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Agriculture & Industry Survey

India's Leading Business Magazine for Agriculture

Mocherla Pradeep Kumar

Dr. Shama Afroz Zaidi

Chetan Gore

Platosen Samarasam

Venkatesh S Kshatriya

DeLaval provides integrated solutions designed to improve dairy producers' production, animal welfare and overall quality of life.

Chetan Gore

Is passionate about farming for long and started in 2005. He worked on his barren land in Belanki, and developed a custard apple orchard there, 550 kesar mango trees, and grape yard. He also developed a brand name "Organic Village" to sell mangoes at a good price.

Platosen Samarasam

An MBA graduate with a Biotech degree decided to start a farming company and to restrict to moringa. He talks about his experiments with moringa. He says they get income of about Rs. 1.75 lakhs to 2 lakhs per acre with an expenditure of Rs. 60 to 70 thousand.

Dr. Shama Afroz Zaidi

Discusses at length about the importance of micronutrients in crop production. The company's core area of expertise is chelated micronutrients, crop specific nutrition, and hydroponic nutrients.

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How agriculture has become a powerful political tool in big economies?

Is India still a deficit food economy?

And Russia and other big economies are using their agriculture power as a political and diplomatic tool? Agriculture is not a high priority national goal either with our political leadership or with the non-agriculture industry hubs, the high profile industry lobby that is very entrenched with all the political heavyweights.

For all pretensions, we display agriculture issues don't create the right resonance with the agriculture policy making either at the Centre or the States level politics.

As we write there is the looming danger of the entrenched farmer's groups at the borders of the Delhi city and we don't know how long this protest group's politics would go on and if there is any guess to be made it is better to leave the matter as it is, better neglect it or forget and pursue some other topic or course for media reporting. Indian media industries growth itself seems skewed and unpredictable with so much feared mindset at all levels of our living. And see what a contrast it is with the big economies and big agricultural countries that use the agri sector as a powerful tool.

Take Russia for instance, as per the latest write up in the high profile, London Financial Times newspaper that Russia today has emerged as the country's biggest wheat producer and wheat and grains exporter. The title of the article is Russia sows the Seeds of wheat diplomacy. When the long-ruling current Russian leader Vladimir Putin became the President he was told by his colleagues that Russia imported more than 50% of its food was imported. When the president heard this comment, it is told, his face went pale. The report says that when he heard this comment Putin has made it his goal to provide better food security in the country. He vowed that Russia would become self-sufficient in food by 2000 when it had been a net importer and that won't be the scene anymore. As one who attended his meeting said that the President dreaded dependency and thanks to his vow, today Russia is number one in wheat and today Russia has reached a stage where other countries, friends, and foes who are becoming reliant on Russia for their food.

The food sector by 2000 was neglected, today others have come dependent on Russia. Today the Russian agriculture goal is 80-95 percent of self-sufficiency in key products. A decade later a grain charter to boost transparency in the market was introduced.

After the political controversy surrounding the annexation of Crimes and stand off with neighboring Ukraine the EU imposed sanctions against Russia and this made Russia become more sensitive to the food crisis and hence the move to boost wheat production and given the Russian gigantic landmass of the country, there is no physical limit to expand agriculture opportunities.

Russia has the world's biggest country by landmass, now the top wheat exporter and passing the US and Canada. Russian exports, wheat, and grains to Saudi Arabia. Cut its oil production to balance its external trade. Today 10 percent of Saudi Arabia's grain imports are from Russia.

There are bigger issues, climate changes and other international issues, food exports to Iran and in return Russia sells Iranian oil. Agricultural outputting the country has grown almost 50 percent since 1991. Russia is not all about oil and gas exports. Says one expert: Russia is not about green land, blue water, and clean food. America is of course still the world's biggest agricultural economy. But Russia's new thrust into agriculture and food exports is catching up.

Still the USDA, the agriculture department of the USA is very well organized and knows each inch of the world's agriculture regions.

India has many lessons to learn from the current developments in the worlds' leading agricultural regions. We have to know more about how to accelerate our agriculture production strategies.

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Founder Chairman
V. Isvarmurti

Managing Editor
Kartik Isvarmurti
editor@agricultureinformation.com

Magazine Coordination
A. Kavitha
kavitha@agricultureinformation.com

Website Coordination
Rajani Jain
rajani@agricultureinformation.com

Dhanalakshmi S
dhanalakshmi@agricultureinformation.com

Contact Number and Email
9620-320-320
support@agricultureinformation.com

To subscribe visit the website
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www.agricultureinformation.com

Office Address:
Vadamalai Media Group
C-2/286, 2 C Cross,
Domlur II Stage
Bangalore 560071
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'Farm graduates can become self-reliant by setting up agriculture start-ups'

Despite being the oldest profession, agriculture is still not getting adequate returns and for many, it is yet to become viable, Chairman of Karnataka Vikas Grameena (KVG) Bank P. Gopikrishna has said.

He was delivering the keynote address at the Academia-Industry Interface conclave on "Agri Start-ups - Way Ahead" organised by World Bank-funded Project NAHEP-IDP at University of Agricultural Sciences in Dharwad on Monday.

"Famines in the 1960s and 1970s led to shortage of foodgrains and milk in India and forced import of foodgrains. Subsequently, impetus was given to farming in the successive Five Year Plans leading to Green Revolution. As much as 50% of the total 218 million hectares available for farming has already been brought under irrigation. But, unfortunately even after 75 years of Independence, farm returns continue to be low," he said.

Referring to Prime Minister Narendra Modi's plan towards doubling farm income by reducing input cost and increasing market price, Mr. Gopikrishna said that it is time graduates of agricultural sciences became self-reliant by setting up agri-entrepreneurships.

General Manager of NABARD R.M. Kummur sought to know why agricultural universities are yet to produce agriculture start-ups when IITs and IIITs could produce entrepreneurs. "Start-ups in agriculture do not mean just crop cultivation. There are a number of byproducts and related industries which can be established. Over 250 byproducts can be prepared with maize and over 100 byproducts from soya. With both these being major crops in the region, several start-ups can be set up," he said.

Mr. Kummur said that the problem of funds for start-ups could be addressed through CSR funding by incubation centres.

Presiding over the programme, Vice-Chancellor of UAS-Dharwad Mahadev Chetti said that although the country had achieved production of 305 million tonnes of foodgrains, it lacked the requisite storage facilities and consequently, tonnes of foodgrains were getting lost every year.

Prof. Chetti said that to meet infrastructure needs, the Union government has earmarked ₹100 crore for establishing 50,000 agriculture start-ups in the State. And, the State being a pioneer in framing agriculture start-up policy, has drawn up plans to set up at least 5,000 agriculture-related start-ups, he said.

Source : www.thehindu.com

Amazon India announces the launch of 'Kisan Store'

Amazon India's Kisan Store will enable farmers across India to get access to more than 8,000 agriculture inputs listed by small and medium businesses (SMBs) such as seed, farm tools and accessories, and more.

Amazon India has announced the launch of Kisan Store - an online platform that will enable farmers across India to get access to more than 8,000 agriculture inputs such as seeds, farm tools and accessories, plant protection, nutrition, and more. Listed by small and medium businesses (SMBs) these products will be available at competitive prices on Amazon India, with the added convenience of delivery at the doorstep of the farmers.

The store was launched by Narendra Singh Tomar, Union Minister for Agriculture and Farmers Welfare. Commenting on this development, he said.

"I hope this initiative proves to be beneficial for the farmers and the people associated with the farming community to engage the Indian farmers in the modern era of digital economy, increase the productivity of agricultural produce, and provide services like logistics industry."

The online store will be present in languages such as Hindi, Telugu, Kannada, Tamil, and Malayalam and the farmers can buy the items using digital payments.

Amazon has also opened up its network of 5,000 plus Amazon Easy stores for farmers to shop with the help of the store owners who will help them browse through it, identify a product they like, create their Amazon accounts, place orders, and checkout to buy. These stores have thousands of products listed from over 20 brands.

Amit Agarwal, Global Senior VP and country head of Amazon India further added that the online kisan stores will empower the farmer community. He said,

"The launch of Kisan Store marks our first step to create an ecosystem for farmers that will enable them to seamlessly place orders and get products of their choice delivered to their doorstep at the click of a button."

Recently, Amazon also launched its agronomy services for farmers that will provide timely advice and enable them to make accurate decisions on actions required for their crops.

The aim of this initiative is to introduce machine learning technology for better produce and build a robust supply chain infrastructure.

By Bhavya Kaushal

Source : yourstory.com

The lure of 10 million jobs a year

Employment in agriculture has increased. Will it lead to shed the belief that agriculture will not be able to employ further?

The latest data of the Centre for Monitoring Indian Economy (CMIE), a non-government research agency, points out an interesting trend in employment in India. An increasing number of people are joining agriculture for employment in a shift from non-farm sectors like manufacturing and other informal jobs.

The CMIE analysis says that the share of the agriculture sector in total employment has increased to 45.6 per cent in 2019-20, from 42.5 per cent in 2018-19.

Also, the economic collapse due to the impact of the novel coronavirus disease (COVID-19) pandemic has led to huge losses in jobs in non-agricultural informal sectors.

In the last one-and-a-half years, people have returned to villages and have taken up cultivation. Agriculture has been the only sector that reported a decent growth in 2020-21.

Mahesh Vyas, the managing director of CMIE, writes analysing this data, "It is a sign of distress in the labour market where non-agricultural sectors are unable to provide employment and labour is forced to shift to agriculture." He calls it an involuntary reverse migration from "factories to farms".

Migrating people from farm to non-farm sectors has been the key strategy of India to provide livelihoods to the largely informal workforce. And there has been a consistent outflow of people from agriculture.

All this assumed that a critical transition was happening to ensure decent employment. It was also regarded as a sign of economic growth, finally leading to job creation.

Thus, the CMIE report comes as a shock. We are now in an employment situation that we have been encouraged to transit from since decades. Agriculture lost favour with people because it has not been remunerative.

Also, this sector has already plateaued in employment generation capacity. Irrespective of all these, agriculture still employs over 50 per cent of the country's workforce. Vyas says it is an economic distress as many more millions have rejoined a sector that has an average wage of Rs 291 per day.

Other sectors not creating employment and agriculture being a sector where people are joining out of distress will have another political ramification. The National Democratic Alliance (NDA) government has promised 10 million jobs a year as well as doubling farmers' income by next year. At the current rate, both seem to be not happening.

This reminds one of a development some 20 years ago that brought unemployment into focus. Rather, this set in motion the strategy that agriculture would not be further able to create employment.

In 1999, the ruling NDA led by the late Atal Bihari Vajpayee first promised 10 million jobs a year. He set up a Task Force on Employment Opportunities under Montek Singh Ahluwalia to suggest ways to achieve this.

Ahluwalia submitted the report in 2001. It gave the verdict that in the future, agriculture would not be a job creator anymore. An annual economic growth of nine per cent would lead to creation of jobs anyway. We have not achieved that kind of consistent economic growth and as data points out, economic growth per se has also not created jobs as expected.

There was another development that escaped everybody's attention in 2002. Prime Minister Vajpayee also set up another task force called the Special Group on Targeting Ten Million Employment Opportunities Per Year.

This was headed by SP Gupta, a former member of the erstwhile Planning Commission. Its findings were a contrast to the Ahluwalia one. It maintained that the agricultural sector was a 'gold mine', with the potential to create at least 11 million jobs over five years.

It emphasised horticulture, floriculture, agroforestry, minor irrigation and watersheds among others as labour-intensive, high-value areas. These are the same ways that the Modi government is focusing on doubling farmers' income.

But the moot question is: How will India be fully employed? The debate over farm vs non-farm needs a fresh look. Jobless growth is happening but the farm sector has beaten this trend in recent years. It shows that agriculture might not have lost all its potential. It just needs a new political deal to revive.

By Richard Mahapatra

Source : www.downtoearth.org.in

Adani in the eye of the storm as Himachal apple prices crash

Apple growers feel that instead of incentivising big corporates, the state government should instead help farmers build cold storages.

The main argument of those rallying behind the Bharatiya Janata Party government's controversial farm laws; that the free market economy will reward farmers, faces a major dent in the wake of the crashing market price of the apple crop in Himachal Pradesh.

The Rs 5,000 crore apple business in the hilly state, which mostly runs on the free market model, was dealt a major setback right at the beginning of the season when the Adani group, a big corporate buyer in Himachal Pradesh's apple market, announced its opening price for A-grade, premium quality apples at just Rs 72 per kg, much lower than the Rs 88 per kg it offered last year.

This led to a disruption in the whole market, with apple growers slamming the corporate giant for the price crash and the consequent skewed income to the growers.

Adani properties are already under siege in Punjab and Haryana due to protests by farmers who blame the big corporates – and their tendency to monopolise the agriculture market – for the controversial farm laws. Now in Himachal, where trade is open, apple growers say Adani's functioning is proving detrimental for them.

Dimple Panjta, president of The Himalayan Society For Horticulture and Agriculture Development, a Rohru-based NGO consisting of a large number of apple growers, told The Wire that in 2011, Adani bought A-grade quality apples at Rs 65 per kg. A decade later, it is offering just Rs 7 more.

"Is this what we really deserve," asked Panjta. "While our farm inputs expenses have gone up manifold, the company brought in by the government to help farmers in getting good market rates is resorting to exploitation of farmers by continuously reducing procurement rates."

According to him, a decade earlier, the cost of production for the growers, inclusive of packaging costs, was Rs 250 per box. Now it has gone up to Rs 600 per box. "But see the returns, it is [the] same [as] a decade earlier," he added.

Panjta said the problem with the Adani group is that it carries a lot of weight in the apple market. Even though it buys no more than nine or ten lakh boxes every season (every box has 25 kg of apples) – which is not more than 3-4% of the state's total apple production – Adani's offer price somehow sets a benchmark for the rest of the market. This is what destabilises the rates.

"Traders often say when Adani is buying at 'X' rate, why should they [the traders] pay more?" said Panjta.

He said, moreover, that Adani plays it smart with its offer rate. Its offer price is for the premium quality of the apple and pays quite less for medium and small size of apple. Further, if the apples are discoloured, the rates are far less than farmers' production costs. Now that It has fixed the rate of Rs 72 per kg for A-grade apple, the average earning of an apple grower, if they supply to Adani, will not be more than Rs 50 per kg.

"On the other hand, there is clear evidence that apples procured by the company at a cheap rate from the farmers are sold in the retail market for Rs 250-300 per kg in off season. But farmers don't have the luxury to hold back the produce and wait for the day when the rates go up in the retail market. We are under compulsion to sell our crop soon after the harvesting," he added

"From reliable sources, our NGO has come to know that the Adani group, which was given land at a token price to set up three cold storage centres in Rampur, Rohru and Sainj in Shimla District, is violating land lease rules. Under the rules, they must leave 25% [of the] space in their cold stores for the Himachal growers, which we firmly believe is not [being] complied with. We have written a letter to the chief minister to inquire about it and make the findings public," he said.

'What was the use of providing subsidised land to Adani?'

Lokinder Bisht, president of the Progressive Growers Association, told The Wire that Adani was given the land to set up its cold stores at subsidised rates, but he questioned what good it did for the growers ultimately. He said that before Adani announced its rate, the premium A-grade apple was being sold for Rs 80-90 per kg, at over Rs 2,000 per box. But the price crashed soon after Adani's Rs 72 per kg announcement.

"Keep aside its commitment towards [the] welfare of Himachal's apple industry in lieu of subsidised government land, where is the company's corporate social responsibility anyway? They should ideally announce rates more than the prevailing market rates but for them, their profit is supreme [to] the growers interests," he said.

Read full artile @ https://bit.ly/3l16jmi

Source : thewire.in

India's first building made of bio-bricks at IIT-Hyderabad is a great example of 'wealth from waste'

Developed to counter the air pollution caused by stubble burning, bio-bricks cost only about Rs 2-3 when mass-produced and can be an extra source of income for marginal farmers

The Indian Institute of Technology (IIT) in Hyderabad on Thursday inaugurated India's first building made of bio-bricks from agro-waste. Calling it a perfect illustration of 'Wealth from Waste', IIT-H Director BS Murthy said the institute will submit a proposal to the Ministry of Agriculture to promote its wider adoption by the rural community.

Researchers at the IIT demonstrated that agricultural waste can be converted into sustainable materials which, in turn, can be used to build eco-friendly, cost-effective structures. In April this year, the team secured a patent for the bio-brick material and its manufacturing technology. The technology has been developed by research scholar Priyabrata Rautray under the supervision of Professor Deepak John Mathew at the Department of Design.

"This innovation is going to be a game-changer for rural village farmers as their agricultural waste will become an income generator for them. Also, this will give employment to them during their lean period," Professor Mathew said. They have jointly published two research papers on bio-bricks at international conferences at ICED 2019, Delft University and ICoRD 2021, IIT

Researchers at the IIT demonstrated that agricultural waste can be converted into sustainable materials which, in turn, can be used to build eco-friendly, cost-effective structures.

Mumbai. Burning of agro-waste after harvest is a major cause of air pollution. The bio-brick technology was developed to counter such pollution caused by stubble burning. "Bio-bricks are economical and are found to be 1/8 and 1/10 of weight for similar volume compared to burnt clay bricks and concrete blocks, respectively. Compared to burnt clay bricks, Bio-bricks will cost about Rs 2-3 when mass-produced.

Farmers can make this material at the site and further reduce labour costs. Manufacturing bio-bricks can add to the marginal farmers' income and create a new employment opportunity during off-seasons," said a press release.

According to the researchers, the material exhibits excellent thermal insulation and fire-retardant properties. When used in roofing and wall panelling, it can effectively reduce heat gain by 5 – 6 degrees. They realised that generation of ago-waste in the country was huge while the demand for regular bricks was growing exponentially, leading to the loss of fertile topsoil and more air pollution. "I sincerely hope farmers and villagers adopt this technology to build their homes," Rautray said.

As part of the BUILD (Bold Unique Idea Lead Development) project to demonstrate the strength and versatility of the material, a prototype of a guard cabin was designed and executed by the team on space allocated on the campus. The building made of bio-bricks is supported by a metal framework.

The roof structure is made of bio-bricks over PVC sheets to reduce heat gain. The inside and outside of the wall is cement-plastered to protect the bio-bricks from rain.

Source : indianexpress.com

Online Meetings @

www.agricultureinformation.com

Upcoming events

SEPTEMBER 13, 2021

3:00 pm
Mr. M.G.Sathyanarayana on "Commercial cultivation of different varieties of tissue cultured bamboo (Dandrocalamas Family) plants"

SEPTEMBER 14, 2021

3.00 PM
Mr. Sumeet Deshmukh on "Use of solar fencing in farming"

05.00 PM
Mr. R S Venkatraman on "Tamarind : Demand and uses – Domestic and export markets"

SEPTEMBER 15, 2021
3:00 pm
Mr. Nitin Singhal on "Soil borne disease management"

05.00 PM
Mr. Ramakoti K.Venkataramana on "Low budget natural farming"

SEPTEMBER 16, 2021

3:00 pm
Ms. Archana Agrawal on "Aloevera gel extraction and marketing"

SEPTEMBER 20, 2021
3:00 pm
Mr. Devvrat Sharma on "How to make beekeeping a successful venture ?"

