as well, like Punjab?

Of course, we have done plenty of work in Punjab, Andhra Pradesh, Haryana etc. It comes out beautifully in Punjab. In fact, Punjab Agricultural University has got a collaborative projects with us. Lot of private farms in Punjab have adopted drip irrigation for paddy. They have used sprinklers as well.

Can we grow paddy in 15mt space in between horticulture crops?

It can be done. However, you need to have a separate pipe running to cater to the paddy irrigation because paddy fertigation and horticulture crop cultivation demands are different. So, you should either have a localized lateral stopping cock which will stop water flowing into the horticulture row or you will need to have a separate line running from the source itself for paddy alone.

Can we use organic manure in drip irrigation for rice?

Yes, you can use organic manure in drip

irrigation systems for any crop, not just paddy. The only thing is that the organic matter you put into the system should be double filtered because organic matter will have small broken pieces of straw or othe2r suspended particles. If not, the dripper orifices gets blocked. Hence the mixtures needed to be prepared. Left for settling then filtered through a muslin cloth before feeding into the system.

Do you have any trial in West Bengal?
West Bengal we don't have drip in paddy but we do drip for various other crops. Nevertheless, our local staff in West Bengal can be contacted and we can plan out and discuss possibilities.

Can the drip irrigation that we use for sugar cane be used for rice as well?
It can be used. You can contact the local Jain Irrigation personnel in your area and seek assistance.

I am planning on incorporating a drip irrigation system in my mango orchard. Can I grow paddy in between mango plants, which are 25 years old and they are spaced at 8ft x8ft.?
Unless the crop is very bushy and the plants are lush in growth and there is a shade effect, you can go for paddy. Paddy is a highly tropical crop and it needs sunlight. But I would recommend switching to ultra high density mango cropping rather then inter-cropping with paddy. Along with drip irrigation, you will get great yield from 3rd year itself with peak yield from the 5th year.

What is the material used in drip irrigation?
There are 2-3 materials used. PVC pipes are of course Poly Vinyl Chloride. Laterals are made from low density poly ethylene. They are different forms of plastic.

I hear Jain Irrigation is planning to expand into banana tissue culture. Can you give some insight?
We have been doing banana tissue culture from 1994 onwards. Today we are world's largest producers of tissue culture bananas. We produce around 10 crore banana plants every year. In addition to tissue culture banana, we are also into tissue culture of pomegranate, sweet orange, guava and strawberry.

Where do you have your tissue culture farm?
We have our lab in Maharashtra and the plants are hardened in Andhra Pradesh and Tamil Nadu.

Any last words of wisdom?
At Jain Irrigation, we aim at more crop per drop. May that be our aim of our nation as a whole.

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THESE 4 START-UPS ARE USING SEAWEED TO HELP SAVE THE PLANET

We're all familiar with the role forests play when it comes to providing a sustainable source of food, energy and raw materials, and locking away CO_2 emissions. But perhaps we're less knowledgeable about the potential of forests of seaweed growing in the oceans.

A type of seaweed known as kelp is being developed for its nutritional value and its ability to absorb and lock away huge quantities of carbon dioxide. Seaweed absorbs CO_2 more effectively than trees. It also improves water quality by extracting harmful nutrients such as nitrogen from the sea.

BUILDING A NEW OCEAN ECONOMY

These benefits are familiar to a new generation of oceanic entrepreneurs. They're working to preserve the world's marine ecosystems, while playing a key role in combating food insecurity and climate change.

Here are four companies rising to the ocean challenge:

KELP BLUE

Kelp Blue runs giant underwater farms where it grows seaweed crops that are harvested for agri-foods, fertilizers, pharmaceuticals and cosmetics. The kelp also absorbs large quantities of CO_2. With a mission to "re-wild" the ocean and capture millions of tonnes of CO_2 annually by 2050, Kelp Blue's sustainability credentials are reinforced by the fact that no fertilizers, pesticides, fresh water or land are used in its production processes.

Kelp Blue is currently in the pilot phase of the project which it hopes to eventually replicate in offshore locations across the world. The government of Namibia has granted environmental clearance for the company to start farming off its coast, a location that has perfect conditions for seaweed cultivation.

SEA6 ENERGY

This Indian company is all about scaling up and mechanizing tropical seaweed farming. It produces biomass for fuel and sustainable raw materials for industries that span agri-foods, health supplements, cosmetics, bioplastics and polymers. It has secured patents across the value chain.

Sea6 Energy has designed what it calls 'SeaCombine' - a tractor-like vehicle that sows seeds and harvests tropical sea plants off-shore, currently in India and Indonesia.

The infographic above predicts the scale of the new ocean economy by 2030 and details some of the planet-friendly benefits that farming ocean plants on an industrial scale could bring.

AUSTRALIAN SEAWEED INSTITUTE

Australia has never had a seaweed farming industry, but Jo Kelly is planning to change that in her role as founder of The Australian Seaweed Institute. She believes that seaweed can help to mitigate climate change and create jobs in aquaculture in remote parts of Australia.

The Institute was founded in 2018 and is partnering with farmers, research bodies, manufacturers and government to develop a framework for the industry.

The foundation for that framework is the UN's Sustainable Development Goal 14 – addressing "life below water". The infographic below details the blueprint for building Australia's seaweed farming industry, which could contribute directly to reducing ocean acidification and pollution.

The Institute is developing a biofilter network, in partnership with Central Queensland University's Coastal Marine Ecosystem Centre. The system will be used to remove nitrogen and CO_2 from the Great Barrier Reef.

It's a pioneering project that caught the attention of the World Economic Forum and was featured at the The Davos Agenda in 2021.

CASCADIA SEAWEED

Cascadia Seaweed, based on Canada's Vancouver Island, is focused on bringing its ocean bounty to more dinner tables. It hosted the Canadian province's inaugural Seaweed Days Festival in May 2021. The UN's senior advisor on the global impact on oceans was there to see for himself the benefits that the new ocean economy can have in the real world.

The two year-old Canadian company has farms offshore. It's also built its own seed nursery.

Cascadia currently grows four types of seaweed, but plans to expand into more varieties in time. The company is motivated to provide increasing work opportunities for the region's indigenous communities and has forged partnerships with local tribes as it expands its enterprise along the coast of British Columbia.