05.00 PM
Dr. Sivalingam Elayabalan on "Artificial intelligence powered smartphone banana app(TUMAINI) for pest and disease detection"

SEPTEMBER 22, 2021
3:00 pm
Mr. R. Kantharaj and Ms. Sunitha H R on "How to get organic certification for the farm produce and processing units"

SEPTEMBER 23, 2021
3:00 pm
Mr. Sachin Bakshi on "How to do agriculture as business"

SEPTEMBER 24, 2021
05.00 PM
Mr. Chinmay Rajwade on " Whole process of se4ing-up a hydroponics farming business"

SEPTEMBER 27, 2021
5:00 pm
Dr.Yugraj Yadava on "Value chain in marine fisheries India"

SEPTEMBER 28, 2021
3:00 pm
Ms. Priyanka Pramod Kharche on "What is integrated farming system? "

05.00 PM
Mr. Sai Krishna on "How breeding is done for oil quality in mustard"

SEPTEMBER 29, 2021
3:00 pm
Dr. Madhumita Dash on "AI and IoT in solving major agricultural challenges of today"

05.00 PM
Mr. Mendu Srinivasulu on "Role of Farmer Producer Organizations (FPOs) in promoting smart farming and smart agribusiness in India"

SEPTEMBER 30, 2021
3:00 pm
Mr. M. Lakshmi Narayanan on "Value addition in banana"

05.00 PM
Mr. Khan Shaker on "Market strategy and planning hydroponics"

OCTOBER 1, 2021
3:00 pm
Mr. Shaji GR on "Scope of Jack fruit value added products after pandemic"

OCTOBER 5, 2021
3:00 pm
Ms. Saroj Patel on "Stevia farming and value addition in stevia"

OCTOBER 8, 2021
3:00 pm
Mr. Rajender Kumar on "Nutraceutical – Emerging greenhouse crops"

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Recently Completed Meetings

Mr. Surajit Sinha on "Achieving food traceability through technology"
Mr. Surajit Sinha is the Head - Agritech at Farmsio in Chennai, Tamilnadu. He is into
- Market linkage through digital technologies and a professional over more than 16 + years of success in achieving revenue, market expansion, profit and business growth.
- Reshaping agriculture through digitization and impact into a single platform to the millions of smallholders
- Worked on input marketplace integration, market linkage and direct advisory
To know more view https://bit.ly/2YnOovx

Dr. Shashikant Joshi on "New alternatives for plant growth promoters"
Dr. Shashikant Joshi is the Director of Swakit Biotech Pvt. Ltd. in Bengaluru, Karnataka. To know more view https://bit.ly/3ygvwy4

Mr. Nesibur Rahman Barbhuyan on "How to grow agarwood plants and their benefits"
Mr. Nesibur Rahman Barbhuyan is the Proprietor of Neria Live Enterprise in Lanka, Assam. To know more view https://bit.ly/3gofBHU

Dr. Priya P. on "Improved agronomic practices in chickpea"
Dr. Priya P. is an Assistant Professor (Agronomy) at College of Agriculture (University of Agricultural Sciences, Dharwad) in Haveri District, Karnataka. Her interests are Nutrient Management, Organic Farming, Precision Farming & Nanotechnology and Integrated Farming Systems.

Mr. Arun Patel on "How to run a successful green house"
Mr. Arun Patel is the Director of Keisha Green in Ahmedabad, Gujarat. To know more view https://bit.ly/3somygy

Mr. Kodali Naga Pradeep Kumar on "Commercial business about dragon fruit crop"
Mr. Kodali Naga Pradeep Kumar is a Farmer from Mulakalacheruvu Village in Chittoor District, Andhra Pradesh. His interest is on pink to pink dragon fruit farming, teaching and commercial business about dragon fruit crop.

Mr. Mahalingaiah on "How to improve soil fertility"
Mr. Mahalingaiah is a Farmer from Rangapura, Tumkur District in Karnataka.
Mr. Mahalingaiah says we should stop the criminal activity of burning biomass. Instead utilise the same for increasing soil fertility, porosity, infiltration of rain water, benign microbial flora & fauna, arrest soil erosion and bring down global temperature.

Mr. Jeevan on "Processing and value addition of millets"
Mr. Jeevan is the Co-Founder of Orillet Foods International in Anantapur, Andhra Pradesh. His interest is in processing of millets and living a healthy life.

Mr. BK Menon on "Organic cultivation methodology - Dense crop farming and organic quality certification"
Mr. BK Menon is the Proprietor of Green Planet Agri in Bengaluru, Karnataka. To know more view To know more view https://bit.ly/3w2VDIz

Dr. Bikash Ghosh on "Current practices used in sapota farming"
Dr. Bikash Ghosh is a Retired Professor at Bidan Chandra Krishi Viswavidyalaya in Mohanpur, Nadia District in Bidan, West Bengal.

Dr. Rajeshnallaiah on "Agri product value addition"
Dr. Rajeshnallaiah is the Director & CEO at RNR Agri Developers in Madurai, Tamilnadu. To know more view https://bit.ly/3vvPKCc

Dr. PK Shrivastava on "Costing for a dairy farm"
Dr. PK Shrivastava is a Dairy Business Consultant at M/s. Dairy Consultancy India in Bengaluru, Karnataka. To know more view https://bit.ly/2Sj19bn

Mr. Achyuth Reddy Gomaram on "Water conservation and management in agriculture and farming"
Mr. Achyuth Reddy Gomaram, Director, Suregrow Farms Pvt.Ltd., Hyderabad, Telangana is a college dropout who has set an example for youth to look at agriculture and farming as a profitable and respectful profession. His initiate #stopfarmersuicide and #BeAFarmer were shown remarkable change in the way people look at agriculture and farming. To know more view https://bit.ly/31jt3Ep

Mr. Sameer Chadha on "Vetiver farming and oil distillation process"
Mr. Sameer Chadha is the Co-Founder of Chadha Aroma Farms in Lucknow, Uttar Pradesh. His interest is on aromatic & medicinal farming and distillation of aromatic crops.

Dr. Sanjay Kumar on "Medicinal and aromatic crops suitable for cultivation under waste lands"
Dr. Sanjay Kumar is the Principal Scientist in CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow, Uttar Pradesh. He says, now a days our agriculture need the support of crop diversification through medicinal, aromatic and horticultural crops. Some medicinal and aromatic crops suitable for cultivation under waste lands and underutilized lands.

Dr. Bikash Ghosh on "Current practices used in mango farming "
Dr. Bikash Ghosh is a Retired Professor of Bidan Chandra Krishi Viswavidyalaya in Mohanpur, Nadia District in Bidan, West Bengal.

Mr. Amol V Khandare on "Ashwagandha - Commercial cultivation on big area, contract farming and guidance at one place"
Mr. Amol V Khandare is the Head- Training and Capacity Building at International Institute of Advanced Agriculture Skill Development- IIAASD in Jaipur, Rajasthan. He is an Agriculture Graduate from Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra and Post Graduate in Management from University of Pune. Mr. Amol V Khandare's interests are commercial cultivation of medicinal crops and organic farming. He has 11 years of experience in herbal plants cultivation, management, marketing, export, processing etc.

Mr. Surajit Sinha on "Farmers loan risk mitigation through use of remote sensing solution"
Mr. Surajit Sinha is the recipient of National Award from H.E The President of India in Dec 2014 for the development of new cost effective product for manufacture aimed at improving the life of persons with disabilities. To know more view https://bit.ly/2YnOovx

Mr. Jayamurugan N on "Manufacturing and processing of cashew nuts"
Mr. Jayamurugan N is the Proprietor of Guna Traders in Cuddalore, Tamilnadu. To know more view https://bit.ly/2V56DYD

Mr. Vibhor Agarwal on "Lemongrass - Adding health & economic value"
Mr. Vibhor Agarwal is the Founder of VA Agro Farm in Bareilly, Uttar Pradesh. To know more view https://bit.ly/3fgHUaz

Mr. Upendra Halkandar on "Areca leaf products manufacturing project"
Mr. Upendra Halkandar is the Proprietor of Vikalp Ecowares in Nashik, Maharashtra. To know more view https://bit.ly/3ib8vre

Dr. A. Amarender Reddy on "Schemes for value addition and food processing industry development"
Dr. A. Amarender Reddy is the Principal Scientist(Agricultural Economics) at ICAR-Central Research Institute for Dryland Agriculture in Hyderabad, Telagana. He got trained in agricultural economics, but worked in wide range of areas like poverty, public policy, microfinance and agricultural economics . To know more view https://bit.ly/2VdFcve

Mr. Maharshi Dave on "Importance of value addition in agriculture products"
Mr. Maharshi Dave is the Director of Farmbridge Social Support Foundation in Bharuch, Gujarat. With advancement in technology, farmers have ensured food security of 1.3 billion people of the country along with exporting the surplus produce of fruits and vegetables. But, farmers have been struggling with the demand – supply mismatch and price wars. To solve this pain point, utilization in value addition to the agricultural produces is benefitting not only farmers but creating niche for entrepreneurs.

Mr. Niraj Shah on "Turmeric - Adding healthy & economical value"
Mr. Niraj Shah is the CEO at HnyB Tech-Incubations Pvt. Ltd., in Ahmedabad, Gujarat. He says, turmeric is one of the healthiest spice of all. It is basically a root crop and brings economic value in different types of forms. After harvest, different forms of turmeric have great market globally and India is one of the important exporter for the same.

Mr. Muthu Raj S on "Processing of moringa and value added products"
Mr. Muthu Raj. S is the Proprietor of SVM Exports in Tuticorin, Tamil Nadu. His interest is in moringa cultivation / drying process/ value addition etc. To know more view https://bit.ly/2TDJ8oL

Mr. Tejas Joshi on "Selection of different product processing machinery"
Mr. Tejas Joshi is the Manager-Technical at Fixit Engineering in Mumbai, Maharashtra.
Mr. Tejas Joshi says there are two ways the agriculture business runs.
1. Sell the products (Fruit/Veggies/Grains) in market to generate revenue
2. Use the product for further processing (Flours, Oil, Medicine) and generate higher revenue

Mr. Lucky Agrawal & Mr. Mayur Chumbalkar on "Cashew nuts processing in detail"
Mr. Lucky Agrawal & Mr. Mayur Chumbalkar are Managing Partners of L & M Dryfruits Processing Industry in Washim, Maharashtra. They are engaged in Manufacturing an assortment of Whole Cashew Nut, Flavored and Roasted Cashew Nut, Raw Cashew Nut, etc.

Mr. Vinod Kumar Dubey on "Ecofriendly approach for management of whitefly and other pests on arecanut"
Mr. Vinod Kumar Dubey is a Ph. D. – Research Scholar at Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar. During this meeting Mr. Vinod Kumar Dubey will speak on Ecofriendly approach for the management of whitefly, Aleurocanthus arecae David & Manjunatha and wax scale, Chrysomphalus aonidum (Linnaeaus) on Arecanut.

Mr. Kulkarni HB on "Organic Food FPO's challenges and opportunities in Madhya Pradesh"
Mr. Kulkarni HB is the President of Federation for Re-farming Societies in Bengaluru, Karnataka. To know more view https://bit.ly/3ByAKrA

Mr. Nitin Singhal on "Value added products of neem"
Mr. Nintin Singhal is the Director of Huntin Organics Pvt. Ltd., in Faridabad, Haryana. To know more view https://bit.ly/3y1nIke

Mr. R S Venkatraman on "Value addition of sugarcane jaggery"
Mr. R S Venkatraman is the Proprietor of Natura Food Products in Bengaluru, Karnataka. He says majority of the sugarcane jaggery production units are following the traditional production process only. It is mainly because this industry is run by traditional people only and hence there are no new entrants who could think differently. A lot needs to be done right from varietal selection to identify suitable variety for can production keeping in view the shelf life besides suitability for product diversification. Again new product developments is to be market oriented.

Online meetings are available only for Premium Members

Talking to

Venkatesh S Kshatriya

DeLaval Pvt Ltd. Pune, Maharashtra

Mr Venkatesh S Kshatriya is the Regional Sales Manager, DeLaval Pvt Ltd. Pune, Maharashtra. He has specialized in providing High-tech dairy farming solutions. In an interview conducted recently, he talks about mechanization in dairy farming.

DeLaval is a dairy farming solution provider for over 140 years. DeLaval provides integrated solutions designed to improve dairy producers' production, animal welfare and overall quality of life. Their first solution was dairy cream separator, which revolutionized the dairy farming industry. This was followed by many other innovations, and the milking machine itself has completed 100th year of creation in 2017. They innovate to transform dairy farming every year. Robotic Milking system is one of the prestigious and sophisticated milking systems, extremely popular abroad and India. Started 1878, DeLaval continues to help dairy farming industry and dairy farmers.

DeLaval is 29 years old in India and have set up milking machines, milk chillers, milking parlors and other several solutions helping the dairy farming industry and dairy farmers. The challenges that were mitigated by mechanizing the dairy farming industry are:

- Small and scattered milk collection
- Ignorance of hygiene practices
- Poor infrastructure
- Low feed quality
- Availability of skilled manpower and other resources
- Cost of production and productivity

A small farmer sometimes may not have the means to run a hygienic farm. This affects the health of the cows, nutrient quotient of milk, productivity, and stressful environment for the workers. Also, there is a chance of quality compromise when he gets milk in small containers to a central place of collection. To counter these adverse effects, dairy farmers are moving towards Industrial Farming or Commercial mechanized Hightech dairy farming, by moving to integrated farming and mechanized farming, using mechanized tractors to bullock cart, moving from furrow irrigation to sophisticated irrigation systems like drip irrigation, Crop management systems. This is similar to the steps taken by the dairy farmers by moving to high yielding cross breed cows and highly productive desi cow breeds like Gir, Sahiwal and others.

Commercial dairy farming is not backyard farming but a business with sustained productivity and profitability. Here are the different farmer profiles in this sector.

- Marginal Farmer with 1-3 cows to 10-50 cows
- Modern Indian Farmer with 100+ cows to 300+cows
- Investor farms with 1000+ cows

Marginal Farmer: Usually has cattle for his own consumption (for milk, agriculture and/or manure). So, this is not a business, but a backyard farming. The cattle that he has is to support his family with milk and dung. When he wants to upscale to 10-50 cows and turn profitable, he will need better system to manage. They may have small mechanization like, bucket milking system, small chaff cutter or a small milking machine. This segment can also have seasoned farmers who know their fields very well, how to run dairy farming, their animals, feed, and mechanisms.

Modern Indian Farmer: When the herd size more than 100, they need different systems for better management. This segment may be progressive farmers and entrepreneurs. The farmers in this segment may be

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young, look at dairy farming as a commercial set up and are open to uptake technology.

Investor Farms: These are the farmers / persons who invest in commercial set up of dairy farming. They will have separate resources for managing the farm, milking, and for managing various departments with the farm.

For marginal farmer with 10-50 cows, "Free Housing" type of system is recommended. In this type, there will be less stress on the cows, less work burden, less resource unlike traditional dairy farming. In the Free housing set up, cows move around freely to graze. Water troughs and feed in the feed table are freely and readily available. At the end of the day, they come back to the shed and rest. This creates a stress-free environment for the cows increase the productivity and the quality of milk and reduce labor. The only thing that was changed from the traditional farming is just the Free Housing setup.

The bigger setup of farm with 100-300 cows, free housing is not sufficient. For this, "Free stalls" system is recommended. Here the living area is set up with partitions /cubicle dividers with rubber mats and mattresses, where cows go, feed, and rest. They will go to common feed area to feed and can roam around in the open area "Paddock". If in a dry sandy place, the cubicles can have sandbags which will be more comfortable to the cows. This set up does not fit in wet climate and black soil where in the the bedding materials will not dry quickly and not good for animals. In this kind of housing system, the cows will be resting in a designated area, and the manure will be in the "Manure Alley". The manure will be cleaned by either tractors or automatic scrappers making management easy. It can be easily transported to manure tank and then to treatment areas or a biogas plant for further treatments like De-watering, Wormy compost, etc

Feed Preparation: This is the labor-intensive process, if feed preparation and storage are properly planned, will result in efficient use of labor and improved feeding. Depending on the size of the farm there will be different machineries like chaff cutters and feed choppers. Some of the different type of chaff cutter are:

- Operated manually
- Operated by motor
- Operated by tractor
- Pulverizer – to crush corn and materials

For a large-scale mega farms and small-scale farms, these chaff cutters and feed preparation machineries are needed, but for large scale farms, on a very different capacity and range. These machineries will chaff the fodder, convey to the trollies, then to the machineries to bale, and wrap them ready for the storage in large scale farms. Green grass can be kept in good condition by keeping in a silage. In small scale farms, the Silage, PVC /Tarpaulin sheets will be lined in a shallow pit, where the chopped green grass will be compacted and kept covered airtight. Once it is fermented, in about 60 days, that will be ready to use. If the silage is prepared properly, this can be used for about 4-5 months.

For a farm with more than 100 cows, one should move to bigger Silage - "Bunker" style above the ground level. On an average, one bunker can hold feed for about one month. The silage preparation can be scaled up depending on the number of cows. There are companies that manufacture these silages. Instead of taking the trouble of making bunkers, you can buy the silage bales. Their capacity is in the range of 50 kg, 100 kgs and 300 kgs. They are available across India in the states like Tamil Nadu, Karnataka, Maharashtra, and Andhra. This is one of the latest developments in the Dairy Industry.

Small dairy farms with cows ranging between 10-50 without any farming land, but want to give the cows fresh grass feed, can opt for hydroponics fodder system. In this system they can sprout grains like wheat, corn, or other grains. The sprouts are hydroponic grass, grown for about 6-8 days to be fed to the cows. These are used in smaller farms, goat farms, and horse farms. This system can increase the nutrition value and reduce concentrate cost.

Milking is a labor-intensive dairy process, which can be mechanized using 'DeLaval Milking Machine, DeLaval Speedline Milking Systems, DeLaval Automated Milking Parlours" Mechanization is needed to:

- 24 X 7 X 365 days dedication
- Milk Quality
- Cost of feeding Vs Milk production
- Scarcity of skilled milkers
- Mastitis
- Stress on Diary Animals

Advantages of Mechanization:

- Increase in milk yield and quality
- Saves time – 32hrs/cow / year
- Reduced Stress and dependency on Human milker
- Easy operation and maintenance
- Affordable and feasible

On an average, one person can milk only 5-6 cows at a time. However, using milking machines with stable electricity and power, any number of cows can be milked. When using

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a milking machine, the quality of the milk is not compromised as the milk is transported through food grade tubes to SS Food grade milk cans and then to milk storage cans.

There are studies that prove how usage of milking machines increases the yield of a cow. The milk secreting hormone – oxytocin will stay in the cow for about 6-7 minutes. While milking manually, depending on the duration of milking a cow, the extraction of milk from cow to cow becomes less efficient. However, while using milking machines, once the clusters are attached, based on the flow, milking is done, with ISO standard pulsation rate. Within the stipulated time of 6-7 minutes maximum amount of milk can be expressed leading to the increased production. Milking machine imitates the natural calf suckling, and the cows need not wait for their turn, and thus stress is reduced.

This machine is very friendly and used by Indian farmers across various ages from young farmers, women etc., Adoption of milking machines paves a way to 'Community Milking Centers'. These collection centers are located near farmer who is having a very few cows or farmers who cannot afford to set up milking machine. They can bring their cows and get them milked where there is buyback system. This type of system is being adopted in states like Karnataka, Andhra Pradesh, and Gujarat.

Bigger dairy farms with 100 cows or even mega size farms, adopt a different system called 'Milking Parlors'. This starts from a speed line system where the milking is done, and pass-through stainless-steel food grade pipes, and collected in a BMC. There are several types of milking parlors Parallel Milking Parlors, Herringbone milk-

How to tackle the challenge in quality and adulteration of the milk? Is having a mobile milking system in a vehicle a feasible solution?
Yes! This will help to keep check on the quality of the milk and also to check on adulteration. This is being practiced in Kerala and Gujarat. Older term used for this is called "Milk-o-bike". Now vehicles like Tata Nano/Ace are being fitted with the milking machine and the cans to collect the milk.

What is your position on buffalos' milk?
There are solutions for various types of cattle like cows, indigenous Gir, Sahiwal and buffalos. The farms for cows and buffalos are more geographical oriented. Most of Karnataka, Tamil Nadu, Kerala, Punjab, Gujarat rear mostly cows. North Karnataka, Maharashtra (Mumbai, Nasik region), Andhra, and Haryana rear mostly buffalos. Infrastructure requirements, system requirements are same for cows and buffalos. However, the milking system is different. For cows, we use normal milking machine run by the pulsator. But for buffalos, there is a DeLaval patented milking system called 'Duo Vac', which works on the basis of their milk flow. If there is no flow, then the machine will massage, and the milking will be done when there is a flow.

What is the arrangement between AlphaLavel and DeLaval here?
They are actually the same group for many years. Now based on the business orientation, we are different companies, under the same group. Under the TertaLaval, we are DeLavel. DeLaval focuses on the farming machineries, Tetrapak on processing & aseptic packing, Sidel on aseptic Pet packaging, and AlphaLaval as a separate group focusing on big scale food & industrial machineries.

Do you have branches in Chennai, Tamil Nadu?
We have Strong presense all over india with our own employees and dealers & Yes We have very strong Employee & dealer networks in south India, Bangalore, Mysore, Mangalore, Bagalkot, Hyderabad, Rajamundry, Chittoore, Chennai, Erode, Madurai, Coimbatore, Trivandrum, Todupuza, Cochin, Trissur, Malabar in Karnataka, Telangana, Andhra Pradesh, Tamil Nadu & Kerala.

Do you have any recommendation for a small-scale processer say for about 200-300 liter, where the morning and evening collection will be around 1000 liters each?
In DeLaval we have farming systems up to storage of milk. However, there are other systems for these requirements. They are called 'Batch type Processing System', something like batch of 500 liters or 1000 liters per hour. There are many companies that can help such small requirements. We can help you identify companies.

Is there anything that you can add about post scale servicing, customer care centers etc.?
Most of the dairy farms are situated far from cities. When there is an issue with machinery, that needs to be addressed immediately. So, We have our certified service engineers in each regions & our dealers are also in close access to the farms and farmers. They have to be aware of preventive maintenance service so that they don't face such issues. Before the customer decides to buy machines from us, we educate them on milking machine:

- need per requirement
- how milking physiology works
- type of milking machine needed
- pressure to be used
- pulsation rate as per ISO's recommendation

The farmers while installation have to ask for ISO test for their machines. These will show what actually the machines are doing, amount of vacuum applied, and milking ratio. It is like ECG for milking machines. Most of our dealers and service centers have this ISO test kit and will be able to help the farmers with this.

Without any farm, can we go exclusively dairy with the source of milk powder. This is to address to cater to the needs of milk requirement where there are no cows available but with requirement of fresh milk.
Yes! It can be done. In India, when there is excess milk production, they are turned to Skimmed Milk Powder which will be used when there is liquid milk shortage. Milk-scare states like Sikkim, and Assam use this method. Before white revolution, this was more commonly used. According to NDDB guidelines, they are not fresh milk, but just 'Milk'.

ing process and Rotaries. These are based on the herd size and the way of farming.

Smart farming makes the farm owner/ manager to easily manage and maintain the farm. Several integrations are possible using smart gadgets with Herd Management Software, where the cows are connected to the Worlds No-1 herd management system, DelPro, to have complete farm data control, like feed, herd, and environment, giving leverage to manage the farm.

Feeding systems: For a small farm the feed can be distributed manually. For a bigger farm, with 50+ cows the feed can be distributed using Feed mixer wagons where you mix silage or green grass, fodder, feed additives, dry grass and concentrate feed, as recommended by a nutritionist. This is mixed into a homogenous mixture and then dispensed to the shed, depending on the requirement. This method reduces the feed time and feed waste. There are different types of wagons - vertical mixer and horizontal mixer. They are available in different sizes - 5, 8, 12, 20 metric tons. For smaller farmer, they suggest having TMR or locally fabricated mixers to reduce the feed wastage.

When a new farm is set up, focus is to be on manure handling, a challenging process. The dung falls into the shed in the stalls and collected, transported to manure tank, and disposed or discarded. Or a tractor pushing system can be implemented. Another method is to have automated scrapper with sensors that can be programmed to scrap the manure on certain times. This will collect the manure into a channel. From there they are pumped to manure tanks by flush plume or gravity to manure tanker or pumped further to tank and then disposed. There are 3 types of manure disposal:

- Vermicompost
- BioGas
- Direct pumping into agriculture fields

For each process several machineries/ solutions are available in the market.

The biogas can be used to generate power to be consumed in the farm. The above-mentioned activities like Milking, General Management, Manure Handling are labor intensive, and the mechanization can be used to reduce labor dependence and increase efficiency.

Cow Comfort and Animal Health Systems: Healthy and happy cows yield better volume and quality of milk production. Here are some of the solutions for maintaining happy cows:

- Healthy rest area with mats and cushions
- Good grooming manual or automatic brushing
- Proper potable clean water
- Cow cooling with fans or sprinklers / foggers during summer and hot days
- Disinfecting udders and hooves to avoid mastitis

DeLaval can suggest different solutions. For Pre dip and post dips Like "Dipal, Lactisan, Lactifense & Biofoam". All farmers follow this measure to avoid Mastitis. This is a barrier-based prevention, where the teats are dipped in a solution called Dipal, Lactisan, Lactifense & Biofoam which will protect them from mastitis causing Bacteria's or pathogens. To check whether the teats Health are in a good condition, CMT (California Mastitis Test) needs to be tested once in 15/30 days by adding the milk to the reagent in the kit, and it will indicate which teat infected with the mastitis causing bacteria for early detection and prevention.

While summarizing about Mechanization in Dairy Farming, Mr Kshatriya mentions

- Quality of milk is a challenge and an opportunity: To meet the customers requirement of hygienic food products, the farmers need to adopt to a system that will get good quality food and milk. Mechanized Farming helps the farmers in this area.

- Commercial dairy farming is the need of the hour: Scalable farms, big farms are the need of the day to cater to the demand with proper mechanisms and systems in place.

- Different segment of farmers needs different approach: All solutions are not suitable for everybody, as every farmer's requirement is different, we need tailor made and proven solutions as per the need of the farmer.

- Investment in commercial dairy farming provides sustainable model.

- DeLaval is prepared to support focused initiative to Indian farmers and. There is no alternative to produce clean milk other than Commercial Dairy farming.

CONTACT :
Mr Venkatesh S. Kshatriya
venkatesh.kshatriya@delaval.com
Mobile: +91 9652623451

And

DeLaval Private Limited
A-3, Abhimanshree Society,
Pashan Road, Pune - 411008, India.
PHONE: +91 9665099390
EMAIL: marketing.india@delaval.com
www.delaval.com/en-in/
www.facebook.com/DeLavalIndia/

Talking to

Ajit Singh Batra

Atul Limited

In agriculture, we have farmers and then we have agriculturists – those that have a vision and imbibe a culture for the benefit of many.

At Atul Ltd, they have a vision – a goal! According to Mr Ajit Singh Batra at Atul Ltd, "We, at Atul Ltd, endeavor to regain India's bio-diversity. We don't simply aim at making some planting material and supplying it around. But we hold the vision of establishing a modern date industry in India. Atul Ltd. is also a chemical company and hence, this project helps us reduce our carbon footprint. We embarked on a journey of bringing greenery into deserts since 2008."

Think desert – think date palm!

Date Palm, in the Middle East from the ancient time, has been termed as the blessed tree. Every part of this tree, like the coconut tree, is useful. It has many properties and uses and moreover, it has a life of 80-90 years. Prior to Indian independence, India was amongst the top 5 date-growing nations in the world. After the partition, in 1947, we lost most of the date growing parts of India to Pakistan. This is how we lost the advantage of bio-diversity that this crop largely contributed. The date fruit is a complete food which sustained the inhabitants of the Middle East region until they discovered petroleum.

Does date palm have the potential to create a huge impact?

This tree has huge socio-economic-ecological impact:

- It helps create wealth in the arid regions.
- It helps retain the lost bio-diversity of the Thar desert and the Rann of Kutch
- Develop a modern-date industry in India
- Combat desertification
- Improve livelihood of farmers
- Generate employment
- Create sustainable ecosystems in the arid region
- Contribute towards the food and nutrition security of the nation
- Double farmer income
- Develop value added products
- Contribute towards Make in India

As per FAO, the top 10 countries producing date palm are Iran, Algeria, Iraq, SA, Pakistan, Morocco, Tunisia, Egypt, UAE, Sudan.

Today we do not feature in the list above although we have tremendous potential to be in there. We have a huge domestic market as well. Our country imports close to half a million metric tonne of date fruit every year. Hence contributing to date production would relieve India of a huge expense.

Tell us about how you ventured into tissue-cultured date palms.

Tissue culture of date palm has been tried in research institutions, government institutions, since 1952. The private sector has also tried its hand at it but with hardly any success in the last 6 decades. Atul technologies signed up an agreement to UAE to get their technology transferred to India.

Tissue cultured palm trees have a long gestation period. There are three main phases:

1. In the laboratories: There are 4 main stages of in-vitro - initiation, multiplication elongation and routine. It takes about 2 and half years to get the tissue cultured plants ready in a test tube.

2. Hardening process in the greenhouses: here, it comes for acclimatization - primary hardening and secondary hardening. Takes another 2-2.5 years

3. On the field: Once planted in the field , it begins to fruit in the 4th year

Fruiting takes about 9 years. We created 250 acres of demonstration farm of different varieties of tissue-cultured date palms in Jaisalmer and Bikaner with underground and canal water at both places. It started fruiting after 5 years.

There are 4 ripening stages of the date fruit:

1. Kimr
Fruit color: green
Taste: bitter and inedible

2. Khalal
Fruit color: yellow/red depending on the variety
Taste: Some varieties are crunchy and sweet at this stage and is edible.

3. Rhutab
Fruit color: Brown
Taste: Fruit begins to get soft, moist and sweet - nice to eat but is difficult to handle

4. Tamar
Fruit color: Brown-black
Taste: dry and semi-soft and very sweet - high shelf life at this stage

Is there scope for value-added products?

In terms of value-added products, the potential is quite a lot - date pickles, jams, chutneys, beverages, date cutlets, health bars etc.

What is the soil, water and climatic requirements to grow date palms?

The main conditions necessary for date palm cultivation are:

1. Arid/semi arid regions - temperatures above 40 -50 degrees Centigrade is preferable. The plant needs as much heat as possible which helps with the ripening of the fruit

2. Sandy soil is most preferable but red soil will also do

3. It needs water but it does not need flooding. Drip irrigation at the root zone should be done. Heavy monsoon

areas are not advisable because monsoon season can clash with the ripening of the fruit. Rain is okay for the plant but not for the fruit.

Is it feasible to grow date palm in North Maharashtra?

We have people growing dates palms across several districts in Maharashtra. You may connect with us and we can guide you depending on where your farm is located.

What is the average yield per plant for tissue-cultured date palm?

Yield is a factor of the agro climatic conditions and the age of the plant. Let's assume that the variety is barhee, the most popular variety in India, which is harvested in the fresh fruit stage and that the plant is about 9-10 years after plantation. If the agro climatic conditions are favorable, pollination is done properly and you have followed the recommended package of practices, you can expect a fruit yield of approximately 200 - 250 kgs per tree per year.

What is the pollination technique followed in date palm cultivation?

There are several pollination techniques followed across the globe. There are dry and wet pollination methods. Under dry there are two techniques - fresh pollen and dry/stored pollen. When the female flower is about to open up and harvested the male pollen, you can take the strings of the male pollen and attach them to the female flower. This is the most successful and widely practiced procedure in India.

Alternatively, you can take the pollen powder, sprinkle it on the female flower and pollinate the plant.

Some farmers also use cotton swabs to pollinate the pollen powder. We do not recommend it though because the results of direct pollination proves much better.

Then, there is wet pollination wherein pollen is dissolved in a media following which it can be sprinkled over the flower. This is recommended only in highly dry regions where you do not have humidity in the environment like Israel, Saudi Arabia on big trees wherein it is difficult to reach the flowers. For Indian conditions, the dry method is recommended. Care should be taken that pollination is done at the right time, done in the early morning hours when there is dew which helps for pollination to be more effective.

Can honey bees be used for pollination?

Pollination in date palm is done manually. Insect pollination, wind pollination has no major impact on date palms. In fact if the pollination quality is not good, you could land with useless fruit.

How many plants can we have per acre and what is the cost of each plant?

The standard practice is to grow 64 plants per acre at a spacing of 8mtx8mt. In some countries and regions, some farmers go for larger spacing of 9mtx9mt or 10mtx9mt. 8mtX8mt is the most densest form of cultivation that we recommend in India.

The selling price of a tissue-cultured plant which is ready for field plantation depends on the variety. We have two varieties. The fresh fruit varieties best suited for where the monsoons are early, come at a price of Rs.3750 per plant plus transportation. If it is a tissue cultured male plant is Rs.5000/- plus transportation. The other variety is Rs.5500 per plant plus transportation.

Why are the date palm saplings so expensive?

There are many reasons for this:

1. The production lead time is extremely high.
2. GST on imports is very high. The price is inclusive of GST
3. The process itself is pretty lengthy and there are high chances of contamination which makes the production highly meticulous.

How many male plants are required on one acre of land?

If it is tissue-cultured plants you need approximately 5% of the total number of plants on the plot to be male plants.

What is the water requirement for the date palm?

This depends on many factors like the soil type, climatic conditions, transpiration losses, evaporation etc. But as a thumb rule, plantation on sandy soil, on a peak summer day will need about 25 litres per plant per day. A fully matured tree on sandy soil, laden with 200 kgs of fruit, on a peak summer day would require 200 - 250 litres per day per tree. This can be very less in terms of frequency in winter and monsoons.

What are the consultancy charges at Atul per acre?

Atul does not charge separately for consultation. It was our duty to help farmers follow the package of practices and provide technical guidance. We provide consultation on a complimentary basis.

How to know the quality of fruit and also know the maturity indexes?

The quality of the fruit is measured as a result of many factors like:

- size of the fruit
- Number of days taken to ripen
- Blemishes present on the fruit
- sweetness and nutrition of the fruit

How are dates produced by the plants by Atul compared to those cultivated in other parts of the world?

It is closely comparable to the ones we get overseas. In fact the fresh fruits are of higher quality. This is because water is much sweeter in India than in places like the Middle East. Water has lesser TDS and hence fruits gets much sweeter. Hence there is great potential for export.

What is the cost of cultivation per acre?

The cost of cultivation would be close to Rs.30,000 to Rs.35000 per acre per year for maintaining this crop. The capital expenditure for cultivation a date palm along with planting material would come up to about Rs 3.5L per acre.

What is the cost benefit ratio?

The pay back period would be close to 7 - 7.5 years for a farmer because for the first three years, there is no fruit. But in the next 3-4 years, the farmer stand to get higher fruit quantity helping him recover his money. The fresh fruit sells at a rate of about Rs.50 per kilo to Rs.200 per kilo. The price depends on various factors, like when the fruit was plucked etc.

CONTACT : Mr. Ajit Singh Batra
Landline telephone: (+912632) 230000
Extension: 5688
E-Mail: ajitsingh_Batra@atul.co.in

Sameer Chadha

Co-Founder
Chadha Aroma Farms, Lucknow, UP

Mr Sameer Chadha is the Co-Founder of Chadha Aroma Farms in Lucknow, UP. He is very much interested in aromatic and medicinal plants farming and distillation. His Farm is into growing lemongrass since 2015, and currently 15 acres are being cultivated. They provide planting material and technical know-how to the interested people. In a recent interview, Mr Sameer talks about the cultivation and marketing of lemongrass which can fetch about Rs. 1.25 to Rs. 1.5 lakhs net profit per acre.

All the aromatic plants that have fragrance have essential oil, such as Chandan, rose, lemongrass, and lavender. The roots of vetiver, leaves of lemongrass, bark, or stem of Chandan can get you essential oils. Lemongrass is an aromatic grass native of India and Sri Lanka. This grows all over India, especially widely in South India. It is a hardy, rugged plant and is pest and disease free. It needs less water and fertilizer. Since it is a grass, it does not need much care. It can be grown in rainfed areas in India. The life of the plant is about 15 to 20 years, but we grow it for 6 to 7 years till which time essential oil can be taken. Then it starts to decrease. The smell of the plant resembles lemon or citrus, and it is one of the most commonly used fragrance in the world.

The plant is a perennial one that grows on. It is a multi-cut plant and can be cut in 2 to 3 months, and then it grows again. The plant contains certain amount of oil like any other essential plant, such as sarson which has 20 to 40% oil. The oil recovery 0.5 to 1% that depends on the age of the mother plant, crop variety, and management factors.

The essential oil from lemongrass has great demand in pharmaceutical industry for making hand sanitizer, antibacterial, fungal, and fever medicines. In the food and flavour industries also it is in demand. In the cleaning industry, the oil is used in detergents, dishwasher soap, shampoos, and room fresheners. Since it has insect repellent property, it is used in pesticide industry too. Lemongrass can be grown as powder in tea industry. Fresh stem is used in Chinese and Thai restaurants.

Since lemongrass is a rough and rugged plant, it can be grown all over India with varied climates, especially in South India. In North-eastern regions and ghat areas also it is grown. In salt-affected areas like Kutch, or soil erosion areas also it is cultivated. When you grow lemongrass, you need not have any fence as no animal eats this grass. Lemongrass is grown from stems and roots called slips taken from 2-year-old plants for better oil recovery. They are planted 2 to 3 inches into the soil. You can cultivate the plant any time of the year if you have water availability. In rainfed areas, June to September is ideal. In northern India, it is a challenge in December and January since it will be very cold. But in Southern India, December and January have pleasant weather, and so it can be grown. During March and April, you need to take extra care, and the starting irrigation should be done on time.

In an average land and condition, about 22 to 23 thousand slips can be planted in an acre. In adverse conditions, 25 to 30 thousand slips are to be cultivated. If there is 20% shade, production of essential oil will not be affected. You can do this in between your orchards and do as multilayer farming also. We have done in 50% shade in mango orchard, and it is growing very well. People can grow in between low-density horticultural crops like Chandan or moringa. The spacing should be 1.25 to 1.50 ft between the lines, and 1 ft between the plants.

As post-planting care, it needs very less care, but in the starting it needs some attention. We need not worry about the weeds which will not grow as the lemongrass itself is very dense. It is cut 3 to 4 inches above the ground. We leave it

for some time so that excess moisture evaporates and then transport it to distillation unit.

The process of getting the oil from the aromatic plants is called distillation. Usually farmers use hydro distillation. There is fire and water in a huge tank. The steam reaches the herb when channelised through the condenser. There is steam in between the pipes and cold water outside. Water works as an exchanger, and it takes all the heat out of the water and converts steam into essential oil and water. In this heating and cooling process, the water and oil get separated. As the oil is lighter, it gets collected on top, and water is found below. We collect the essential oil from the top and the fragrant water below is collected. This has a huge demand in phenyl industry and sells at a good price. We use the waste from the last crop that has been distilled as fuel. So our expense on the distillation apart from labour is zero. The lemongrass distillation process takes about 3 to 4 hours. It should be distilled within 12 to 24 hours of harvesting, and so the distillation unit should be nearby.

A well-managed crop yields 30 to 35 kg oil in every 3 months. Since it is a multicut, we cut it from the bottom, and we extract the oil. 4 to 5 cuttings we can have. In 4 cuttings we get 120 to 140 kg oil, and we can go for 5 cuttings if everything is done in time. It is basically 3 months to cut, but within 70 to 80 days also we can do. If it is a monsoon crop, it will mature early and be ready for harvest. We can then do 6 harvest also in areas such as North-eastern India. Oil recovery and production will be better for 7 to 8 years. If you add all the expenses such as harvesting, distillation, and farming practices like watering, the cost will be about Rs. 25 thousand per acre. There is no need for spraying.