SUPPORTING OCEAN ECONOMY PIONEERS

These start-ups are at the forefront of an emerging and promising sector of a global circular economy. Their blueprints and strategies for the future could be replicated across the world for the benefit of people and the planet.

The World Economic Forum's UpLink platform provides an environment for entrepreneurs to present ideas that can drive the world towards meeting the UN's 2030 Sustainable Development Goals.

Source : World Economic Forum

SANTHOSH KUMAR

Manager - Operations. Modern Distropolis Limited, Kerala

Whilst the world gets smaller with collaboration at a high pace, there is one thing that keeps conflicts low lying – knowing one's boundaries. It is the same in agriculture – the industry that feeds the world, need fences and boundaries to keep away intruders and conflicts at bay. Mr Santhosh Kumar, Manager Operations, at Modern Distropolis explains, "We are the authorized distributors for TATA Wiron and other various TATA products in Kerala. Today Central and State governments are giving lot of subsidies and benefits to farmers. Fencing is very much needed so that crop produce is well protected.

As far as fencing is concerned. In the early days, people used to have different forms of fences. It used to mark boundaries and contain livestock. Varieties of fences included hedge fence, cactus fence, bamboo fence, stone walls, etc. Nowadays you have sheet, slab, hedge and coconut leaf fences.

Then, there are electric and barbed wire fences, chain link and welded mesh fences too." (See fig below)

We do not provide electric fences as a solution but we do deal with the material it requires. Barbed wire is highly popular due to its longevity, ease of installation and cost. Barbed wire and chain link are the most popular as far as Kerala is concerned.

Barbed Wire Fences

There are different types of barbed wire fences. Based on the purpose and application, we can adjust the line wire and corss wire in fence.

Modern Distropolis Limited provides fencing solutions mainly in Kerala but we are open to providing services pan India. But, as far as the materials are concerned, we have to go for the authorized distributor or dealer in the respective State.

Which is the most popular among these fences?

Chain link fences are the most popular these days because:

1. It looks aethetic
2. It is appealing to agricultural lands and gardens.
3. Mesh cones with different gaps and sizes

Chain links comes in 3 guages

- 2x2 & 3x3 in 12 gauge & 10 guage -6 feet
- 2x2 & 3x3 in 12 gauge & 10 guage -5 feet
- 2x2 & 3x3 in 12 gauge & 10 guage -5 feet

Apart from fencing solutions, we have two more products useful for farmers:

1. Vegetable creeper and
2. Tomato cage

Why TATA Steel Wires?

- A1 fence products and TATA Steel Global Wires are the two noted companies in India that provide complete fencing solutions.
- TATA Steel Global Wires provides services via distributors.
- Recently TATA steel introduced a portal called Aashiyana.tatasteel.com. Through this portal you can place orders for materials as well as fencing solutions.
- Customers can avail TATA Wiron Fencing solution by booking service through TATA Steel's Aashiyana portal or by calling in at 09388476900.

Where can we purchase the post from?

There are concrete post manufacturers who supply it. There are GI posts also available across India.

How do you as a company proceed once you get an inquiry?

On receiving an inquiry, our team visits the site, takes measurements and then we give a formal quote.

- **Vegetable creeper**, which can be used as fence as well as support to creepers in agriculture. Researches show that this type of vertical creepers are giving more yields than that of ordinary type 'Pandal'. Smaller size of this item is being used as tomato cage.

Is there another distributor like Modern in Hyderabad?
We can do the fencing solutions for you. Of course we will liaise with the distributor in Hyderabad to source materials so that you and we can save up on transportation costs.

What is the life of the GI wires?
Normally you get 5 years. It comes with a formal guarantee of 5 years but practically you get more.

Will painting the GI wire increase its life?
There are two options to ensure that GI wires go on for more time. One is galvanizing and the other is painting. Since the wire is already galvanized you do not need to paint it. Painting it will perhaps be effective after 10-15 years.

What is the maximum height of fencing you have in the diamond shape?
The fast-moving ones are at 4ft, 5ft and 6ft height. We can do custom sizes as well. For example, we do fences for tennis courts, which demands a height of 20-50 mts. Hence, custom size is possible.

What is the cost difference between a concrete wall and fencing?
There is hardly any difference but chain links gives more aesthetic value. It also gives a sense of openness since you can see the other side of the fence. Concrete wall gives a cut--off feeling from the neighborhood. Besides that, labor cost and time taken will be more for setting it up.

Please give a rough estimate of the tomato creepers support.
Those are also made of GI wires. The height of tomato cages are 5ft. We supply it in roll form, which comes to a length of 50ft. This will give 10 cages for 10 tomato plants. It also comes with a special coating to protect it from rust. It is safe and very easy to install. This is available for Rs.1200/- per roll.

We were advised to change our fencing to bamboo because of snakes getting caught in our fences. What is your advise?
GI wire fencing comes with a minimum gap of 2 inches. This allows snakes to pass through. We, honestly, haven't heard of such issues in Kerala. Moreover GI fences have more life than bamboo fences which may last for perhaps a maximum of 2 years.

Can you give a package estimate for material and labor cost for barbed wire fencing for 2 acres and 1 acre agricultural land in Kolar district of Karnataka?
We can give. For example, in Kerala for 4 line, our normal rate is 270 per running meter. This is a 5ft line with concrete pole, This rate comes inclusive of material, labor and transportation cost.

Since this is outside Kerala, the transportation and labor cost will be higher.

The cost difference between cement wall and barbed wire is perhaps 50% cheaper. Please clarify.
Concrete wall is slightly cheaper but the life cannot be compared with that of barbed wire because. concrete walls can get damaged by any force acting on it. But you can be rest assured for the next 15-20 years when it comes to barbed wires.

I also recommend chain link because it can keep away nuisance.

Can creeper wires be used for pepper plants. If yes, can it protect the pepper roots from wild boars?
Yes, absolutely! Some farmers in Kerala have opted for creeper wires for their pepper plantation. On demand I can send some photos as examples.

What is a solution for keeping monkeys away?
We unfortunately, do not have a solution to keep away monkeys.