The market price is Rs. 1000 to 1500 and it may go up to Rs. 1600 too. On an average, you can expect Rs. 1200 per kg. After all the expenses, you can get a net profit Rs. 1.25 to 1.50 lakhs per acre. In some areas of India, where irrigation facilities are not available, and on lands which are rainfed, lemongrass can be cultivated. At the starting of the crop, if you are using irrigation, you can do it anytime of the year. If you do not have irrigation facility, you should do it in June-July season. Oil recovery will be 60-70 kg because harvest is low around 2 -3.

The lemongrass oil is light in colour. If stored for a long period of time also, it does not deteriorate. For 8 to 10 months, it can be stored in HDPE drums and if for a longer time, it can be stored in aluminium or stainless-steel drums. But we do not store. Since the market is good, we sell it and get income in 3 months. Then there is no point of storing. The current demand of lemongrass oil in India is 10 thousand tonnes, and production is 6 thousand tonnes. There is a huge gap that needs to be filled. About 2 to 3 thousand kg oil is exported.

There are buyers in every state capitals. They can be easily contacted, and if it is huge quantity, they will collect from the farm, check the oil, weight, and make the payment. There is no credit system. In Chadha Farm, we provide good quality planting materials of lemongrass and vetiver all over India. If it is a small quality, we send by railway, and huge quantity by truck.

The lemongrass grows dense, and no one can walk through it. Four harvests are taken from 1 year-old plants. Every 3 months it grows dense. Every 3rd day, it grows 1 or 2 inches. We also provide technical knowledge about essential oil production, how to get maximum yield, and setting up distillation unit.

I am in Uganda doing lemongrass cultivation. We can get 25 MT every month. How do we do the marketing? Can you suggest some big companies that we can go to for selling?

For such big markets, you can check export websites, mail them, and sign-up MOU with them. Based on that you can do, and if they may go for monthly purchase of specific quantity you can work on that. You can export to other countries like USA and UK.

Who are the top buyers in India?

There are many traders. You can contact big exporters who can deal with you. Since your production is very good, every buyer wants to save the cost of mobilization. The more the buyers, they will have the cost of acquiring the oil. If you have large quantity, it is an advantage.

What are the main varieties you grow?

We have both Krishna and Shikhar.

What is your experience with the oil content in Shikhar?

The recovery of oil in Shikhar variety is about 0.5 to 0.8%. It is a more evolved variety, and we are focusing on Shikhar only. Both varieties have been developed by CIMAP, Lucknow.

What is the minimum acreage to set up a distillation unit?

A small distillation unit costs Rs. 1.5 lakhs. If you are setting up this, the area of cultivation should be 2 acres. If you have good area of cultivation, plants

will also be more. So start with 3 acres. I started with 1 acre and installed the distillation unit. With whatever area, you start, the distillation tank has a huge capacity, and you should keep it busy.

What is the best price for good quality of lemongrass oil?

The best price for lemongrass oil is Rs. 1500 to 1700 per litre, which is the wholesale rate. The best price on an average is Rs. 1500. There are big consumers like USA, UK, and Southeast Asian countries where it can be exported.

For vetiver, do you have to have a separate distillation unit?

In this distillation unit, you can extract all essential oils. We are currently extracting menthol mint, vetiver, lemongrass, tulsi, chamomile, and marigold. Once the extraction of a particular product is over, the tank is cleaned, steamed, and ready to use for the next crop.

From 2 acres of cultivation, how much oil can be extracted in 3 months?

After 9 to 10 months or 1 year, you can get 30 to 35 kg of oil per acre in a year.

Where can we buy the distillation unit?

Fabricators are there everywhere. In my region, we have good fabricators, and I can provide the contact details. We can provide the technical know-how. It is not necessary that you install the unit immediately after planting. You can instal it after 4 or 5 months. If you are unable to set up, you can sell dry lemongrass.

What is the life of the plant?

Life of the plant is more than 10 years. Till 7 years, you can get essential oil production of 120 to 140 kgs. After that it starts to decline. The plants do not die if taken proper care.

If we approach you, can you get us slips to Bangalore and provide us technical know-how?

Yes, we can supply the slips, and we send them all over India and export too. We can provide technical know-how too.

What is the cost to install a simple extraction unit?

There are 2 capacity units – 500 kg and 1000 kg. if you have 10 or 12 acres, you can instal 500 kg, and you can extend if you want. A 500 kg unit costs Rs. 1.5 to 2 lakhs and 1000 kg unit Rs. 3.5 lakhs.

Is it a continuous process?

Yes, we have 2 to 3 crops planted. This is a perennial crop. We also have seasonal crops. So in between the distillation unit is rested. During monsoon we grow tulsi, eucalyptus, and some other oil crop. You can go for lemongrass and later on other crops. We have lemongrass in 15 acres, and others also grow it. We charge rental, and they extract form our unit. We buy their oil. The unit might seem a big investment, but it will prove to be a good opportunity not only for you but for others too. You can earn the rental income also from them.

You said you grow tulsi after lemongrass. What do you do with it?

You can use the distillation unit for all plants. From tulsi we extract oil during monsoon time. You can get oil from haldi leaves. The leaves are wasted, but you can convert the waste into essential oil. Similarly eucalyptus oil can be extracted. The trees can be used as natural fences, and leaves are used for extraction. Also marigold leaves can be extracted for medicinal use.

For all the products such as tulsi, do you have market?

Yes, Mumbai is a huge market in the southern region as also Chennai. There are lots of buyers in state capitals. We are tying up with a few companies for buying lemongrass and vetiver oil.

What is haldi oil price? What is the oil content in leaves?

Per kg, it costs Rs. 800 to 900, to Rs.1200 on an average. It is somewhere around 0.4 to 0.5%.

What are the major challenges in lemongrass cultivation?

It is important to cut the crop in time, as once it over matures oil recovery reduces. There should be timely distillation.

What is the planting material cost?

It costs around 75 paise to Re 1, based on the variety. We sell Shikhar variety at 75 paise.

Can you tell me the rate you get for lemongrass, tulsi, and haldi oil extractions?

Per kg, Lemongrass oil Rs. 1000-1500, Tulsi Rs. 700-800 to 1300 and Haldi Rs. 800-1200. Marigold oil is Rs. 2500-3500 per kg.

If you have to keep a distance of 1 to 2 ft, how many slips can be planted in one acre?

We increase the plant population if the soil is weak, sandy, or loamy. Per acre you can plant 22-23 thousand per acre. Row to row

1.25 ft and plant to plant 1 ft distance is required.

Any special preparation needed?

No. Very basic preparation and basic fertilizer is needed. Sowing is done with 2 to 3 inches below the soil like we sow rice. It can be planted, and some water given.

Can it be grown as an intercrop with bamboo?

You can grow as an intercrop with bamboo and all the trees.

What is the harvesting method you use?

Usually it is harvested manually or with brush cutter. We use manual method.

What do you do with the leaves after the extraction?

After the extraction, the dried leaves are used as fuel for the next extraction, resulting in waste management. We do not use any wood. They are useful for mulching and after chopping can be used to make vermicompost.

Which oil fetches more money?

Lemongrass and vetiver fetch good money. We can be assured of the returns as lemongrass is a safe crop, and there is security.

For the distillation, do you use SS or MS?

We have a hybrid tank. To save cost, you can have the vessel holding the crop in MS, and the condenser and parts where oil comes in touch in SS. The condenser and the connecting rods I have are of SS. This way, oil quality is maintained, and cost saved.

Is the price you have quoted for MS for holding vessel and SS for condenser?

No separate price. There could be some slight difference in price. Colour variation may be there. If overburnt, the colour changes. 99% of the oil is extracted in MS tank. Condenser is SS.

Does black cotton soil affect plantation? Does Water logging affect them?

Black cotton soil is best for lemongrass. Water logging if there for 15 -20 days it is ok. Beyond that you can make ridges and plant on that.

Do you advice plantation in bed or ploughing?

You can do both ways. Bed plantation is good. Plant population should be good.

Sugar plants grow tall. If we do intercropping, will the lemongrass get sunlight?

We also do flood watering. You can try growing in between the sugar crop. You can do it separately. In orchards the lemongrass grows well. You can do on raised bed or flat bed.

If there is delay in transporting, will the plants be spoilt? Will they get dried?

We pack in such a way that they won't be damaged. We pack in net bags, and even if it is planted after a week, it won't be spoilt. Only if it gets water, it will be spoilt, it should be dry. Even after 8 to 10 days you can sow. Slips will be good.

CONTACT " Mr Sameer Chadha, Co-founder,
Chadha Aroma Farms, HLC Academy, Bagga Tower
Adarsh Nagar, Alambagh, Lucknow.
Email: chadhaaromafarms@gmail.com
Telephone: 9554180717

Mocherla Pradeep Kumar

Founder - Girmapur Organic Hyderabad

Mr Mocherla Pradeep Kumar, the Founder of Girmapur Organic in Hyderabad, has enormous interest in sustainable organic farming. Girmapur Organics was formed in 2011 with an aim to grow natural and organic crops in an ecological habitat, and crops like vegetables, rice, wheat, staples, and fruits are grown in a natural and self-sustainable manner. He discusses at length about the concept or organic farming to direct consumers.

Mr Pradeep Kumar says that when they started the journey 10 years ago, with an aim to get pure organic produce to the people of Hyderabad, they had very little understanding of how the market would work and how they could grow and service the market. Like any other farmer, they also started growing produce in standard practices of large quantity per acre, single item cropping etc, while doing organic only. It had lots of problems. Either they had lots of produce or none at all. When they had produce, nobody wanted, and when they did not have it was all because of environmental cycles. When it rains, vegetables do not grow, and there is less availability. When the vegetables grow locally, everybody around also grow, and since it is all excess, nobody wants.

Mr Pradeep says we were looking to sell to online retailers like Big Basket and others. We did not have plans to do direct marketing. But after a few years, we were facing problems with retailers, who have not paid for our produce in all these years, and so we decided it was not going to be sustainable if we depended on a few retailers who tried to play with farmers. So we decided to change the way we produced, and we went straight to market. It was how we converted from traditional farming methodology of one or two crops in large areas and then send huge quantities to market and get down with it.

We decided to move up the value chain. Our brand is Girmapur Organics through which we sell into the market. Our farms are called Govardhan Farms.

The farm is spread over 15 acres in Girmapur village in Medchal. This is a contiguous piece of land. I moved to live here so that there is no absentee farming, and there will be 100% reliability of the produce. I and my family manage 9 acres, another 3 acres taken on lease, and the remaining 3 acres belong to the farmers from the neighbourhood as we decided to cultivate together.

The farm has 2 types of soils - Black cotton soil which we use during monsoons for growing rice and in summer for growing some particular short varieties of vegetables. Mixed red and black soil is used during winter and early summer and slightly during monsoon. Predominantly this type is for other varieties except rice. We practice multi-cropping, very intensive in terms of layered farming, underground roots, and trees etc, but more in terms of planning crops based on a pattern based on a targeted harvest.

When we moved from suppliers to direct homes, we were supplying to 30 homes. The problem we faced was that we had plenty of 4 vegetable varieties in stock. We could not do much with so much stock, and people cannot buy every week also. As we got that kind of response, we decided to meet the customers at home. You need to have a diverse basket to cover for a week with vegetables and supply once a week to give the required quantities of vegetables supported with other things like rice, wheat, pulses, till, and peanut and so on. So we started to grow close to 20-25 varieties of vegetable, all within half an acre. Based on harvest expected, we planned one line of drip for this and other drip lines for other crops. So planning became high precision, and there was no food wastage.

We started to grow crops on demand. Some people would want south Indian vegetables, and some prefer north Indian vegetables which is not normally grown for markets. They have to be specially procured. We started to grow them on request from customers, and we became better in managing, such as planning on how to maximise the yield to the market without any wastage.

In the process, we started to get the 15 acres of farm go through different block patterns of cultivation, and at no point of time you would find more than 2 acres of land being used for vegetables and 2 acres for other kinds of produce. Roughly speaking 4 to 4.5 acres are cultivated, and the rest of the land is regenerated or left idle to regenerate before tilling. Rotation of the land usage or crop holiday are important part of our regime in regenerating land without

using any kind of additional fertiliser people use even in organic and natural terms, such as jeevamruth or anything. We only use manure, farmyard manure from our farm, well composted, well laid, and well tilled and well dried. We do not manure crops when the plants are sold. When the land is left to regenerate and start tilling after manuring happens for 4 weeks to ensure the thorough mixing of manure in the soil and making of soil with the manure and regeneration of worms on topsoil. After

that we start such different kinds of rotation patterns.

Talking about precision cultivation practices, as a farm to home producer, we slowly started to process seeds like wheat, whole wheat atta at the farm, sunflower, peanut for oil, safflower seeds, etc. We keep changing varieties every season, growing different kinds of stuff, processing, cold press oil from the products, grain like wheat, ragi, and jowar that people use for their food. When we grew grains and went out to get it milled, we found that the mill itself was contaminated with other produce, dirty, and not conducive to the standard we wanted to maintain. So we started to do the processing in the farm itself.

We have a variety of livestock in the farm, cows, sheep, chicken, and buffaloes for manure production. There are also others like ponies, fish, and geese to keep the environment going. People ask me what is the cost in this operation. Major cost is the human labour, sowing, and weeding, especially weeding cost. We find the practice of mulching profitable, but I have seen friends who did mulching every cycle, people would not pick up, it would get disintegrated in the earth and not degenerate. We do not get any seeds from outside. All the seeds that we use are our own seeds cultivated over 8 years. So only in exceptional cases, some customers come up with seeds from their village, and since they have no place to grow, we grow for them. The seeds are given by the customers for their own use. Apart from human cost, we do not have any other cost.

We have full time staff in our farm to maintain livestock and farm work. We process everything manually. We cut the rice manually, cure it for 3 months on the stock. We sow in July and cut it in November and keep the cutting till January. After that we do hand pounding of the rice for Sankaranti. Then we do the segregation of grain from stock in February and mill. By the time the rice is actually milled, it is cured on the stock for 3 to 4 months, and it is exactly 6 months old when it reaches customers' place. We usually give brown rice, though it is not a diabetes curing variety, to customers as they feel it is effective in controlling diabetes. But good healthy grains show that the body is in much better balance.

We have 3 apple trees and are struggling to keep them alive. One tree has started flowering, so we are hopeful of getting some naturalisation for next year. Cashew, cauliflower, brinjal, yellow cucumber, sunflower, till, ragi, and peanut are grown naturally. We do have caterpillars, but we feel they are part of the eco system. We incur losses but nothing major. We have greens grid with the idea that each small grid is sufficient to come for a week. We have coriander, palak, methi, Ceylon spinach, Amaranthus, and mustard grown in different cycles, so that we can harvest one slot each week and regenerate it for harvest in 6 weeks. The whole area goes for rotation so that the produce is fresh and regenerated. There is no excess use of fertilisers. Bees are also there to help pollination. We have succeeded in multiplying their numbers which is indicative of life nourishing in the farm. Bees help in increasing the yield because of pollination, and the produce is healthier and stronger. We have chicken and ponies graze the ground when the land is not used.

Have you been able to evaluate the cost of production of every product that you grow?

Yes. I am from IT background and still doing it, and farming is my passion. We talk about precision farm, plan grid-wise, how much quantity is going to customers house, how much labour worked, how many rotations of labour have gone into it, and how much we have sold. Every gram of the harvest is accounted. We have a pretty much accurate accounting of the entire cycle.

Is it true that the cost of production is about 35% of the price you get from the market?

No. True organic products cost a lot. Our only cost is human labour cost. This is provided we do not use mulching. The farms where this is not done, they have to pay for labour cost, and it is not cheap. We need to pay a decent amount to the labourers to come regularly. The cost of production is not cheap. The cost of my tomato is Rs. 70 per kg, which is also the cost of production. The cost remains the same throughout the season. It does not change because the market rate is different. The cost is derived based on the plantation and crop and harvest likely to come. The cost of tomato is Rs. 60 to 70 because the weeding cycles involved is high.

What mechanism and step you would suggest to bring the cost down? Is Human intervention a challenge?

Robots can help to a certain extent. You can

see lot of people selling organic produce using weedicide, pesticide, and fertilizer. Nobody has an idea about herbicide which is carcinogenic. When you do not use herbicide and mulching, it is unavoidable to reduce the human cost.

Which crops are not available in your territory, and you succeeded in experimenting them and making it commercially viable?

Very few vegetables are not available in our farm. They are sensitive to environment. They do not easily localise. I cannot grow Toor dhal because the soil and environment are not conducive to it. On the other hand, we do grow potato and broccoli, whatever the soil adapts. You have to understand the soil adaptability and climate adaptability. You cannot make seeds from these plants such as broccoli. You have to get them from

places like Shimla or Bangalore or a cooler place.

Per calendar year, how much is the net profit from these 15 acres?

No profit. I have 15 people working as staff. Our revenue generation is about Rs. 25 lakhs per year. The costs like salary of staff and other things go from this. We are left with a small amount, but that we need as reserve fund. Farming is such a thing that next season, things may not work, and it is all a loss.

Where do you sell your products?

All the products go direct to homes. It is a home delivery. We have a website. On a specific day and time we deliver. We sell in high-tech city areas. There is no marketing, only word of mouth. Our customers do not leave us and get us more. We can serve maximum 300 to 320 homes.

Is it happening daily?

It happens every alternate days. In a week, we have 300 customers, but on an average delivery is for 200 orders over 3 days. People can order anything, there is no delivery fee if they are in our route. Orders come the previous night; we get the consolidated list the next morning. We start the harvest by 7 am, by 1 pm they are cleaned, sorted, and packed, and from 2 pm they are dispatched to homes. The produce is cut fresh in the morning and delivered by evening to homes.

How was your trade off from IT to farming? Would you suggest others to do it?

If you want to give back something to the environment, it is possible. It is not for profit.

How do you handle disease and pest problems?

We are getting caterpillars since the last 4 years. Initially we had fungus, but we observed that when you use Neemastra or any such thing, they work, but the next cycle the pest is back stronger. What we worked on was increasing the fertility of the soil. When we have good fertile soil, plants growing healthy, attack from virus goes down partially, and more significantly what helps is localised seeds. You make your seeds and use them. We have been using so for 4 years no, and there is no pest or virus attack. We do not take any action for caterpillar.

How do you manage water supply?

We manage everything using a single submersible borewell. We have managed through drip irrigation. We have grown rice using drip irrigation for many years. Water supply was tight. For the last 2 years, we are getting good rainfall, and we notice high water level tables, and better moisture levels in soil.

What is the salary you pay for labourers?

For men we pay Rs 12 thousand and for women 10 thousand per month.

Are you ready to extend your service to other areas in Hyderabad?

No. I have seen many people doing so, but I do not. I can certainly help, advise, and support with seeds. Farming is such a thing that you have to be there to take immediate step in case of weather and other sensitive issues everyday so that your efforts are not wasted.

How did you transition from software to farming? Did you start farming in all 15 acres?

I am still in IT and farm too. Farming is not a business but a passion. It is just a reorientation of lifestyle. Farming is not the source of livelihood for me, but for many staff working there, it is.

Any action you take to control caterpillars?

No. They are our only pests. We do not take any action because they become butterflies who do magic in the crop. We let them live in the farm.

Do you allow visitors in your farm?

Yes, most welcome.

With your experience what are the areas of improvement to make it more viable?

If you want to do pure organic farm, in the present circumstances, it is difficult to make it a business, to fund, and make a profit out of it. It is good to live in countryside where there is no budget, input cost, only you have to put your own labour. But for city people it is very difficult to pump money to do pure organic farm in the current sale price levels. If you want to do it in the large scale, then the only thing in the value chain that is optimised is human weeding cost. There is no other cost in the value chain that can be optimised.

Have you tried green mulching?

Mulching straw we tried but it did not work in our system of farming where we grow 25 varieties in half an acre because there are different cycles for different plants. Straw mulching works. For that you need to go to monocrop. The problem here is if you want to sell 2 tons of tomatoes in the same shot one day, nobody will buy 2 tons in a day. If people change to go for organic, situation may change.

CONTACT :
Mr Mocherla Pradeep Kumar
Girmapur Organics
Govardharn Farms, Girmapur,
Medchal, Hyderabad.
E: pradeep@girmapurorganics.com
Mobile: 9885246105

- Plant-sourced foods are good for you.
- Agriculture plays a unique role in food security.
- A third of all food produced globally is wasted.
- Better management of food chains can help minimise waste.

Why the colour of your fruits and vegetables matter?

Happy International Year of Fruits and Vegetables!

The United Nations Food and Agriculture Organization (FAO) has designated 2021 as a special year to recognise the health and economic benefits of fruit and vegetable consumption.

The event was established as a way to help promote healthier diets around the world, as well as acknowledging the unique role that agricultural crops play in food security and farmer livelihoods.

Scientists say that access to fresh fruits and vegetables can help protect against non-communicable diseases, like cancer, diabetes and cardiovascular disease. Collectively, non-communicable diseases are the leading cause of death worldwide. They could cost the global economy $47 trillion by 2030.

Consuming the right amount of fresh fruits and vegetables contributes to healthy growth in children, improved immunity, better mental health, and a longer life.

As the image below shows, the colour of a fruit or vegetable can be indicative of the nutrients it contains and benefits it conveys. Ensuring a mixture of them is key to a healthy diet.

On average, we only eat about two-thirds of the recommended minimum amount of fruits and vegetables. In sub-Saharan Africa, that level drops considerably, with nearly 70% of those aged 50 and over failing to consume sufficient quantities in South Africa and just 5.5% of the same group doing so in Nigeria.

Boosting the supply of nutritious food

But what can be done to intervene?

Making fruit and vegetables more widely available, by improving the value chain between producers and consumers, is a cornerstone of the FAO's strategy.

That includes encouraging small-scale farmers to join national and global value chains alongside multinational firms. This can be achieved through schemes like contract farming, which gives farmers a guaranteed price for a predetermined level of produce.

The organisation believes that government investment should also prioritise locally produced, indigenous varieties over the exotic and imported, which has led to reduced consumption of seasonal items. Up to 50% of fruits and vegetables produced in developing countries are lost in the supply chain between harvest and consumption. In many cases, the value chain from farmers to consumers is complex and multi-layered. Simplifying it could create opportunities for a more direct connection, such as at farmer's markets, for instance - while strengthening support for smaller retailers could help to improve transparency and food safety.

Eliminating waste

The International Year of Fruits and Vegetables is also intended to support supply chain innovation and a more sustainable food system, including the minimisation of food waste.

According to the FAO, a third of all food produced globally is wasted. One target of the United Nations Sustainable Development Goals is to halve per capita food waste by 2030. Technology is helping to reach that goal. For example, StixFresh antimicrobial stickers mimic the compounds that soft fruit produces itself; creating a protective layer that slows the ripening process.

Online, sites like Olio connect neighbours and local businesses to donate unwanted food so it doesn't get thrown away - while in the supermarket, artificial intelligence-driven solutions offer variable pricing matched to expiry dates. Events are being organised around the world to celebrate the International Year of Fruits and Vegetables. The FAO hopes that its work will help more people to gain the nutritional and economic benefits that could improve living conditions for millions.

Source : World Economic Forum

Srinivas Katla

Farmer, Karimnagar, Telangana

Mr Srinivas Katla is a farmer from Karimnagar, Telangana. He is into cultivating two types of fig varieties - Brown Turkey and Dayana for fresh fruit market. He says farmers will get good income by cultivation of fig if the temperature is above 35 degrees to below 45 degrees. He is practising organic farming by using oils, such as ground nut, mustard, coconut oil, neem, and kanuga etc, apart from eggs for soil application and foliar.

Mr Srinivas Katla says his father was working in Singareni Collieries. It was in 2015 that Mr Katla started vegetable cultivation. He was growing spine gourd, ridge gourd, and bitter gourd. When his father fell sick, nutritious food was suggested for him. Then he wanted to venture into cultivation of figs. Upon searching, he found that in Pune and Bellary two varieties of fig were being grown. The dry variety was from Turkey, Chile, and Italy. It is named Dayana. Fresh fig is being cultivated in Bellary, Raichur, Gujarat, and a little bit at Telangana. He started cultivating brown turkey fig in 2019. He took the samplings from Mr Ram . He started with 450 plants in one acre and cultivated in 1 hectare.

Mr Katla says that the plants can grow in areas with temperature above 20 degrees C up to 45 degrees. There is no need to apply any chemicals for their growth. He follows Chauhan technology and mostly uses natural manure like panchakavya, biofertilizer and biofungicides. He makes biofertilizer using 200 kgs of cow dung, azotobactor, phosphor bacteria, rhizobacterium, he also adds biopesticide. He has added 11 cultures from CRIDA, Hyderabad. Within 10-15 days the microbes are developed with this dung. He applies 100 g of the cultures done to each plant.

The main problem with fig plants is managing nematode issue in the fig root. He used Paecilomyces culture to control this problem. It was controlled naturally. He started applying it whenever there was a problem and got good results. He says every 3 months tipping is needed after plantation. It is essential to prune the fig plants every year. He is also using edible oils and poultry eggs to apply for the plants. Two hundred eggs and 15 l of cotton oil are mixed with 200 l of water, and half a litre of it is applied to each plant. This enhances the vegetative growth of the plants. Every month it has to be repeated. Mr Katla says the oils can be changed. Cotton oil, karanja oil, mustard oil, castor oil, groundnut oil, sesame oil, and coconut oil are used. Each oil has different nutrition. Karanja oil is the source of sulphur and prevents leave infection in November and December. He also sprays these oils. Rusting is another issue with the plant in winter. He uses core technology to address the rust.

He got the first yield after 11 months. In 2019 he started the plantation and in January end 2020 he got the yield. Per acre he gets about 15 to 20 kgs of fruits. His plot size is 2.5 acres. He got about 50 kgs for that year. To prevent damage to the fruits, he has installed plastic mesh, and thus stopped any menace from monkeys and birds' attack to the fruits. After that he had no problems and got a yield of good quality fruits.

Mr Katla does his own marketing too. He has 6 fruits in each box and affixes a sticker on the box indicating the medicinal value of fig fruits. They are good for heart diseases, diabetes, bones, improving the brain memory, and cancer protection too. He has his own brand market. Around 40 kgs fruits are plucked each day, and he sells each kg at Rs. 150 near his farm. Each day he gets about Rs. 8 to 10 thousand. So he is planning to cultivate figs in another 3 acres of land. The market for brown turkey and Dayana varieties are very good. He will start processing by April or May this year.

Pruning of the plants have to be done each year without fail. The weed has to be removed every 45 days. He engages labourers to get it done. Every 3 months the tipping has to be done so that the plants develop side branches. In June this year he did not get the yield. After pruning, the fruits are available in November. The small fruits will get matured in 60 days. Each fruit will take that much time and has to be plucked then. Brown turkey is a highly sweet fruit and gets recurring business. Though Mr Katla does not have fruits in his farm now, he is getting calls about the availability of the fruits. It is with great pride that he says that he got the Best Farmer award in Telangana a couple of years ago. Before I starting my farming, I met RHS manging director Mr Mannapalli Ravi garu and B.Vinod, Radhakrishna garu farmers in shanthinagar jogulamba jadwal district Telangana. They have given wonderful suggestions and support me for crop management; I am gratitude to them for this success and also my mother.

Can you please explain about the spacing between the plants?

There should be a spacing of 8 ft or 2.4 m between two plants and 3.6 m between two rows. I have currently

460 plants in my 1 acre of land. I have taken Gooty plants form the farmers. I have also installed drip irrigation. I have availed 90% subsidy from the government of Telangana. I also have used 15 kg of cow dung for all plants.

Since when are you doing fig cultivation? Where do you market them?

I have been cultivating fig since the last 2 years. I do the marketing in Karim Nagar. I get about 40 kg of fruits each day and sell them there.

Do you get fruits all through the year? Do you get 40 kg per acre?

We will start getting the fruits from November till end of May. For 6 months we should get fruits. Plants need pruning each year. I did pruning in June 2nd week this year, and plants are in the growth stage. In the first year I got 20 kg of fruits per acre. This year I should get 50 kg more every day. Every 6 months we can get the fruits.

What is the rate at which you sell the fruits?

I sell at Rs 150 per kg. I do my own marketing. I put a stall in Karim Nagar and sell there.

Do you have idea of doing nursery of these plants?

Yes. I will be starting the nursery from June next year.

What is the cost per plant, and what is the life of the plant?

Per plant, the cost is Rs. 40 to 50. The plants should live for 10 years at least. You will be getting the fruits every day. Plants need pruning every year.

What is the water requirement of the plants?

We are giving 3 to 4 hours of drip irrigation. About 60 litres of water is needed per plant during April and May every day.

Can we visit the farm?

Yes. You can visit in December so that you are able to see the fruits also.

What type of climate is required for the fig cultivation?

About 20 to 45 degrees Celsius is needed for the cultivation. The fruits may be sunburnt if the temperature is more. Below 20 degrees, the plant will get rust and develop leafspot which we have observed. These problems need to be addressed.

What is the shelf life of the fruits? Will you be able to sell the fruits within the shelf life?

The figs have a shelf life of 3 days after plucking. Usually, the next day itself it is all sold.

You are going organic way in cultivating figs. Do you agree that the fruits grown otherwise are not of good quality?

I have installed the Dr.Cho farming method. The fruits grown otherwise are not of good quality. We are doing better than the others. The solar drying quality is very good. In Maharashtra, farmers are getting about 70% subsidy.

Do you prefer tissue culture plants? Or the dried ones like Dayana for multipurpose?

Gooty type is the best choice for the farmers. One scientist introduced tissue culture plants for cultivating fig, but he did not get good fruit size. Fruits are usually small size, and the crop is also yielding fruits late, may be after 14 months. I prefer Gooty plants as they grow better within 7 months.

Which year did you get the Best Farmer award?

In 2020, I got the District Best Farmer award. in 2016, I got the Telangana state award.

Do you plan to increase the yield by other methods?

I hope to get a better yield this year. Organic manure has to be given to the fig plants. I have given about 30 kgs to them so far and developed all cultures. I use biofertilizer, biofungicide, and bio insecticide. This year I used these biocontrollers to control the disease and expecting good yield. I am learning by myself each year. I get advice from Dr. R V S K Reddy, the Deputy Director, of YSR Horticulture University. I am implementing all his ideas.Plant protection aspects under guidance Mr.Shekar sir DAT Center, Karimnagar,PJTSAO and KVK Jammikuntta, I want to get at least 50 kg per day per acre.

What will be the weight of the fruits and the box?

Approximately 60 to 90 g will be the weight of the fruits. Each box of the fruits weighs 500 g.

Can it be grown along with mango plants? Do you support intercropping fig?

No, fig is not suitable for intercropping. It should be a dedicated crop.

How do you compare the quality of Brown Turkey figs of your farm with the others grown elsewhere in the country?

The fruits grown in my farm is purely organic. I apply only edible oils and panchakavya. I do not use pesticide. We spray fungicide in November and December. I do not use any fertiliser too.

What pesticide or fertilizer do you use? Do you apply any hormones for the growth?

After pruning in June, I use Single Super Phosphate, or SSP 100grams per plant. I do not use 19-19-19 or any other fertilizer. No. I do not use any hormones as the plant bears fruits. Nothing for the foliates. Panchakavya and anything organic I use. Last year I introduced red bugs from NIEPHM 4 pairs and used in my garden to control chewing pests. During winter we can expect fungus related problems. Waste decomposer will give high returns. With Lactic acid bacteria and imo in the waste decomposer, the disease will be controlled. I have used it in my vegetable farm.

Are you going for organic certification? Per acre what is your income per annum?

Yes, I have applied for it through Telangana government this year. Last year I got around Rs. 6 lakhs per 2 hectares from the yield, out of which Rs. 2 lakhs were the expenses, and the profit was Rs. 4 lakhs. This year I should get Rs. 10 lakhs or more.

What are the value-added products from fig fruits?

We can make jam, use in Choco bar, and syrups. The Indian Institute of Horticultural Research, Bangalore, is providing training for making the value-added products from fig fruits. I am planning to learn those things.

CONTACT : Mr Srinivas Katla
Srinivasyaramalla@gmail.com
Phone: 9949194232

Chetan Gore

Managing Director, Urjit Biotech Pvt Ltd, Sangli, Maharashtra

Mr Chetan Gore is passionate about farming for long and started in 2005. He worked on his barren land in Belanki, and developed a custard apple orchard there, 550 kesar mango trees, and grape yard. He also developed a brand name "Organic Village" to sell mangoes at a good price. He owns a company Urjit Biotech Pvt Ltd that produces organic biofertilizers in liquid and solid form for the farmers.

In Mr Chetan Gore's interview recently, he talks about cultivation of custard apples and marketing the same. The farm was an 8-acre land lying unutilised for many years. He did not have any professional experience or qualification in farming, but he wanted to go for organic farming. In 2005 he started the plantation of custard orchards in 4 acres, with trees planted at a distance of 10 by 10 ft between each other. They are more than 15-year-old plants now. They also have a mango farm with 550 kesar variety trees.

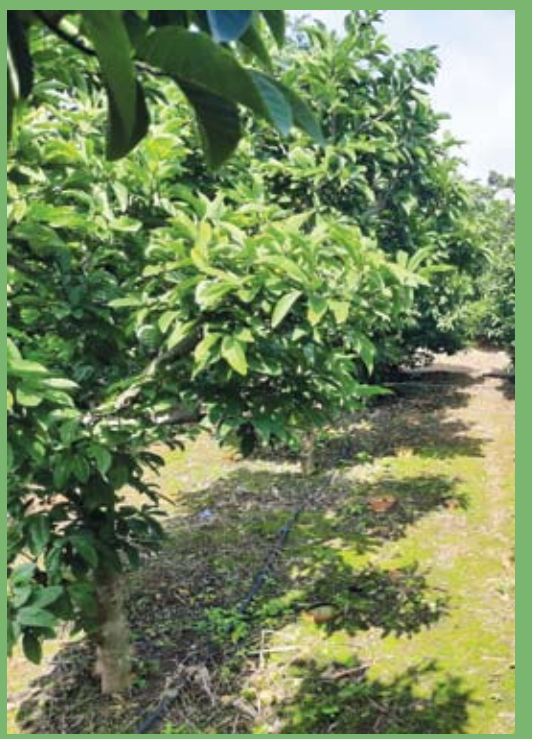
Custard apple plantation can be grown in rocky, hard, and draught prone areas with less water unlike other plants like sugarcane. They can be also grown in other places. You need to select the soil properly, and there should be no water clogging as the plants will perish due to excess water clogging. The recommended distance between the plants is 15 by 12 or 14 by 8 ft. Every horticulture plant should be planted in horizontal manner and rectangle. There are so many varieties of custard apple, and the most popular variety is balanagar variety. You should select the variety according to the conditions in your area. Custard apples can sustain draught and minimal water supply, and yet they need minimum 500 to 750 mm of rainfall. Heavy soils, alkaline soils, water holding soils, and thick black cotton soils are not recommended for this plant.

The soil in his land was rocky, so he had a J C B to make pits and remove the stones and blasting to remove the hard stones to get smoothened soil to plant. He says they are getting premium produce now, and anyone who has a better land will be more successful. In 2007, he started using diffusers to help subsoil irrigation. They irrigate the plants below 4 inches from the soil surface. By using diffusers, they could further reduce the requirement of water.

He says they have used microtubes 16 mm laterally and diffusers for 9 inches, 3 inches above the soil and 6 inches below the soil. Water is given around 4 to 6 inches below the soil surface, and they use 4 mm microtubes carrying from lateral drip irrigation to the diffuser providing only required amount of water to roots.

Mr Chetan says that they observed some plants were not growing well, and so they made trenches around the plants. It was a very hard rock surface surrounding the root zone, and so the roots were not growing resulting in low plant growth. So they brought concrete breakers and did root cause analysis. They removed big stones from the periphery of the roots using the breaker, and then the plants started growing well. They are yielding ample fruits. Usually there are about 200 to 300 fruits in each plant, and they remove excess fruits to maintain the quality of fruits.

They get 3 to 4 fruits in a bunch and



remove the excess fruits. He points out that 1 fruit per sq ft area has to be kept, and the farmers have to decide how many fruits the plants can hold. Leaves are like solar cells, and so the more area they get, the more fruits they can produce. 1 fruit per sq ft will give healthy and more yield. If the number of fruits is more, the size will reduce.

In 2009, they decided to plant kesar variety of mango trees in the remaining area of the farm. They prepared the land digging pits and refilling with plants. They installed drip irrigation system and kept sticks for support. There are 10 varieties for cross pollination, but kesar is the majority variety. Since they have extreme climate, they keep the plants under shade net to acclimatize to the new weather conditions and then plant. They have a small goat farm of 25 goats. If the farmer can have proper distancing in the orchards, he can do intercropping with watermelons and vegetables. For the first few years intercropping can be done.

Talking about the economics of agriculture, Mr Chetan says that only growing good quality of fruits is not sufficient but also good prices. Farmers should learn how to develop their own sales network to sell their produce. If they have 500 mango trees and expected produce is 5000 dozens, he should arrange for the network through digital media like Facebook or WhatsApp. He should also arrange for proper packing called augmentation of the product and sell it at a better price. Otherwise economics of farming will not be good. Till last year, their mangoes were exported at Rs. 70 to 120 per kg. Now buyers are taking undue advantage and say that due to covid condition the produce will not get good price or get sold. Mr Chetan felt the produce was too good a quality to sell at a low price. So he accepted the challenge and prepared boxes and a brand name called Organic Village. He could sell all his produce in 5 days at Rs. 100 per kg in cities like Nashik, Pune, and Ahmednagar. Farmers should understand that their produce should not be sold at a low price to make it affordable and beneficial.

Mr Chetan says that agriculture was his passion, but he is not from an agriculture background. He studied and learned from books about farming to slowly develop his farm. Now he feels that the distance between custard apple plants should have been 12 by 14 ft or so. They are also operating a biotechnology company called Urjit Biotech and producing biofertilizer which is used in their farm. They can guarantee that their products are organically grown, even though they have not yet received the certification. He feels that by regularly using organic biofertilizer, farmers can get better quality of food and taste, and people ask for their products. His farm experiences very less fungal attack, one of the benefits of using organic biofertilizer.

Fruit rot and stone fruit are the problems with custard apple. Fruits become black and hard. They should be removed and burnt. Otherwise the fungus starts spreading again during rainfall. You need to apply fungicides and sprayers and keep the farm clean to control the disease.

He says his company provides the NPK, zinc, potassium fertilisers organically. Shashwat is the organic bio-enriched manure preventing soil borne fungal attack in plants. It is full of NPK, zinc, potassium and organic carbon which are very good for plants. Empower Bio Kit has been developed for the farmer friends and sold at good rates. Since the last 15 years, he has been in farming sector and wants to take it up as a full-time occupation.