Would you advise barbed wires with stones to be changed to chain link fencing? If yes, what would the total cost be for 2 acres?
There are 2.5mm wires, 3mm and 4mm wires.
2.5mm wires at a gap of 3x3 and 4ft high comes at a rate of Rs.480 per mt including material, labor and transportation cost.

What is a permanent solution for elephant menace?
Electric wires are the best to keep elephants away because of the shock it gives out.

Do you do solar fencing?
We do not offer solar fencing solutions. But we do supply the wires. We also know of contractors who does solar fencing.

Would you know the cost estimate for solar fencing?
Sorry, we do not offer it as a solution, so we wouldn't know. I can check with the contractors I mentioned and can share later.

How many meters of wire is required for a one acre plot?
That will be 250 meters.

What is the cost for 3mm gauge and 6 ft high chain link fence per running meter?
We charge Rs.730 per running meter, inclusive of material, labor and transportation.

What would be the cost of the material alone?
Material is billed against the number of kilos. It is Rs.158 per kg. 6ft height will approximately come up to 70 to 80 kg in one roll. One roll is 50mt. For transportation convenience we normally make 50ft length roll.

Do you provide your service at Pune, Maharashtra?
Yes, we can provide service anywhere in India. We will deal with the in-state distributor for materials and we can proceed with the fence setting up.

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Agri University

Dr. K.N.Kattimani

Dr. K.N. Kattimani, Vice Chancellor, University of Agricultural Sciences, Raichur, has a wide experience in agricultural and horticultural fields and to their technologies having worked in various capacities in different Agricultural and Horticultural Universities. Presently Dr. K.N. Kattimani is serving as Vice-Chancellor in the University of Agricultural Sciences, Raichur, Karnataka since 17th October, 2018.

Considering his credentials and earnest contribution, His Excellency, the Governor of Karnataka appointed him as the Vice-Chancellor of UAS Raichur for a period of four years. Prior to this, he occupied various positions at the University of Horticultural Sciences, Bagalkot, Karnataka such as Dean (Horti.), Dean (Students' Welfare), Administrative Officer and Registrar. He served as member of Board of Management of UHS, Bagalkot during 2016-17 and Member Secretary for Board of Management of UHS Bagalkot during 2018.

Dr. K.N. Kattimani obtained his Doctoral degree from ANGRAU, Hyderabad (Andra Pradesh) during 1999 with a brilliant academic record by bagging Gold Medal. He served for more than 35 years in different Agricultural / Horticultural Universities of Karnataka. He has developed several crop varieties and technologies on Medicinal and Aromatic Plants (MAP). He has published 128 Research papers, 07 Books, 20 Extension bulletins, 40 Extension articles, 35 Research reports and 65 Abstracts. He was pioneer in establishing M.Sc. (Horticulture) in Medicinal and Aromatic Plants Department at KRCCH, Arabhavi under UHS, Bagalkot and also a Founder Dean of College of Horticulture, Munirabad (Koppal district). He has guided 15 M.Sc.(Horti.) and 4 Ph.D. students as a chairman and 60 students as member of advisory committee.

Dr. K.N. Kattimani received UAS appreciation awards for Adhoc Projects worth of Rs. 168 lakhs, during 2004; Confederation of Horticulture Association of India (CHAI) has recognized him for his contribution in the field of Horticulture during 2013. He is also recipient of many more awards,the most recent being the MOST INFLUENCIAL VICE CHANCELLOR AWARD from Global InfoTech at Golden AIM award function.

The University of Agricultural Sciences, Raichur came into existence on 2008 as the third Agricultural University in Karnataka through a Karnataka Act No. 10 of 2010 by the Governor of Karnataka and has started functioning independently from April 2009. The University is taking up trifold activities in Teaching, Research nad Extension offering both UG/PG courses of Agricultural and Allied Sciences, the University administers admission through either ICAR examination at national level or K-CET examination conducted by GoK.

The University of Agricultural Sciences (UAS), Raichur established in view to cater the needs of farming community in Kalyana – Karnataka. The Jurisdiction of the University covers 22% of the total geographical (19.9 m. ha), 31 % of total cultivated and 20% of the irrigated area of Karnataka state. It spreads over seven districts of North Eastern Karnataka (Bidar, Kalaburagi, Yadgir, Raichur, Koppal Ballari and Vijayanagar). A number of agricultural, horticultural and forestry species represent the rich biodiversity of the area. There are three major irrigation projects viz., the Tungabhadra, the Upper Krishna Project and the Karanja in the region which provide irrigation to about 12 lakh ha accounting for 18 per cent of the total cultivated area of the state. The climate of the region is subtropical endowed with variety of climate, soil and crops. It is located at 1606'N and 7706'E with an altitude of 398.9 m above the mean sea level. The university covers three agro climatic zones of Karnataka North – Eastern dry zone, North Eastern Transitional zone and Northern dry zone.

University of Agricultural Sciences, Raichur shall persuade the needs of Agricultural Education to sensitize the farming community with scientific innovations, short and long term way outs for the tribulations faced by the farming community through Research for growth and sustainability of agriculture sector and outreaching the technologies to uplift the socio-economic status of the farming community through strong Extension linkages. Thus "Greening the life of farming community through Education, Research and Extension" is set as the motto.

ALLIED INSTITUTIONS:

• Four Agricultural Colleges (College of Agriculture Raichur, Kalaburagi and Bheemarayanagudi and Gangavati)

• One Agricultural Engineering College (Raichur)

• Seven Krishi Vigyan Kendras(ICAR-KVK at Bidar, Hagari, Kalaburagi, Gangavathi, Raddewadagi and Kawadimatti)

• Six Agricultural Extension Education Centre at Bheemarayanagudi, Lingasugur, Koppal, Hadagali, Deodurg & Nalavar.

• Two Diploma in Agriculture and Agricultural Engineering

• 14 Research Stations (MARS - Raichur [est. 1932 & has a total area of 602 acres] ARS - Bellary [est. 1906 & has 192 acres] and ARS - Yadgir [est. 1981 & has 390 acres] among others)

• 17 All India Coordinated Research Projects and two volunteer centres

More than 90 percent of its faculty hold a Doctoral degree in their respective fields and many are Post-Doctoral fellows (PDF), who have done their PDF research in renowned research institutes around the world including University of LINCOLIN (UK), Magrahill University (Australia) and Massachusetts Research Institutes (US) among others. This expertise facilitates the university to carryout outstanding research in line with the major research institutes of the world.