Can you elaborate on custard apple marketing efforts, yield per acre, and the price sold?

We are currently getting 5 to 6 tons per acre. I have planted 10 by 10 ft with more than 350 plants in an acre. We get 10 to 12 thousand dozens of fruits a year. But we want to reduce it to 8 thousand dozens. In that way we will get better size of fruits. The plant produces food by photosynthesis which gets distributed to all fruits. If the number of fruits is restricted, you will get big size fruits which will get you good price. Once we got Rs. 1 thousand per dozen also. But if you do not have proper quality and size, the price drops. It depends on the availability of the fruits in the market also. This year, we had very bad experi-

ence, as the rains were heavy, corona attack, and the roads getting flooded due to rain. The rates were low. Usually we get Rs. 1.5 to 2 lakhs per acre. We tried to sell to dealers in other states, but due to covid it did not work. Custard apples are not easy to transport. You cannot put 2 layers in one box. Ripening time and shelf life are less. If the quantity is huge, you cannot do retail sale of fruits yourselves. You can plan the season and extend harvest time, and you can sell your fruits using your own boxes and brand name.

From your experience, how do you assess the quality of the fruits?

The first criterion is the size. Custard apples of 250 g are good, if about 400 g, they are of premium quality. When the fruit setting period happens, thrips attack them. The insects suck the juice of the fruits which do not grow in even shape. If the fruits are not round in shape, if black outside due to fungal attack, and if any physical damage seen outside, they are not good. If nutritional management is good, fruits will have better size and pulp inside. Physical appearance and weight are the two criteria to determine the quality of the fruits.

Sangli is famous for pomegranate too. Did you try growing them?

No. I am not into growing pomegranates. Sangli is famous for jaggery, sugarcane, turmeric, grapes, and pomegranates in some parts.

Do you suggest the upcoming farmers to grow balanagari variety of custard apples in future or any other variety?

Some new varieties are coming up, but somewhere we have to stop and start planting. All varieties are good. If you get 300 fruits in plants which have a canopy of 10 by 10 ft, they will be of small size. If you have 60 to 70 fruits in the same canopy size, you will get good quality and size fruits and premium price. When buying mangoes, just because they are alphonso variety, you do not pay high price, but only when the fruits are of good quality. Balanagari is a great fruit bearing variety. The fruits are of good size in the new varieties, but the number of fruits per plant is less.

How many custard plants can we keep per 1 sq ft distance? There are opinions that you can go up to 25 to 30 fruits per 1000 leaves. Can we go for such an arrangement to get fruits of good quality and size?

The maximum food producing capacity of custard apple is 500 g. So out of that, some portion plants will use for growth and remaining to the fruits. You should remove more number of fruits in one branch. 2 fruits can be in one sq ft but different branches. The fruits at the end of the branch should be removed. If you get proper number of fruits, you will get good size ones.

At what rate we should keep the fruits, say 400 mg per fruit?

You calculate the canopy or shade by afternoon. If the shade is 8 by 8 you should keep 65 to 70 fruits in the tree. You can expect premium size.

If we are unable to sell the fruits, can we deseed the fruits, keep in containers, and sell to ice cream companies or can they be exported?

Pulping custard apple is easy with the help of machines or even manually. You need to immediately freeze the pulp below 12 degrees and maintain the cold chain. Custard apples have lot of sugar and start fermenting immediately. Even within 2 hours outside, it will start fermenting, and colour will change. You will not get good price. The skin is thick and has 30 to 45 seeds. If you have 10 tons of fruits, you will get only 3 tons of pulp. The pulping labour charges, and cold chain cost have to be calculated. If you get better rate, you can do this.

Do the seeds have value addition as they are also used for pesticide?

Better quality fruits seeds are used for making nurseries. Selection of fruits is important and not grafting. So you can use the seeds to make nursery and small orchards. The pulp of seeds is used in pesticides.

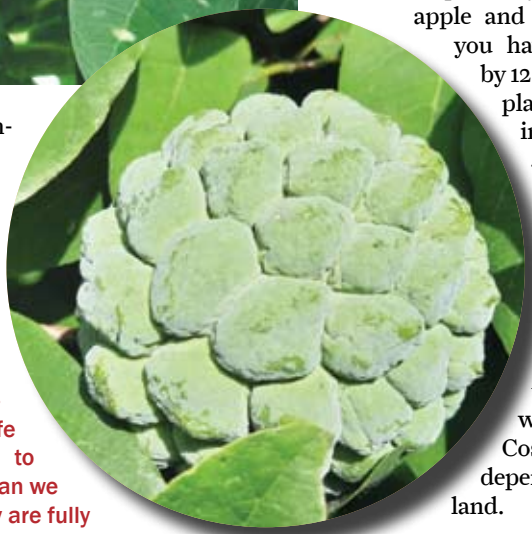
Do you prefer straight varieties or the grafted ones?

Selection is more important. The yield from seeded plant or grafted one is the same. Within 2 years, you will get the fruits in both types. It is the size of the tree and the canopy that determine the number of the fruits. When the trees grow, the canopy will also grow as also the size of the fruits.

At what age can we expect the harvest after sowing the saplings?

From the 2nd year you will get fruits. After 4th year the trees will grow to 6 to

8 ft high and canopy 6 to 8 ft on all sides. You will get more fruits. After 4 or 5th year, you can get commercial production.



How can we improve the shelf life after harvesting to get right price? Can we pluck before they are fully ripe?

It is not possible in custard apples. The new varieties claim they have better shelf life but even if you harvest it late, the shelf life will be 2 days. If you harvest before it ripens, it will get black and wasted. Custard apple is less expensive, and it is low risk low return product.

To get the size and weight do we wait?

No. Custard apple of any size takes time to ripen. It should become yellow, called by farmers as opening its eyes. The two grid lines should become yellow, and you should harvest then. Even if it is small, when it shows yellow, you should harvest. Only then it is useful for eating. If you harvest early, it will not ripen.

Can we contact you online for NPK and Shashwat?

Yes. You can contact me for that.

How do we alternate mango with custard apple? What distance should I have? What is the cost of planting custard apples?

Never cultivate mango and custard apple together. Custard apples need rest period, and leaves should be shredded fully. When you give stress to custard apple, mangoes need water. If you water mangoes, custard apple will not ripen, and the same with mangoes.

You can probably have custard apple and drumstick. If you have decided 15 by 12 ft, 180 sq ft per plant you are giving. If there are 40 thousand sq ft with 15 by 12 ft, you can have 220 trees per acre. If it is 14 by 8, the number of trees per acre will be more. Cost of planting depends on your land.

If you buy custard apples and sow the seeds, you can have an orchard at a low cost. You can avoid buying at Rs. 70 and spending Rs. 1500 for transporting. You need to check for fungus and use fungicides. Dense plantation will lead to fungus. Plants need proper sunshine from all sides.

What is the life of the plant?

The commercial life of the plant is 35 to 40 years. You may have to add 3 to 4 years initially and then last 4 years for downfall. Thus the entire life of the plant is 50 years, but the commercial life is 40 years.

What is the reason for custard apple and mango not going together?

Custard apple has rest period from December to February. We usually harvest by Dussehra. To get premium rates, we plan that way. By November, we start reducing the water supply and the leaves start shedding. February and March are the resting period for the plant, but mangoes are ready for harvest in April and need water. So custard apple will also get water, and the plant will not bear fruits. If you try to maintain the water stress to custard apple, mangoes will not grow.

Do you need to prune them?

No. Leaves shed automatically. The food in the leaves return to the supply lines, and the empty leaves shed on their own. Reduce watering and stop in April, and the leaves will shed on their own. Since our harvest is in October, we taper our supply from then. You can apply compost then.

How to plan harvest of custard apple?

You can decide by giving stress to the plants, then leaves shed. When you start watering, you will get fruits in 4 months. We plan in such a way to harvest during Dussehra. We start watering 4 months before that.

Can we grow custard apple in desert areas?

If you have water supply from May to December, you can grow, you should not give stress to the orchards till 3 years. Every week you have to water. You can manage with tube well or drip irrigation. You can grow using seeds. If you purchase 1 dozen quality fruits, you will get seeds sufficient to grow in 1 acre. It is the size, shape, taste, and juice in the fruits that matter.

CONTACT : Mr Chetan Gore
Managing Director
Urjit Biotech Pvt. Ltd
S-1 Raghunath Apartment,
Near Ganapati Temple,
Sangli, Maharashtra
Email: cvgore@gmail.com
Telephone: 09372142792

Platosen Samarasam

Managing Director - ZUWA Organic Farms Pvt Ltd
Tirunelveli, Tamil Nadu.

Mr Platosen Samarasam is the Managing Director, ZUWA Organic Farms Pvt Ltd in Tirunelveli, Tamil Nadu. It is an organic farming company and is into organic farming of horticultural crops, medicinal plants and agro marketing of organic produce in India and abroad. Mr. Platosen Samarasam is a MBA graduate with a Biotech degree from Anna University, Chennai. He decided to start a farming company and to restrict to moringa. In a recent interview, he talks about his experiments with moringa. He says they get income of about Rs. 1.75 lakhs to 2 lakhs per acre with an expenditure of Rs. 60 to 70 thousand.

ZUWA Organic Farm was started in 2015 with 250 acres in Tirunelveli, Tamil Nadu. There are a few mantras for running a farming project successfully. The farmer has to identify the product with market potential, amenable to value addition and scope for export. The productivity should be higher than the productivity of standard traditional farmers. The next aspect is cost control, increase revenue, and decrease cost. If your revenue per acre is increasing and cost decreasing, and if you are able to do both, you have a successful formula on hand.

We found that the market size for moringa in 2015 was 4 billion USD and 9 billion USD in 2020. There is good growth and potential. India is the key player with at least 50% trade from here. Major market from the West are USA, Europe, Japan, and Southeast Asia, Taiwan, and China as the buyers of seeds. Major sellers are India, Philippines, Mexico, Brazil. As a trader and exporter, you can generate more. Another parameter we applied was the fluctuation of price for moringa. A crop like tomato could fluctuate between Rs 30 to 50 paise, and it is not a right crop to do. If for some reason we are forced to realise it and the market price is low, then we will not meet our cost. If a product has to be sustainable and profitable, we need to look at the product where the lower price is still making sense to us. We chose moringa because of this aspect.

Every part of moringa can be used. As a private company, we are using the whole plant. We saw that the different parts of the plant have medicinal value, human application, husbandry application, water purification, and cosmetic industry. We toured in Gujarat, Tamil Nadu, and other states to see how it is grown, and in most of the places only traditional cultivation of 500 to 700 trees per acre was followed. We studied if any international research has been done, the kind of recommendation, and how it was perceived, and saw that reality was a stark contrast. We discussed with agricultural experts to start the pilot commercial scale moringa plantation, such as if we can do 10 thousand trees in an acre, can we extend the last value of drip irrigation to the trees, etc.

Traditional farmers are harvesting all the parts, leaves, and seeds now. Some more serious farmers went on to check if they could have 5 harvests in a year. They were getting 150 kg per acre harvest of dried leaves per year. When we adapted ultra-dense cultivation, with 10 thousand trees, we realised we could do more than the traditional farmers. We could get 425 kg of dried leaves per acre, 2.5 tons per year simply by tinkering with density and inputs.

We went on with drip or sprinklers. Inputs are always a constraint for an organic farmer. I saw when we have an

organically certified farm, unless I have cows of my own to manufacture my own input, it is going to be difficult. So we went for standardised organic inputs. Rs. 1500 per acre per month was not affordable, and unless we brought down the cost, we were not looking at the jackpot. Then we looked at the nano input to reduce the cost. It is like a bullet that gets into the tissues of the plant. We did 2 things, standardized inputs, and went full outright nano input. It is Rs. 200 now per acre, giving lot of saving that translated into profit. After every third row, one row was left to spray. You will go into it only while harvesting and using pest control and spray. We slowly moved from sun dry to an automated solar dryer imported from Australia for moringa leaves at a specific temperature and humidity.

To increase productivity, we went for ultra-dense cultivation. We decided to go for 1 acre dosage standard packing of inputs. Some inputs are 5 g per acre and some 250 g per acre. One packet equals supply to one acre to make it easy for farmers. We were able to reduce the cost by shifting to nano inputs and standardising the periodicity of application to 1 month. Drying techniques kept changing. To sell to local traders we went for sun drying, for agri processing or farmers for solar drying, and for export and pharma grade need more advanced automated solar drying, at 35 to 45 degrees to keep the nutrients intact.

How to procure quality products I learnt, but maintaining quality is the problem in organic farming. Though our farm is certified from Lacon, a German certifying body in India, since we harvest every month we had to get them tested from a reputed lab in Bangalore called Eurofins. Each test cost Rs. 20000, an expensive affair.

The minimum quantity to get tested is 2 tons. Otherwise it is expensive and adds to cost. We get it tested and certified and ask the buyers to reimburse. If we fail, the buyers will not give us anything. Just practising organic is not good enough when you try to do on a large scale or export. You need to get traceability certificate.

If the product is for pharma grade or export, microbial contamination is a big issue. You have to eliminate it at source. Or you have to do gamma irradiation which is done in Bangalore and Hyderabad. Controlling temperature and humidity to retain colour and nutrient is important, since if it is overly dried it will be lost. If not properly dried, it will degrade when packed. You have to use a sophisticated machine to dry properly. We felt unless we have foothold in every part of value chain, we cannot have success. Today we have our own agri inputs using for ourselves, but if somebody needs, we provide.

We are processing 45 value added products from moringa aided by our sister concern and export to France, Germany, Australia, Singapore, and South Korea. It all worked for us because we could experiment with seeds, inputs, density, fertiliser, and frequency, in our farm. Farm tours always end in our farm, and we teach visitors about practices and technologies we follow.

Typically we apply 10 tons of farmyard compost before we lay the drip with 3 ft between laterals. We sow through seeds. One kg has 2500 seeds, and we are doing 25000 plants per acre. We need 7 or 8 kg seeds. We sow seeds at a depth of your thumb, about 4 cms.

You do not have to dig a pit for this for ultra-dense cultivation. If you do normal farming with 1 thousand trees, you have to dig 45 x 45 x 45 cm pit, add compost, and soil, and then plant on the soil.

Ours is a porous soil, and we don't need a raised bed to sow the seeds. Within 7 days they sprout and within 50 to 60 days, if you want, you can prune from 8 cms from the tip, to get fresh shoots. In our farm we don't prune.

Only after harvesting we prune. In the first yield we have 1 stick per plant and after second harvest and pruning, we have 6 sticks which makes up for our loss. Within 90 days it is ready for harvest. We have 4.5 lakhs moringa trees. We cut the plants after harvest with trunk 3 ft above the soil. The shoot can be used as compost.

For leaf powder which variety do you prefer for high yield?

For leaves we started with PKM1 in 2015. We heard that Jaffna is a good variety. It is thicker and bigger. But most of our farms have PKM1 variety even now. It is an annual crop and grows fast. The problem with PKM1 is plantation life is 5 years, and we have to replant. We use PKM1 seeds for germination, but for oil production Momax is a good variety.

In Cuddalore, we have red loamy soil, in a hilly area. Will it be suitable and any specific condition for water and soil?

Red soil in a hilly area is suitable. In Cuddalore, there is no worry. The only place to think twice is moringa

grows very well in black soil. But if water stagnation is there, the plants will decay, and if you don't water, they won't die, but will survive. So you need to ensure drainage system there. Damp and wet seasons are not suitable for moringa. Half humid and dry weather is ideal. Any soil is ok as long as drainage is there.

Do you have contract farming? We want to get the seeds from you and supply leaves to you.

If you are in and around Tirunelveli, we have no problem. If I know your location, I can get others connect to you. We can technically advise you.

When you had laterals at 4 ft apart, at what space you sowed the seeds?

When we sowed the seeds, laterals were at 4 ft and drip point 2 ft. We were sowing at 40 cms of gap. Between 2 laterals we sowed 1 seed each. So the distance between 2 laterals was 120 cm, and the distance between the seeds was 80 cms. Between 2 laterals, there were 3 plants.

Do you cut off all branches when you start cropping on 90th day?

Leaving 3 ft from the ground, we chop off the entire plant. Within 45 days, it is ready for harvest.

Where can we get your 1 packet for 1 acre?

We manufacture it for our use, and if you are interested we can share with you.

How complicated is your new solar drying technology, expensive, and what should be the minimum size of the plant? I have 800 trees in an acre and use traditional method.

If you are experimenting I will not recommend the imported IOT based Solar dryer. If you are experimenting from the production angle, you can sun dry as there is market for sun dried leaves.

How do you do sun drying?

You can have a 60 x 60 ft tarpaulin or cement platform for drying, and then go for machine. You have to do progressively.

How long does it take to solar drying or sun drying?

Solar drying takes about 4 to 5 hours. Sun drying may take a couple of hours more. You have to start drying by 8.30 or 9 am and by 3 pm it is dry.

There are lots of medicinal uses of moringa leaves. Have any experiments been done to prove all these claims?

Yes. Experiments have been conducted, and the claims have been based on them. But there are not many dossiers that go to prove the claims in allopathic way. They have anti-cancerous properties like turmeric and active compounds in that sense. A lot of literature of ayurvedic and Siddha mention about it. More than 200 types of ailments moringa is able to address. Today it is high end science, and moringa is subjected to it. And that is why it is becoming super food. We are moving towards using majority of them.

How to market and who do we address?

Any serious buyer of moringa will buy if you have stock of minimum 1 ton. Small traders may buy 500 kg or so. If you have 1 ton, you can do testing at that output level. You need to have at least 7 acres of moringa. If you don't have, you will not get 2 tons for testing and reach serious buyers. Contact nutraceutical companies and exporters, enter into contract farming with them, and sell. There are lots of serious buyers in Bangalore, Mumbai, and Gujarat.

When doing moringa on a commercial scale, which one is profitable – leaves, pods, or seed production?

The moringa leaves are labour intensive, and it requires lot of care. If you can provide utmost care, every rupee you invest in moringa leaves fetches you Rs. 3, an attractive return. Price of drumstick fluctuates from Rs 4 or 5 to Rs. 120, at the higher end. Average price is Rs. 30 to 35. And in PKM1 you can get 16 tons. If you have a 5 acre farm with 16 tons, even if you get Rs. 20 it is worthwhile.

Harvest has to be done every 4 days, leaves at 45 days, and pod every 4 to 5 days. Otherwise it will become hard and not fit for cooking. If you can employ people and every week take it, you can sell it to local markets and other places where you have tie up with markets. Seed business which has 2 types is tricky. One type is for oil purpose, and it does not have any problem. They are sold from Rs. 250 to 600. The other one is for germination. You may get from Rs, 1500 to 2500, but minimum Rs. 1500 is assured. The problem with germination seeds is you should not have any moringa farm around your farm for 1 to 1.5 kms. As moringa is a high cross pollination crop, if they

cross pollinate, you will get yield, but it may not be the original variety. If it is PKM1, you will get shorter drumsticks.

When we sow every half foot, is it alright because trees grow tall, and won't they obstruct the other trees?
We are planting every 1 foot. Since it is the property of the plant to grow towards light and straight, not a single stick will go cross. It becomes extremely dense when harvesting, and if you delay, the lower part of the leaves will go yellow due to lack of sunlight.

Please tell us about Momax and Jaffna varieties.
Jaffna is very good for leaves, but I have not grown them. With PKM1 you can have 5 harvests a year, and up to 5 years you can harvest. PKM1 grows fast. Jaffna also grows fast.

Should you wash the leaves before putting them into the dryer which is for large scale production?
If you want to export and pharma grade, you have to wash, centrifuge, remove excess water, and dry.

Can you please tell us about the machine you have imported?
The machine is from the company Solar Klin. It is not for leaves alone. The distributor for India is my buyer from Germany. I can connect you to them once installation in my farm is complete.

What is the rate of moringa leaves and powder in both markets?
If you do not have a traceability certificate, you will sell at Rs. 100 to 120. If you are a certified organic farm, you can sell at Rs. 160 to 200. International market may be Rs. 225, but not sure. For powder, the price is Rs. 300 while locally it is Rs. 220.

For contract farming with you, what is the land area you are looking for?
We enter into contract farming only with those who are reachable within 1 hour from Tirunelveli.

Do you expertise in moringa pods or leaves?
We did pods in the past, but now we are doing leaves and seeds.

How many harvesting can be done after plantation?
In the first year, you can do 3 if you plant after rainy season. It will be 5 harvests each year for 5 years.

What is the income per acre?
Income is about Rs. 1.75 lakhs to 2.5 lakhs per acre. Our expenditure is Rs. 60 to 70 thousand.

For dried leaves market, who should we approach?
For dried leaves I can pass on contact in Hyderabad, and you can contact exporters, pharma, and nutraceutical companies.

Once dried, what is the shelf life?
We use low density polyethylene bags to put the leaves, and then into PPE bags. You may take about 15 days to harvest, testing, and till then you cannot sell your product. Shelf life of dried moringa leaves is 1 year.

After getting the fine powder, can the next quality be used for something else?
High quality is used more for human consumption. The lower quality can be used for animal feed. You can request the animal feed companies to mix in cattle feed. You can sell the powder for Rs. 40 or 50.

How to eliminate microbial contamination at source to maintain the quality?
Eliminating at source is a challenge. Once you harvest, you have to wash, centrifuge, and pack without human touch. There is a procedure for this, or you can employ people who are covered with cap and gloves to do it. If you use the machine, you can move the dryer and collect the powder with protection. If you cannot control microbial contamination at source, you can go for gamma irradiation which is available in Bangalore and Hyderabad.

My moringa trees are 25 years old. Is there any life left in them or shall I replace?
If you have 5 acres, you can start replacing with new plants one by one acre.

For your 10 acres, what is the cost of your advanced solar dryer?
Rs. 20 lakhs. It has a capacity to dry 250 kg of leaves per day.

We have about 2 lakhs plants per acre in Uganda. Is this model sustainable with high density?
Theoretically, it is possible to get 50 tons per acre. I have seen 1 lakh plants per acre. But if you can do, then nothing like that. You can do in 5 acres what we do in 100 acres.

CONTACT : Mr Platosen Samarasam
Email: platosen@gmail.com,
Info@zuwaorganic.com
Phone +91 95661 01102

Vivek Vijayan

Sales & Managing Director

ABC Fruits, Krishnagiri, Tamil Nadu.

Mr Vivek Vijayan is the Sales and Managing Director of ABC Fruits in Krishnagiri, Tamil Nadu. ABC Fruits is a leading manufacturer and exporter of fruit puree, pulps, and concentrates in India. They specialise in mango, guava, tomato, papaya, banana, pineapple, and pomegranate. In a recent interview, he talks about fruit pulps and concentrate processing.

We are a leading manufacturer and exporter of fruit purees, pulps, and concentrates. We have 2 processing units we process 1 lac MT of all fruits per annum. We process alphonso and totapuri among mangoes, pink and white guavas, hybrid and country varieties in tomatoes, papaya, banana, pineapple, and pomegranate. We also process tamarind, jamun, grapes, amla etc which is about 10% of the total fruits. We focus mainly on mangoes which is about 60% of the processed foods in India. India processes about 7% of the total 15 million tonnes. Other countries that also process mangoes are Philippines, Pakistan, Thailand and so on.

In India, many varieties of mangoes are being processed. While we have our processing unit at Krishnagiri, there are other processing units at Valsa, Ratnagiri, and Nashik in Maharashtra, and the factories are more in Southern and Western India because of availability of fruits. There are many varieties of mango, but we do not process all the varieties. There are two reasons for this –the availability of fruits as a large quantity of fruits, and low price for the processing. Only then you can compete in the export market. 12.5% of the mangoes grown India is totapuri and 9.36% is alphonso. 76% of the variety preferred for processing is Totapuri because it is the cheapest and big in size. You will get more pulp from it. Alphonso is a premium variety processed for export market for companies manufacturing juices and yoghurt in European and American countries. Totapuri pulp is widely accepted globally as staple mango pulp, cost effective and cheapest in India.

There are two varieties of guava, white and pink. In white there are 3 types - Lucknow variety grown in Nuzividu and Vijayawada, Safeda variety in Bangalore and Tadipatri, and Allahabad variety in Madurai, Dindigul, and Theni in Tamil Nadu. Only Lucknow variety has more pulp, cheap, and available in large quantity which is the main requirement of processing and marketing. Allahabad is only a table variety, big in size, and too expensive for processing. In pink, there are two varieties – pink from Karnataka and Taiwan, and Arka Kiran from Tadipatri and Vijayawada. The desi variety is ideal for pulping with more flesh and colour. Taiwan is ideal for table use. Papaya has three varieties, red, sinta, and yellow. Red papaya is ideal for pulping. It is widely available, easily grown, and fast growth.

Among bananas, Cavendish is preferred for pulping, easy availability, and smoothness of product. The colour does not change while heating. G9 is a table variety, big in size, available everywhere, and cheap. But you cannot process this. There are 2 varieties in tomatoes – hybrid and natti varieties. The hybrid variety is very red in colour and mainly grown in Hassan, Karnataka. Natti variety is more green in colour, not fully red, less bricks, and no seed. It is grown in Andhra Pradesh and Tamil Nadu. The hybrid variety is used for pulping because of its colour and higher number of bricks.

Processing flowchart: The following are the steps we follow:

- Harvest the fruits
- Send to factory
- Sorting
- Check the quality of fruit
- Reject all bad fruits
- Unload in the ripening chamber
- Ripening
- Washing
- Removing seed and skin
- Destoning
- Refining
- Standardisation of pulp
- Check acidity
- Brick consistency
- pH level

Once these are done, we send for pasteurisation or sterilisation. During sterilisation, we heat the pulp to 110 degree centigrade and cool to 30 degree centigrade. We pack them in Aseptic bags and store them in warehouses. Pasteurisation is done for frozen pulp, and then canning. We add chemical preservatives like sodium benzoate. Sulphate pulp is available in the market.

When mangoes are harvested, they are brought to the factory, inspected, and unloaded into ripening chambers. There are 16 ripening chambers of 2 thousand tonnes capacity. After 5 or 6 days, mangoes are sorted, and processing begins. We do both chlorine wash and freshwater wash. We remove the tips and black spots to suit the international standard. Seed and skin are removed in destoning

machine. Fibre is removed, and pulp is collected. We calculate the acidity, pH, and consistency and then standardise the product. We cannot change the parameters. The specifications should be followed. We heat the pulp to 90 degrees to increase the shelf life. The evaporator concentrates the pulp, makes it thicker, and removes the water content from the pulp to export the product easily. Steriliser will heat the pulp, cool it immediately to sterilise the product, and remove any foreign matter. These are automated machinery. Once pulp is fed, everything is automated. These are imported from Italy. Indian machines are also there doing the same.

By going for aseptic packing the shelf life is more than 2 years, and product is fresh. Aseptic packing is the latest technology. It maintains the colour, consistency, viscosity, and standard of the product. We check the quality of the product if it is over-ripened, or under-ripened, and for the sweetness which is very important. The bricks value determine the sweetness, and then we put them in drums, put a liner bag, and close it. We either export or supply domestically. Each drum has drum number and batch code. We know where the fruit for that drum comes from. This traceability is FSSAI approved.

We have ambient temperature warehouse and cold storage. For mangoes, ambient storage is enough, but for other fruits we need cold storage as otherwise the colour changes if kept outside. It has to be 5 to 10 deg c. Then colour and quality remain stable. In the central laboratory we do analysis of microbial parameters like e-coli and salmonella, as they will spoil the product and taste will change. Every batch in each drum should be checked before sending to customers to ensure that it does not

contain any pathogens. All the samples are collected for future verification.

Basically we do exports and domestic business also. We supply to juice, beverage, jam, yoghurt, and ketchup companies based on the fruit. In our industry aseptic bag is popular form of packing and globally accepted one. 90% packing is done in aseptic bags. Canning is an older method. In the initial phases about 10 years ago, it was in vogue but there are lots of issues, such as you cannot do sterilisation but only pasteurisation. The net weight will be 3.1 kg, but customers do not want cans as there will be lots of wastage and manual labour involved. There cannot be any automation, and so canning is getting outdated.

Aseptic packing is 1.5 MT per bin. This will be consumed by large customers. They do big standardisation and consume every day 100 tons. In companies like Pepsi, Parle, and Fruity the usage of drums is different. Packing is reasonable and good. We basically do all packing. Machinery changes for each packing, for aseptic and canning, but the process like pasteurisation and sterilisation remains the same.

Our major customers are Maaza, Del Monte which is a global market, Frooti, B Natural, Paper Boat, Kissan for jams need papaya concentrate, and Maggi needs tomato paste which is also used in sauces, and chilli processing. When we look at the fruit and pulp marketing, it is majorly export oriented. Globally not many countries grow mangoes or guava not known to many countries, so also papaya. India is a vast country with natural vegetable and fruit resources. Mango is a big product along with guava, papaya, and banana which are growing.

Similarly tomato and pineapple are also getting into processing industry. Since amla is an immunity booster, the pulp and concentrate are being exported globally. Dabur health drinks use amla pulp and concentrate. We are exploring new varieties of fruits for pulp and concentrate. Red chilli and green chilli are good for immunity which are also processed for various usage.

What are your ideas about machinery and from which countries?

There are many machinery used in the units. Steriliser is one that we get both imported and Indian machinery. We have been in the industry in the last 20 years. Indian machinery was recently supplied to us. HRS Industries in Pune make sterilisers and evaporators. Alfa Laval in Pune also make such machinery along with pasteurisers, seed modules, fillers. All the machines such as pulper, finisher, destoner, and tank are available in India.

What kind of preservative do you use?

For Aseptic products we do not use any preservative because the product is heated at 110 degree and cooled in 2 to 3 seconds. Aseptic bags will retain the product fresh if we maintain the acidity. When we do the standardisation, we make sure to maintain the acidity of totapuri mango product 0.4 to 0.6, and we add ascorbic acid and citric acid. We do not use benzoate. It is a sterilised

product packed in aseptic bags. As long as acidity is maintained and sterilised, products will have 2 years of shelf life.

Don't you think Pomegranate acts in a different way as the colour is lost?

There are different kinds of pulping and processing. Aseptic, canning, and sulphated preservative pulp. For pomegranates you can preserve the colour. It depends on the raw material and heating process. You can reduce the heat and maintain at 90 degree and keep it frozen. When the product is filled in drums, it should be preserved at -18 or -20 degree c to retain the colour of the product.

Where do you source fruits from? Is there scope for farmers to contact from outside with the produce? What are the standards you need?

The plant is strategically located. The reason why our plant is in Krishnagiri is the availability of fruits in proximity. We can source fruits in Krishnagiri near our factory. The processing industry runs on price, low price, and large volume and on how we market to customers globally. We get tomato from Yelahanka Bangalore, guava from Andhra Pradesh. As long as we have price and quantity and customers to pay the price. We strategically locate our unit so that we save our cost on transportation and export to our customers. We work on raw materials, where we get from, how much raw material is available, and our location helps in sourcing raw materials at the lowest price and large quantity. We market at the price we source.

Approximately, what is the cost of the unit?

The cost depends on the capacity of the machinery and price for it. We have 25 to 30 tons per hour facility. I would suggest you do not go for such a big one initially. Try 1 or 2 tons per hour or may be 4 tons per hour and 10 thousand tons per annum, the cost including land and civil will be Rs. 4 to 5 crores.

What is the procurement capacity of mango and guava?

Mango is our main product. We get in large quantity, especially during the season, we procure about 1000 MT totapuri every day to our 2 facilities. We buy all over India, in states such as Tamil Nadu, Karnataka, Kerala, Maharashtra and Andhra Pradesh. It depends on the availability and price of the fruits.

What is the criterion you impose on the people who supply? Where do you inspect the fruits?

We need the fruits to be ripe 70 to 80% as we further ripen. We are keen about the size. We do not want small ones as there will be no pulp when crushed. We also tell them about the specs as during rain and hailstorm the skin and pulp are affected. We have 2 to 3 methods of procuring. We have contract farming in Tamil Nadu in 1000 acres. We do mandi sourcing. We have mandiwallahs in Andhra Pradesh, Kerala, and Karnataka with whom we discuss and get the required quantity. Srinivaspur is a good market. Direct farmers sign contract on annual basis to supply quantity and at the price we agree upon.

How many farmers are sourcing raw material?

We have 1500 contract farmers, small and medium farmers, and lots of merchants and mandis, more than 500 across India.

Will there be any variation in procurement price?

In contract farming, we can control price and quality. Once you go to other states, there is no control on price and quality. We do not do contract farming and backward integration. We send agronomists and sourcing guys who go to mandis, inspect farm, and during loading, check the sorting and loading. It depends on the crops. During bumper crop you can choose good quality ones, but if there is any shortage due to bad weather, you cannot pick and choose. You have to accept the fruits that are available. Based on that we manage the customers and control the quality parameters during the process.

Do you supply only to corporate brands in bulk? Do you have your own brand?

Our business is b2b based. We are a processing company supplying raw material and ingredients to large beverage companies. There is a market for retail, but we are not into it.

What are your future plans?

We are exploring lots of varieties of fruits, custard apple, and frozen products. We are working on amla. We started with 20 tons, but now we are doing 500 tons. Due to covid, amla products are in great demand for boosting immunity. We do tamarind paste and pulp. We

are doing frozen products, frozen dices, and slices. We buy fruits, slice, dice, and freeze, and this has a very good export market. The frozen product is not heated and not eaten at a high temperature. So it has the natural nutrition and qualities retained. This is growing very well in USA and UK markets.

You supply these also only to corporate and not to retail companies?

There are 2 segments, b 2 b and b 2 c. To make b 2 c, we have to create brand, pack in smaller quantities. We have not explored that industry. We are familiar with b 2 b sector, food processing industry and supply the ingredients to manufacturers.

Do you want to enter into contract farming for amla and custard apple?

Yes, we are working with lots of contract farmers.

If you want to enter into agreement with farmers, what is the minimum land you want to order to?

It depends on the farm and availability. We are happy to sign with farmers for contract farming. We will send agronomists and sourcing team to inspect farms. Since amla is rarely available, we are signing contract with 1 or 2 acres also. We need more farmers because this product is in great demand and sign contract to backward integration and contract farming with them.

What is the maximum expiry time of finished product?

It depends on the packaging of the products. Aseptic filling in drums will have 2 years of shelf life. Pasteurisation and canning will have 1 year at 90 degrees. The frozen products have shelf life is 2 years in -25 degrees.

Aseptic packages are stored in ambient temperature or frozen?

Ambient temperature is enough for aseptic packing. Banana and custard apple if kept in ambient temperature for more than 6 months, the colour will change. You need to keep banana, white guava, and custard apple in cold storage. Since mango is a shelf-stable product even after 2 years there will be no difference.

Do you have experience with oranges?

We are mostly export oriented. Indian oranges are available in limited quantity and variety, and prices are not processable. Mainly they grow in Nagpur and Nanded where some companies are producing orange juice and concentrate. They cannot be exported as the quality does not meet international standard, and the price is not competitive. You can do as a domestic business.

When you look at the pulp of Real Fruit or Tropicana, the concentration varies from international standard. We find 20% is actual pulp and the rest is not known.

Raw material is the same for all beverages. In Maaza and Frooti, the quality varies and price. It depends on the brand, recipe, pulp, water, and other things controlled by the company. It is their own recipe from their scientific and R and D team. We supply only raw material.

Are your units busy all through the year?

We keep ourselves busy for 10 months, the remaining 2 months we do maintenance and other things. It depends on the availability of fruits and seasons.

Do you exhaust all the readymade products you make?

We do our best. The way we work is, during the season, we try to contract customers as to how much they require and how much to process. We contract with Coco cola and Parle for mango pulp.

Based on their requirement, we process at least 20% more than that as many customers go for spot buying. We have to keep stock throughout. We store the products and offer spot basis. We cannot wait for the season for fruits.

What is your workforce?

We have 2 units, and 400 employees, apart from 400 to 500 seasonal employees.

What is the scope for supplying packaging material to your company?

We buy packaging materials from all over India, from Bangalore, Delhi, Gujarat etc. We have our own facility; we import steel and make drums. We also buy drums from Balmer and Laurie. Liner bags we get from Hosur and Italy. You can give your contact details and we will get in touch with you.

CONTACT : Mr. Vivek Vijayan
Sales & Marketing Director
ABC Fruits
Street Name: Ankinayanapalli, Bargur
Krishnagiri, Tamilnadu.
Email: vivek.vijayan@abcfruits.net
Telephone: 9842317610

R.S. Ganesh

Director
Vama Oil Private Limited
Coimbatore, Tamil Nadu

Mr R.S. Ganesh is the Director of Vama Oil Private Limited in Coimbatore, Tamil Nadu. The company is into manufacturing virgin coconut oil, and other value added coconut products. The company was started in 2000. Mr Ganesh talks about coconut value added products, virgin coconut oil, and other products, and the processing methods. He says that they sell regular coconut oil at Rs. 300 to 320 and virgin coconut oil at Rs. 650 per litre.

The company is into developing high end products and common products from coconut. it is a familiar crop in and around Coimbatore and is available in plenty. The factory and the processing centre were started in Coimbatore keeping in mind this fact. The firm is developing various coconut products.

It was in 2000 that the company came up with virgin coconut oil. It is organic certified virgin coconut oil. The brand name of the product is L Oil. It is sold widely all over India and exported too. Virgin oil is the unadulterated, special, and unprocessed product, and it is taken from fresh coconut where we have additional benefits and good properties. It is said that virgin coconut oil is equivalent to mother's milk as it is rich in lauric acid and has lots of medicinal properties. The organic virgin coconut oil is certified by INDOCERT, and we are giving it as 100% organic packed in glass bottles. The company also sells tender coconut water packed in bottles.

The regular coconut oil is extracted from copra using regular processing method, and it is hot expelled dry. This is lauric acid extracted and used in Omega 369 capsules. The filtered coconut oil extracted from expellers from copra. Another interesting product is the coconut sugar where neera is processed and converted into sugar without any chemicals or preservatives. There are lots of goodness in this product, and the USP of this product is the low glycaemic index 35% that is best for human consumption and diabetic people. Regular roasted coconut oil is prepared by cooking the copra and extracting the oil. Desiccated coconut powder processed from fresh coconut is used in bakery. The coconut flour, similar to wheat flour, is mixed with wheat flour to make bakery products and rotis. It is full of high fibre, calcium, and protein. The nutritional value is very good. Bodylite is another product that is high in fibre, almost 74%, with high nutritional value.

Virgin coconut oil is always compared with mother's milk as it has properties similar to it, mainly lauric acid, and it helps in enhancing immune system when you take 15ml to 20. it is also used for cooking and cosmetic purpose, particularly skin maintenance and for hair preventing early greying. The other medicinal benefits are boosting of immune system, taking care of gastric and thyroid problems, and improving digestion apart from taking care of duct health.

You have lots of scope for marketing as the market is growing in a big way. Global markets are open for coconut products. The world is slowly coming out of the myths about coconut and are becoming aware of the goodness of coconut products. Coconut milk and coconut vinegar are the other products that can be manufactured. It is an old saying that no part of coconut tree is wasted. There are lots of usages from each part. Even dried leaves are used to make brooms, husk is used for fibre and coir pith which is used in preparing ground for agriculture. It has a very good volume of business. A huge amount of export is happening in fibre and coir pith blocks. Thus each part is made into value added product making it one of the most lucrative crops.