CONTRIBUTION FROM UAS:

Research programmes are drawn in its 12 agricultural research stations situated in 7 districts of the Hyderabad- Karnataka state mainly to address issues of small holders and also farm women to improve their income and standard of living while ensuring food security. University has involved in development of high yielding varieties in paddy, pigeonpea, cotton, sorghum, groundnut, sunflower, greengram, blackgram, sugarcane, soybean etc. with the support of Karnataka state government. University has developed 180 technologies since its inception for increasing production, control of pests, diseases and weeds and to maintain soil health.

UAS Raichur is widely recognized as a trailblazer for releasing numerous high-yielding varieties & hybrids in different crops over the years, many amongst which are popular at national level with consistent yield potential across years & seasons. In fact, the University has brought alive multiple inventions such as Groundnut variety Vijetha (R-2001-2); Greengram BGS-9; Sunflower varieties, namely RSFH-130 (Bhadra) and RSFV-901; Pigeonpea BGR 152, TS-3R; Paddy Gangavati Sona GGV-05-01; Linseed NL-115; Cotton RAHS-14; Tomato PTR-6; and Mango Khader; New Chilli Hybrid JCH-42 & UARChH-42; Chickpea new variety GBM-2 since its inception in 2008.

TRANSPLANTING TECHNIQUE OF PIGEONPEA

Pigeon pea is generally broadcasted or line sowing. Transplanting of pigeon pea seedlings is one of the alternate agronomic practices to overcome late sowing and related lower yields of pigeonpea. This technique involves rising of seedlings in polythene bags in the nursery for one month and transplanting the seedlings with the onset of monsoon after the soil profile is uniformly wet. Yield potential is 15-16 q/ha as rainfed intercrop and 30-35 q/ha as irrigated monocrop can be obtained.

NIPPING IN PIGEONPEA

Nipping of 5-6 cm top growth in pigeonpea has to be done at 20-25 days after transplanting (DAT). Between 50 and 55 days of germination, the main shoot tip (called as "mother" shoot locally) and the secondary branch tips (secondary shoots, called "daughters") are pruned. This promotes development of large number of tertiary shoots (called "grand children" locally), which bear more number of pods, thus increasing the yield by 30-50%. Grand children grow only at the expense of mothers and grand mothers, goes local saying.

TRANSPLANTING TECHNIQUE OF BT-COTTON

Transplanting of 25-30 days old seedlings of Bt cotton at 90x90 cm or 90x60 cm spacing helps for further growth and development. The main purpose of transplanting is to catch hold season with right time of planting. It has the advantage of maintaining the optimum plant population and quick establishment. The cost towards plastic covers is additional and it will be compensated with the lower seed rate. It is better than dibbling and ensures optimum plant population with uniform crop stand.

INTEGRATED FARMING SYSTEM (IFS) FOR IRRIGATED AND RAINFED AREAS

Different IFS component viz., crops, vegetables, flower crops, goats, dairy animals, poultry, vermi-culture and fodder spe-

cies and bunds was more profitable over existing conventional farming system components. The above mentioned components were compared with existing conventional IFS components in rainfed areas. The system income was much higher than conventional system in addition to unaccountable benefits. The benefits from IFS system was realized in terms of employment generation, monetary benefit, improvement in soil fertility in addition to fulfillment of domestic requirement.

DIRECT SEEDED RICE IN COMMAND AREAS

Rice is an important crop of our country as well as in Karnataka state. It is grown in different areas under different methods; in high rainfall areas of Western Ghat and transition zone of Karnataka, it is raised by direct seeding/sowing; in command areas, rice is being grown under transplanted conditions and in other parts of the country viz., Tamil Nadu and Bihar, under Madagaskar or SRI method is popular with the farmers. In West Godavari district of Andhra Pradesh rice is also grown by wet seeding method. The tail end farmers of the ThungaBhadra (TBP) and Upper Krishna (UKP) command areas are getting good yields under dry direct seeding with minimum cost of production. Direct seeded rice (DSR) is a new technology for the farmers of irrigated area, the knowledge on the agronomic practices of DSR is most important for farmers who are willing to adopt this technology in command areas.

BENEFITS OF DSR

1. Direct seeded rice uses 17-35 % less water than the transplanted rice i.e. it saves 17-35 % water
2. It helps in timely sowing of the crop
3. By direct seeding the resources, time, energy required to raise and protect the nursery are saved besides avoiding land preparation of main field.
4. Less seed rate per unit area (8-12 kg/acre)
5. Saving in energy (diesel 8-10 l/acre) and consequently, it is less polluting technology
6. Farmers are saving 25-30% fertilizers in DSR
7. Less cost of cultivation (Rs. 7,000-8,000/acre)
8. Judicious use of water leading to increased water productivity besides avoiding problems associated with excess use of water like salinity in command areas.

USE OF PULSE MAGIC:

Another new technology from KVK Agri University is the Pulse Magic. This technology is beneficial by using foliar application of Pulse Magic by 50% during flowering and the remaining dose after 15 days of first spray. The yield increases by 20%. This is used for pigeon pea, green gram, and black gram. It is sold at the basic price at the university.

GI TAG FOR TUR DAL:

University has obtained GI tag (The geographical indicator) for Gulbarga TURDAL(PIGEON PEA). APEDA is working on popularizing turdal in this area and on exporting the same.

FOOD PROCESSING AND POST-HARVEST TECHNIQUE:

We use machinery to pack the produce and to knot the jasmine flowers. Shelf life of the produce increases and this is quite popular in flower producing areas.

MILLET PROCESSING UNITS:

The university has received more than 3 projects in RKVY and established units for processing millets in Kalyana Karnataka.

SOIL AND WATER ENGINEERING Farming community is benefited by this technique in the event of erratic rainfall. More than 3500 acres of land and 375 beneficiaries fall under this technique.

UAS Raichur has got several state-of-the-art-research laboratories such as Gama Radiation Unit, Laboratory for Climate Change Studies, Organic Farming Research Institute, Pesticide Residue and Food Quality Research Laboratory (NABL Accredited Laboratory with standards ISO/IEC 17025:2005), Centre for Nanotechnology and Laboratory for Post-harvest & value addition studies. These laboratories have churned out some path-breaking technologies that are being adopted on a large scale such as e-SAP (electronic Solutions Against Agricultural Pests), Integrated Farming System for Rainfed & Irrigated Condition and Laser guided land leveling to name a few.

A strong proponent of the power of collaboration, UAS Raichur has established MoUs with 22 organizations across the country including Indian Council of Agricultural Research, New Delhi (Project on Management of Salt Affected Soils and use of Saline Water in Agriculture, Gangavati), IICPT, Thanjavur (Collaborative programme of Research, Training, Curriculum, Institutional Development, Information Dissemination and Exchange of Faculty, Students & Staff), Dow Agro Sciences India, Mumbai (Development of Talent and promoting Research & Development for Enhancing Crop Production) and GAAIA Technologies, Bangalore (e-Pest Surveillance) to name a few. The University has also collaborates via MoUs with six international organizations including Colorado State University, US and University of Saskatchewan, Saskatoon, Canada.

"The predominance of small and fragmented land holdings is the major issue which needs to be addressed by assessing the economic viability of different alternative systems such as contract farming, integrated farming systems, promotion of farmers interest groups

(FPO/FPC) and so forth," remarks Dr. K. N. Kattimani, Vice-Chancellor, University of Agricultural Sciences, Raichur. Further to add to this, farmers are not getting proper price for thier produce . He suggests for fixation of minimum price for the produce in spite of market fluctuations which will help the farmers to get more income so that they can sustain. Dr. Kattimani says that Karnataka has the potential to grow agricultural and horticultural crops apart from seed production in all seasons. The farmers face issues regarding crop cultivation due to lack of sufficient technical knowledge. Krishi Vigyan Kendras and Agricultural Extension Education Centres of the University have been accomplishing the task of providing all the information needed by the farmers.

Dr. Kattimani feels that providing the basic price to the farmers is important. IFS module plays a major role in fetching additional income to farmers in case of any natural calamities. Value addition through food processing and case of policy intervention will help in increasing the net income of the farmers.

STRIDING INTO A BETTER FUTURE

Operating with the mission of providing leadership in Teaching, Research and Extension in agriculture & allied sciences, UAS Raichur has been striving to keep pace with new frontiers of science & contemporary challenges to be socially, economically and technically relevant. The University is committed to develop excellent manpower & useful technologies and their dissemination to the farming community of the state general and the University jurisdiction, in particular. UAS Raichur is en route to achieve this by further improving the learning outcomes of its students by establishing smart campuses,virtual class rooms,implimentation of Academic Management Systems, digitizing library with major research programme of the campus and establishing climate resilient study centre, e-SAP, food processing unit, nano technology entre & so on. However, its ultimate goal is a lofty one that entails uplifting the economy of Kalyana Karnataka region in turn entire country's economy and our farmers' lives.

"We are passionate about deploying resource conservation technologies for the enhanced resource use efficiency & productivity via inter-disciplinary problem-solving approaches as well as assessing anticipated climate change impacts, taking mitigation measures and developing technologies to overcome climate change policy," adjoins Dr. Kattimani. Not stopping there, UAS Raichur also lays immense importance in improving the regulatory framework on efficient use of natural resources, vulnerability to disaster and providing backward & forward linkages between public-private & market.

Today's farmers tend to get information more through e-media and visits to the stations. UAS Raichur strongly believes that Universities should take up the responsibility of providing such linkages for easy forward & backward flow of information between stakeholders and university. "Farmers should be provided services on soil health and its based recommendations through e-solutions. Research Stations/KVKs/AEECs should cater to the farmers' technological needs by arranging travel seminars, exchange of farmers to address capacity building on the regional-/agro-ecological-/crop-specific problems of the region. We endeavor to faciliate these by developing e-solutions keeping in view of the advancement of science for linking farmers with farm institutions," reveals Dr. Kattimani. The University also helps farmers to double their incomes via IFS, World Bank-aided NAIP, BARC, ICAR, DST, DBT, GOK, RKVY-GoI and other national & international agencies.

Furthermore, the University's research stations would remain as the future agriculture growth centers through facilitating education, conducting adoptive trails, testing technologies, assessing them and providing service (including seed, plant materials, information agro advisory services, market, intelligence & more) to seekers. UAS Raichur aims to regularly monitor & evaluate the policy initiatives & programmes on agriculture for their efficiency and utility for sustainable development among others.

The University's future roadmap with respect to research revolves around genetic resource enhancement, breeding for specific biotic and abitioc stresses, breeding for climate change, breeding for quality improvement, biotechnology & bioinformatics tools, crop genomics for harnessing quantitative trait loci (QTLs), genomic resources & crop improvement, breeding of horticultural crops, diagnostics tools, natural resources management, organic agriculture, plant protection, farm mechanization agribusiness management and agricultural policy. UAS Raichur would also be vesting keen emphasis on the transfer of technologies through interlinking universities with farm clubs, farmers association, water users association, commodity groups and others by establishing community radio stations, video conferencing through 4G & 5G technologies. With these pragmatic activities, UAS Raichur is taking great strides towards its vision of transforming Indian agriculture and conservation of bio-resources & environment by empowering human resources through agricultural education.

CONTACT :
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Question

Q&A

Answer

STEVIA

chirag98: *Where is stevia grown in Gujarat? I need some info!*

Answer 1 : organic84 : Stevia is a successfully crop which can be grown in In Gujarat. The Climatic condition of Gujarat suits the stevia cultivation. We can provide you the complete consultancy for the stevia cultivation. Our representative will help you the get your farm developed. We will also provide you the stevia plants at very competitive rate. Stevia is a very profitable crop. Once it is grown it can be harvested for five years. The stevia leaves are used for the making of the calorie free sweetener. There is huge demand of the natural calorie free sweetener in India due to the Diabetes Disease.

LOOKING FOR EXPERTISE TO GROW ROSES UNDER LED LIGHTING

sankarvenkat : *Hi, I have few polyhouses and am planning to install LED lights to grow roses. Please share any experience*

Answer 1 : drsantos : Hi sankarvenkat, I can share my experience regarding your rose farming. Please elaborate your complete structure, climate conditions and varieties you selected.

sankarvenkat : *Hi, The structure of my shed is 75MX10M with a centre height (Ridge Height) of 5.5M. The Lateral height (Height of end column) is 4.5M. I am planning to grow Dutch Roses. As the shed is already covered with cement sheet, I want to use LED lighting instead of converting the shed into a polyhouse. Let me know if you can help.*

Answer 2 : drsantos : Well Mr sankar, Your structure is suitable for dutch rose farming if you replace cement sheets with shad net. depending on only LED Lighting will not give any results

SEA WEED

rvs030791: *Does any one have broad idea about sea weed .like any consultancy type sevice which can provide with regards to sea weeds it economics and its market potential.*

Answer 1 - garao56 : Under Pradhana Manthri Matya Sampada Scheme subsidy is available for seaweed cultivation , Government has to allot area in the sea , unit cost will be Rs/15000/- per member.

Answer 2 - maitys : In global terms, cultivation of microalgae is the fastest growing sector within aquaculture, but despite good natural conditions (cold, nutrient-rich waters), it is relatively underdeveloped in India.

AquaAgri is seeking to identify how to develop sustainable large-scale cultivation of macro algae in India . Cultivation of macro algae has many advantages over land based biomass production.
Macro algae grow faster than terrestrial plants and are therefore more efficient at capturing carbon dioxide.
In addition, cultivation in the sea does not require fertilizer, pesticides or irrigation and does not occupy valuable arable land.
Out of approximately 700 species of marine algae found in both inter-tidal and deep water regions of the Indian coast, nearly 60 species are commercially important.
The seaweed industry in India is mainly a cottage industry and is based only on the natural stock of agar-yielding red seaweeds, such as Gelidiella acerosa and Gracilaria edulis, and algin yielding brown seaweeds species such as Sargassum and Tubineria. Currently most of the seaweed produced in India is used for plant growth factor,
Currently, seaweed production in India is primarily confined to the Gulf of Mannar and Palk Bay in Tamil Nadu,
There are two methods two methods of seaweed cultivation
1.Vegetative propagation method
2.Reproductive method
So far in India, only experimental scale cultivation of commercially important seaweeds such as Gelidiella acerosa, Gracilaria edulis, Hypnea musciform, Acanthophora spicifera and Saragassum species at different field environments using various culture techniques of vegetative propagation method. Sargassum plagiophyllum, Enteroporpha flexuosa, Ulva fasciata and Gracilaria edulis by reproductive method using spores were carried out successfully.
Only in recent years pilot scale culture of Kappaphycus alvarezii being carried out by Pepsi Co., in Mandapam area.
There are also rich seaweed beds around Mumbai, Ratnagiri, Goa, Karwar, Varkala, Vizhinjam, Pulicat and Chilka.
One of the major thrust component of PM Matsya Sampada Yojana (PMMSY) in association with National Cooperative Development Corporation (NCDC) and State Department of Fisheries is making plans for marginal costal fisherwomen communities for encouraging seaweed cultivation at a large scale across several coastal States in the country.
In contrast to other forms of aquaculture, seaweed farming has minimum capital and technological requirements and provides important economic opportunities .

GUAVA PROCESSING

vermaaditya: *Dear Experts, Can you please suggest what are the options to preserve guava? what are possibilities? Jam/Spread/pulp? what's min capacity? Please share your experience. Best Regards*

Answer 1 - maitys : There are several new brands using innovative culinary recipes to prepare bottled Guava juices -
Blending with vegetable juice , Sugar cane juice etc.
Blending of fruit with sugarcane juice is new entrant in the Indian juice space, not only enhances flavour but also elevates the nu-

tritional profile of the juice and is a great source of vitamins and other essential micro nutrients.

Clarified guava juice powders were made using freeze-drying, spray drying and tunnel drying. The freeze-dried product had superior quality; however the spray-dried product was stable and may be more economical. Simple Guava sorbet (ice cream) with spicy combinations ..is also available in India ... one brand is doing roaring business in South India. Guava commercially used in the production of juice, jams, jelly, beverages, canned slices, etc., which leaves behind huge amounts of guava wastes in the form of peels, eaves, bark, seeds, and pomace. Pectin can be extracted from Guava waste (peel, pulp, seeds , peels etc.)

05 CUMIN PROCESSING UNIT IN GUJARAT

javeduk: *How I start Cumin Processing Unit in Gujarat? What type of machinery required?*

Answer 1 - ***shahatul:*** Please feel free to discuss further

Answer 2 - ***garao56 :*** Cumin is an essential spice used by human beings from time immemorial. The peppery flavors of Cumin add to its value as a culinary spice as well as its function for helping ease digestive complaints. The property of this flavor known as a carminative is to help dispel gas from the digestive tract.
There are some studies almost exclusively done in vitro, indicating some promise for the essential oil extract of Cumin seeds as an antibacterial agent
The processing involves 1. Cleaning for whole cumin used as spice, seed purpose etc 2. Cumin Powder 3. Cumin oil
What type processing you going to take up so that necessary machinery can be procured for setting of the processing unit .

Answer 3 - regina: If you want to go for Cumin extraction plant, pl contact S Veerasamy.M.E(Chem)

Answer 4 - atas2020: If you want to set up a cumin cleaning plant with highly efficient machinery please contact. My company manufactures cleaning and powder making machinery for all types of spices.

Answer 5 - empero : I manufacture cumin oil extraction plant.It cost Rs8.5 lacs. Please contact

Answer 6 - garao56: If project report is required please contact us. Crayogenic grinding machinery and equipment will be costing around Rs.40 Lakhs, Unit cost around 1.00 crore. Other type of machinery for spice grinding around Rs. 5.00 to 10 Lakhs

06 NEED GUIDANCE FOR CLEANING SHRUBS AND TREES

vermaaditya : *Dear All, I have around 10 acres of land where there was no cultivation for years and have shrubs and bushes and small trees in that area. I am looking for somebody who can help me clean the land and ready for cultivation or plantation. pls help if anybody knows mechanical way of cleaning the area. Best regards.*

Answer 1 - vmap : Sir, Better you go to uproot all shrubs and other bushes by JCB and later plough it with tractor for removal of cut pieces from inside the ploughed land.same time use labour to clean such land.

Answer 2 - garao56: You can take a land development loan from bank and provide all infrastructural facilities like , Bore well, pumset , pipeline, godown, and cultivation expenses for planting fruit crops or farm forestry or cultivation of crops etc. Please contact us for project report and guidance

07 AZOLLA FARMING

agrihydro : *I am looking to start azolla in Guntur,AP. I would like to know, how to produce it organically. What would be a small scale setup cost and how and where i can market it. Also I am looking for the initial mother culture.*

Answer 1 - garao56: Please inquire at Sangam dairy and Vijya dairy and Joint Director of Animal Husbandry , Guntur , so that they may give clue for availability at farmers in Guntur Dt,. Please contact us for cultivation details

Answer 2 - vasudh : Azolla can be grown Organically Only. It is not possible Grow Azolla with Chemicals. Azolla cannot get online. It is perishable. it has to be put it in the Water within 48 / 72 Hours picking from the Nursery. We can supply Azolla with in 45 Days of Pre Order from Hyderabad If any body interested please Call 9133498366. Full detils on Azolla Growing will be Provided on request through Mail.

08 SCREW-TYPE BRIQUETTES PRODUCTION

zekaka : *Hello Everyone, I have a new venture producing screw-type sawdust briquettes. I am wondering why my briquette machine can't reach its rated output of 300-400kgs per hour. It has a 22kw motor and everything is working smoothly. However, when I check power consumed per hour, it is consuming 18KWh including the heating coils, meaning the motor is only drawing about 13.5KWh. Any ideas how I can reach a higher capacity?*
The sawdust is dry at about 8% moisture. It is sawdust from pine and eucalyptus trees.

Answer 1 - ***samaprbha :*** Hi, What is your expected production capacity from 22 Kw Motor ? What is the production capacity you are getting at present?
May be Heat loss? Can you share photo /Video of your Running machine ? Is your machine can make pellets using sugarcane Bagasse, coconut Husk Powsder ?

09 WHICH TYPE OF GREEN FODDER?

v3p5 : *Hi, Am planning to grow green fodder for 25 sahiwal / crossbreeed cows in 3 acres of land, in HARYANA*
What type of green fodder would be best?

Question

Q&A

Answer

1) Makka (which variety) 2) Sugar graze 3) Napier (which variety) Should i choose all 3 or just 2 and grow .
Any other suggestion welcome apart from the ones stated above.

Answer 1 : garao56 :The popular hybrids of Napier grass are Pusa Giant Napier, Gajraj, NB-5, NB-6, NB-21 and NB-35.

Q10 ADVISE/SUGGESTIONS REQUIRED FOR DESI COW FARMING

nanduryn : *Hello, We are planning to start a desi cow (gir) farming in Hyderabad. Appreciate your advise/suggestions to our new venture regarding the location, number of cows to start with, fodder etc.*

Answer 1 : yuvaarise:Hello, Contact for details you want to know about the establishment of Gir farm.

Answer 2 : garao56 : Please contact us for guiance

Answer 3 :***yuvaarise:*** I am currently at Hyderabad.. I'm running a gir farm since 3 years. Have experience since 2004 as veterinarian. Contact me..I'm happy to help you..

Q11 COST FOR SETTING UP HYDROPONIC FARMS

kadupukotla86 : *Hello Friends, I recently started research on hydroponic farms and would like to know how much it costs on setting up poly house (foggers and exhaust fans) + hydroponic systems in 1 Acre in Andhra-Vizag. And any one know if AP government giving any subsidies? Thanks,*

Answer 1 : ***jayant89 :*** Yes subsidies given by state govt if project report made properly and cost per acre of your polyhouse can start from 10-15 lakhs n go upto 50-75 lakhs depending upon features and level of protection control you want we are consultants. Having good experience with hydroponics in India USA and Dubai and we can help you with details if u want

Q12 WHAT ARE A FEW CROPS THAT SELL WELL AND ARE NOT QUICKLY PERISHABLE?

kevin256 : *I'm interested in part time organic gardening/farming. Currently grow around 1,000 lbs produce annually for my family (includes heavy stuff like melons, squash, potatoes so not that impressive).*
I want to expand and try my hand at a farmers market or direct to consumer. But for the first few seasons I'd like to focus on items that I can store in a cool dry place and sell slowly.
I'm thinking that winter squash, pumpkins and gourds, ornaments corn, heirloom potatoes, while not the most valuable can be stored for some time without the need for a cold room like leafy greens require.

Answer 1 : ***organic84 :*** Hey, There are many crops that sell are very good and they are not perishable quickly.
1.) Cabbage:- A vegetable with an amazing shelf life is cabbage. You should avoid washing or cutting your cabbage until you are ready to consume it, as this can cause bruising, which can shorten its longevity.
2.) Lemons and Limes:- lemons and limes can last two weeks when left out and up to a few months when kept refrigerated. The best way to store them in the refrigerator is in a crisper drawer whole. Do not store them in a container as it can make them go bad more quickly.
3.) Carrots:- The best way to keep carrots for longer is by choosing fresh, whole carrots. When in this state, carrots can be kept in the vegetable drawer of your refrigerator for four to five weeks.
There are many more other crops that are not Perishable quickly and if you want to produce your crop in a more effective way then you should also use organic Products.

Q13 NCOF - WASTE DECOMPOSER

deepak47:*Hello All - Kindly share your views on waste decomposer about its advantages and disadvantages. Thank you.*

Answer 1 : ***shajathali :*** WDC. It is cheapest farm input. One of the best input converting your soil fertile. Fertility of the soil depends on the availability of microbes in d soil.
Microbes need food to live. Decomposed materials are food for microbes. In normal time, decomposing the materials in d soil take more time thereby it gives room for soil born diseases to come.
WDC helps in decomposing all materials in d soil shortly it leads to healthier soil. So irrigate the land with WDC.
WDC cannot acts as pesticides but spraying of plants with WDC helps to decompose the dried parts of the plants.

Answer 2 : ***pmpatil_1:*** Waste Decomposer works is best under organic farming
Advantage:
1. Improves soil humus, organic carbon value in soil by decomposting the organic/ plant residue in the soil which also enhance microbial activities in the soil made smoth.
2. Best organic liquid fertilizer for plants when apply through drenching
3. It also controls many diseases like leaf spot, leaf blight in pomogranate etc.. by Foliarspray
4. It helps to composting of plant residue so just sprinke over FYM pit or Vermicompost pit all residue of waste will decompost within 45days.
5. Cheaper in cost and after first culture you just use 2-5lit of old culture for next culture preparetion was more effective than the bottle culture hence reduce the cost of cultivation

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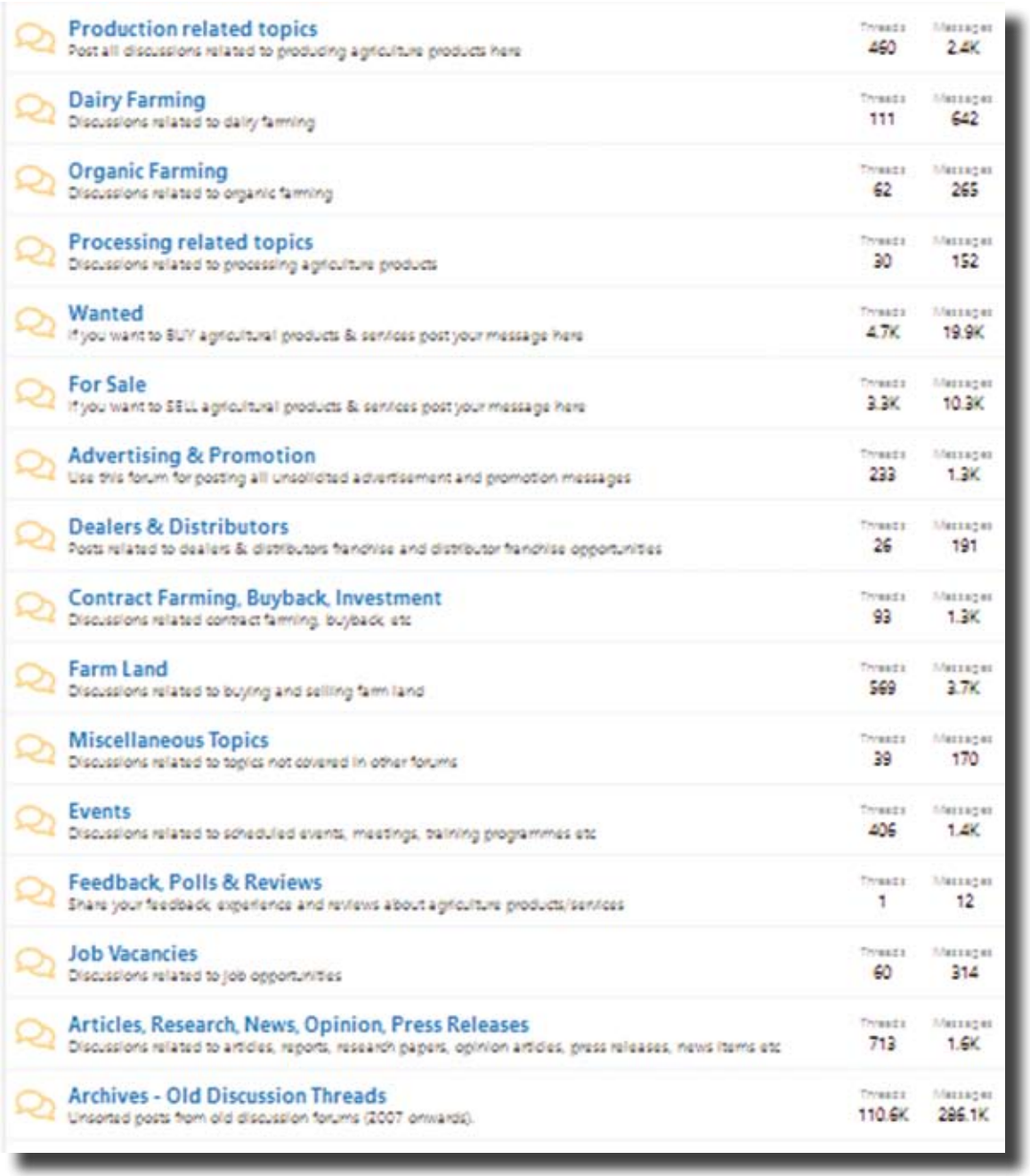

	Threads	Messages
Production related topics Post all discussions related to producing agriculture products here	460	2.4K
Dairy Farming Discussions related to dairy farming	111	642
Organic Farming Discussions related to organic farming	62	265
Processing related topics Discussions related to processing agriculture products	30	152
Wanted If you want to BUY agricultural products & services post your message here	4.7K	19.9K
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Advertising & Promotion Use this forum for posting all unsolicited advertisement and promotion messages	233	1.3K
Dealers & Distributors Posts related to dealers & distributors franchise and distributor franchise opportunities	26	191
Contract Farming, Buyback, Investment Discussions related contract farming, buyback, etc	93	1.3K
Farm Land Discussions related to buying and selling farm land	569	3.7K
Miscellaneous Topics Discussions related to topics not covered in other forums	39	170
Events Discussions related to scheduled events, meetings, training programmes etc	406	1.4K
Feedback, Polls & Reviews Share your feedback, experience and reviews about agriculture products/services	1	12
Job Vacancies Discussions related to job opportunities	60	314
Articles, Research, News, Opinion, Press Releases Discussions related to articles, reports, research papers, opinion articles, press releases, news items etc	713	1.6K
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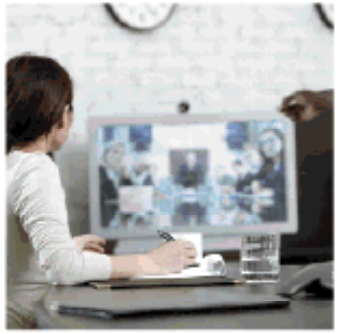

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