Whoever is growing coconut trees is comfortable as it gives many products. Coconut Development Board and Government of India are helping a lot with coconut export. They support us to do

lot of projects and in manufacturing products. The sap from the tree is collected directly from the tree, and this neera is converted into coconut sugar. Neera is a very good natural drink, that should be substituted with other carbonated drinks as it has plenty of health benefits.

The hot expelled oil is famous in North India and Southeast Asian countries for its cosmetic use and cooking purposes. Even people in Western countries and Europe have recognised the goodness of coconut oil, virgin coconut oil, and other coconut products. The global market has plenty of opportunities for coconut products. In India it is a growing market, and you have lots of opportunities. It is an advantage for the coconut industries.

Many industries are coming up with coconut products and trying to give varieties. We are coming up with infused virgin coconut oil with lots of flavours used in cookies and salads dressing. Major products in India are being manufactured in the Southern part of the country. The export volume is more than that of Sri Lanka and other Southeast Asian countries.

Lots of farms are coming up in our area. It is an easy crop to maintain and the profitability of having a coconut farm is increasing. Farmers are into it, fully satisfied with the productivity and profitability. You can see lot of farmers coming up with organic certified coconut. That is a big step as awareness of quality is taking over, and quality initiatives are taken by the farmers. Compared to 5 or 6 years before, we are much ahead. We have good farms in many areas and quality is being maintained there yielding very good coconuts that are organic certified.

Our main procuring centres are in Pollachi, near Coimbatore, which is a coconut hub and major coconut producing area in the whole of India. In a peak season, you can get 12 to 13 crores nuts per day. It is on the border of Kerala too. The climatic condition is very favourable, and there are many coconut farms around Pollachi and Udumalpet. We source coconut from many farms. For virgin coconut oil, we need special and selected nuts from the farms, and for regular coconut oil and other products, we procure coconut from farms who make copra, the sundried ones. We evaluate those, select as per the quality, and we take them to the factory from the yard. Once the selection is made, moisture level is maintained and taken for processing to get hot expelled oil. We dry the copra again using dryers to make coconut oil. Once the copra is dried and taken to processing area, we dry to keep the moisture level low, cut to small pieces, and put them for natural roasting at 100 deg c to enhance the smell. Once it is roasted, it is packed in various quantities as per market requirement to be distributed to market.

For making virgin coconut oil, we take fresh coconut, quality ones from farms, break them, grate them, and take them to dry under low temperature, then take the dried fresh coconut for extraction. The oil extraction happens at below ambient temperature. Then whole oil is expelled at less than 22 to 23 deg c which is below room temperature. There should be no overheating. That is the major difference between virgin and regular coconut oil process.

The virgin coconut oil, because of the cold expulsion, retains the properties present in the coconut without any damage to the components which are very sensitive. When heated above 30 deg c, it tends to lose the properties. Under strict supervision, it is prepared, and we do not apply heat. The natural quality is retained, and it has plenty of medicinal properties.

After the oil is extracted under cold process method and filtered, it is packed in various packages and sent to market for distribution. That is the difference between the two methods of processing. Due to the value addition in the virgin coconut oil, it is in huge demand all over the world.

The roasted oil is processed under heat, and we cook the copra under 100 deg c. Once during the extraction process, the oil heat is raised, and it will be hot. After that it is filtered, and processing done. This oil loses some of its good properties due to the heat applied. For commercial purposes, this oil is also in need because of price and availability to meet the demand. It is used in cooking

and cosmetic in a very big way. Virgin coconut oil is used for drinking also, as it has lot of medicinal value.

The coconuts are selected in the farms, and they de-husk them. Then the coconuts are transported to factories with the help of middlemen. These people also help in selecting the good nuts from various farms. From the commercial angle, the payment is made to the farmers through the middlemen, and thus the process of buying from the farmers is completed.

What is the minimum quantity you want to buy from the farms?
It depends on the capacity of processing. We have daily requirement of 50 to 60 thousand nuts. We procure from various farms where coconuts are available in plenty. We need 2 types – for copra processing and for virgin oil. Tender coconut water also we are processing, so we need tender coconuts for that also. We get the coconut factory in the factory, process, and use retarding processing technique, filter the water and pack in PPE bottles to send to market.

What is the oil extraction percentage between the cold and hot processing?
Hot processing we get 60 to 62.5% of oil using copra. For virgin coconut we get 18 to 20%. Oil seeds expel more oil when heating, and the oil extraction is restricted when doing cold expulsion.

What is the market price?
Regular coconut oil is Rs. 300 to 320 and virgin coconut oil is Rs. 650 per litre.

For the processing technology, is it your own or got it from some institution or company?
It is our own technology which we started in 2000. We did a lot of R and D and got this technology. But now we have Coconut Development Board authorised companies for virgin oil processing and copra processing. Lots of projects are available. There are many machinery manufacturers in India approved by Coconut Development Board. We use our indigenous technology.

If we want to set up a processing unit, will you be able to provide consultation?
Yes, we can help you in setting up the projects, and we can give guidance.

Overall, how many products do you produce?
About 10 coconut products we come up with.

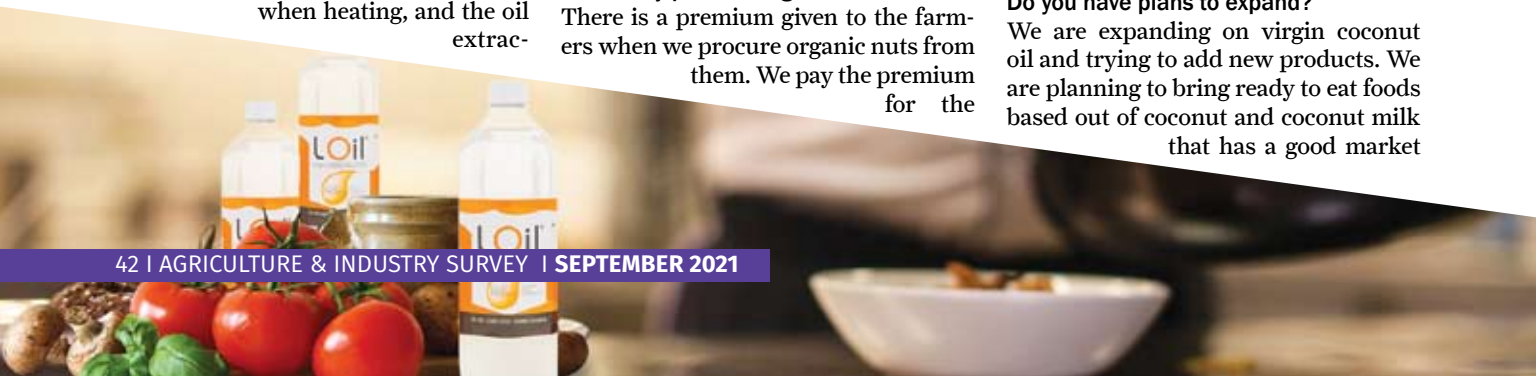
When you procure the coconuts, do you set any expectation from the farmer, like awareness, going for organic certification? Do you offer better rates for farmers when they practice organic methods?
There is a premium given to the farmers when we procure organic nuts from them. We pay the premium for the quality and certification from them as it is an authentication for quality. 20% premium is offered when compared to the market price. We look for certified products as we have our products certified, and we have to give the certificates to our customers. We procure both organic and non-organic products. We have regular virgin coconut oil and organic certified virgin coconut oil.

To set up the processing unit, what is the starting capacity, requirement of land, and coconuts needed for making a business a selling one?
We have machinery which can process 500 to even 5 lakhs nuts. Depending on the capacity we plan. If you plan to process around 500 litres of virgin coconut oil, you need around Rs. 1 crores investment. About 1500 nuts will be needed each day for this quantity. 2000 to 3000 sq ft land should be enough to run the unit comfortably with storage for processed products. Raw materials can be stored outside.

Any specific variety is there for processing the products?
Normally we choose the country variety available in abundance in our area, and nuts weighing 400 to 450 g are ideal for virgin coconut oil. Those below that weight can be used for processing copra. The trees in our nearby farms are about 20 to 25 years old. We procure only country variety. New projects are growing hybrid T and D varieties.

With increasing competition, how to stand up the challenges?
Every business has competition. We need to go with the market requirements and rates. It is a commodity, and it is not same every day. It keeps fluctuating. Green coconuts are being exported, and you have lots of challenges to meet. Everything depends on procurement, how you maintain the goodwill of customers. We get good products, but there is price fluctuation due to market fluctuation.

Do you have plans to expand?
We are expanding on virgin coconut oil and trying to add new products. We are planning to bring ready to eat foods based out of coconut and coconut milk that has a good market



domestically and internationally. We plan to expand with what is popular and accepted in domestic and international markets.

Which one of your products has best scope in international market?
In international market, virgin coconut oil has best scope apart from coconut flour and desiccated powder.

Where do you export?
We export to South-east Asian countries, USA, and UK.

Can we know your capacity? What about tender coconut water?
We produce virgin coconut oil 3 tons each day and planning to expand to 5 tons. Our copra crushing plant has a capacity of 25 tons per day. We can process about 5 to 6 thousand litres of tender coconut water every day. The shelf life is 10 months. We are adding some harmless preservative approved by the board to tender coconut water as it is very sensitive.

What percentage of market is being serviced overall?
Domestic market is a huge one. Virgin coconut oil is new and is becoming famous. All producers put together will not cover more than 10% of requirements. The burden is on the manufacturers to bring awareness level among people.

Is raw coconut exported without peeling husk? Is it exported within Asia only?
They de-husk green coconuts, semi dehusking, and they are packed in bags and exported. It goes to Europe also. Fresh coconut is available in many parts of Europe.

Do you have plans to start the industry in any other place?
We are expanding in our place because of facilities. If opportunity arises, we can think of it.

For 100 kg of virgin coconut oil, how many tons of coconut you require?
We need about 150 to 200 nuts for getting 100 kgs of virgin coconut oil. The price is Rs 600 a litre. There is lot of processing loss and wastage. The output is low, and so the cost is high.

CONTACT : Mr R. S Ganesh
Email - vaamaa@vaamaaoils.com
Phone- 9363127414

Dr. Shama Afroz Zaidi

Senior Manager (R and D)
Aries Agro Limited, Mumbai, Maharashtra

Dr. Shama Afroz Zaidi is the Senior Manager (R and D) of Aries Agro Limited, Mumbai, Maharashtra, and has been working on Plant Nutrition. The company's core area of expertise is chelated micronutrients, crop specific nutrition, and hydroponic nutrients. The company is into this sector for the past 50 years. In a recent interview, she discusses at length about the importance of micronutrients in crop production.

When one talks of plant nutrition, they are reminded only of NPK, but there are other nutrients which are very important for the growth of the plants along with NPK. Plant nutrients are the elements essential for the nourishment of plant health. There are basically 3 categories of the same – primary, secondary, and micro. The supply of the nutrients to the plants is done based on the amount the plant needs. If it is needed in larger amount, it is called primary nutrient, and if less than primary and secondary, and the plant needs in micro level, it is called micronutrients. It has to be understood that all the 3 types are very important for the plant growth.

Basically the plant needs 16 nutrients. The primary ones are NPK, secondary ones are calcium, magnesium, and sulphur, and micronutrients are copper, molybdenum, iron, zinc, manganese and boron. Chlorine is also considered as a micronutrient, but in India not much focus is given to this. The plants get carbon from the carbon di oxide, and hydrogen and oxygen from the air and water we provide. There are 16 essential nutrients. If that nutrient is not provided in nutritional program or schedule, the plant will not be able to complete its lifecycle. Criteria for essentiality of an element is based on the fact that :

1.A deficiency of an essential nutrient element makes it impossible for the plant to complete the vegetative or reproductive stage of its life cycle.

2. The deficiency of an element is very specific to the element in question and deficiency can be corrected /prevented only by supplying that particular element.

3. The element must directly be involved in the nutrition and metabolism of the plant and have a direct influence on plant apart from its possible effects in correcting some micro-biological or chemical conditions of the soil or other culture medium.

Both macronutrients and micronutrients are absolutely essential. There are a few beneficial nutrients which if given, is good for the plant life. Silicon, selenium, and sodium are the beneficial nutrients in plant growth and not absolutely essential. In general, Nitrogen is called the leaf maker and is essential in the vegetative state of growth and other stages. Phosphorus is the root maker as it helps in good development of the roots. Potassium is the flower maker. This composition is absolutely essential and required in large quantity for the plant life.

Micronutrients help the major elements to perform their functions. If they are not present, the major elements will not be able to perform their duties even if you supply them. The common roles are overall plant growth, photosynthesis, chlorophyl formation, cell wall development resistance to plant disease, nitrogen fixation, colour of the fruits, sugar transport, fruit textures, the turgidity of the plant, and osmotic balances.

Micronutrients, though needed in minute amounts play an important role in most enzymatic reactions as they act as co factors for enzymes. In their absence, the entire process will be affected and in turn impact the plant growth. People were unaware of the role and importance of micronutrients in plant growth, but now, as we are becoming more aware about plant nutrition, we know that to make the main nutrients work properly, micronutrients are absolutely essential, and people have started giving importance to it.

There are various factors affecting the micronutrient availability in the soil. Micronutrient availability in the soil is based on the physical (its texture and type) and chemical properties (pH , CEC, organic matter etc) of the soil, climate of the region.

Factors affecting micronutrient availability:

Nutrient uptake is always in the ionic form, either as a cation or anion. This makes it susceptible to other soil reactions like fixation and leaching. Complexing / chelating these ions thus ensures maximum availability to the plants without interference from the soil components

1. Soil : pH is very important parameter affecting nutrient availability. The pH scale ranges from 1-14 , but the optimum pH at which all forms of micronutrients that can be absorbed by the plant roots ranges between 5.5- 6.5. An increase or decrease in pH could affect the availability of nutrients due to their precipitation.

Micronutrient cations are most soluble and available under acid condition. In very acid soils there is a relative abundance of the ions of iron, manganese, zinc and copper. As the pH is raised, their solubility to plants decreases because ionic form of cations are changed to the hydroxides or oxides.

Organic Matter: The other factor that really affects micronutrient level in the soil is the organic matter. If the soil has no organic matter, there is nothing to basically hold the nutrient. As organic matter is decomposed, nutrients are converted into forms that plants can use directly. Organic molecules are produced that hold and protect a number of micronutrients, such as zinc and iron. Organic matter also harbours soil organisms. Some make mineral forms of phosphorus more soluble while others fix nitrogen, which converts it into forms that other organisms or plants may use. Organic matter improves soil structure, which results in increased water infiltration following rains and increased water-holding capacity of the soil; it also enhances root growth into more permeable soil. This results in better plant health and allows more movement of mobile nutrients (such as nitrates) to the root.

Nutrient Interactions: One of the causes of the current stagnating yield levels is the deficiency or imbalance of nutrients. Interaction among plant nutrients can yield antagonistic or synergistic outcomes that influence nutrient use efficiency.

Antagonistic Interactions are those in which the presence of one nutrient adversely affects the absorption of another nutrient. It is negative interaction. Excess presence of NH_4, Ca, Mg, Na induces deficiency of K whereas excess of K and / or Ca induces deficiency of Mg. Similarly excess of PO_4 can lead to hampered uptake of Fe, Mn, Zn, Cu.

Synergistic Interactions are those in which the presence of one nutrient helps the absorption of another nutrient. It is positive interaction. Excess of Nitrogen enhance uptake of all micronutrients whereas excess of Mg enhances uptake of Phosphorus

Nutrient Mobility: Ability of the nutrient to travel within the soil and within the plant. If within the plant, once the root uptakes the nutrient, it has to travel within the plant. Within the plant, Nitrogen, Phosphorus, Potassium and Magnesium are highly mobile whereas Sulfur, Copper, Iron, Manganese, Molybdenum and Zinc are Moderately mobile. Boron and Calcium are immobile in the plants.

In the soil, Nitrate Nitrogen, Sulfate Sulfur and Boron are very mobile and hence prone to leaching whereas Ammonium Nitrogen (Ammonium Nitrogen is temporarily immobile), Potassium, Calcium, Magnesium and Molybdenum are moderately mobile. Organic Nitrogen, Phosphorus, Copper, Iron, Manganese and Zinc are immobile. However, chelated forms of Copper, Iron, Manganese and Zinc are mobile and resistant to leaching. The other general reason for deficiency of micronutrients in plants could be attributed to the fact that farmers have limited access to information and awareness is restricted. They do not have adequate knowledge on the dose and time of application of fertilizers and the effect it will have on plants. So they tend to overuse primary fertilisers. Also, government has given a lot of subsidy on the use of urea, potash, and DAP. They do not realise the impact the overuse is going to have on the soil and

environment and continue to use because it is subsidised. Comparatively , micronutrient fertilizers are expensive and hence there is hesitation in their use. Imbalanced crop nutrition is worsened with overuse of the three major nutrients and underuse or ignoring of the micronutrients (zinc, iron, copper, Manganese, boron, molybdenum) and three secondary nutrients (sulphur, calcium and magnesium). Typically, in a balanced crop nutrition program, the usage of micronutrients should be 4% of the quantity used of the major fertilizers. In India, the estimate of this usage ratio is as low as 0.87%, showing a tremendous underuse of the micronutrients.

The kind of climatic zones and expanse India has, is not constant and keeps varying from state to state. Soil sampling of close to 2.5 lakh soil samples from across 18 states reveal that Zinc deficiency was observed in almost 1 of every 2 samples tested and Boron deficiency was observed in every third sample tested. Hence there is a need for companies to design customized formulations of micronutrients for each geography. In grain development and grain setting, higher amount of zinc and sulphur are very important for the oil seeds to develop oil content. So a balanced nutrition program is the need of the hour and nutrition should be customised. There cannot be one formula of micronutrients throughout the country because state to state the deficiency differs. There is FCO (Fertiliser Control Order) in India, which oversees the entire thing. They check how companies make the nutrients, quality control, quality assurance, and set rules to follow. They have released multi-micronutrient grades which are different for states. Each state has a different program. Depending on the level of nutrition present in the soil in that particular state, FCO gives order through which one can formulate the programs.

Sulphates to chelates – Micronutrients can be given in the sulphate or the chelate form. Sulphate forms were more widely used however considering the nutrient losses due to Crop removal, leaching erosion, run off and fixation , more amount of the sulphatic fertilizers needed to be added which had an impact on the soil fertility and the environment in the subsequent crop cycles.

Chelating the positive ion with a chelating agent ensured that the losses were minimised and the entire nutrient was available for absorption. Hence the quantity that was to be added was also reduced. Chelates are inert molecules with metallic ion in the centre, and it is surrounded by a complexing molecule to ensure that the metal is not freely available to react with the other elements of the soil and directly available to the roots of the plants. That is how the chelates came into being. It is complex or covered by other molecule to ensure that there is no free charge, and the entire metal ion is absorbed by the plant. These can be applied in the soil or as foliar spray that works well. It can be taken up through the leaves. Chelates can well be considered as Specially designed, chemically inert, water soluble complex forms of micronutrient fertilizers, reducing over application of major fertilizers, reduction in labour cost, reduction in the need of expensive pesticides and reduced residue levels. It also has improved keeping Quality and shelf life increasing plant yields by almost 35% and a cost benefit ratio of 6:1.

The entire range of micronutrients to be given to the plants are available in liquid or powder form. Multi-micronutrient mix has all micronutrients present in a particular ratio. Single micronutrient contains specific micronutrients. It could be in chelated or sulphate forms. You can use any of them depending on the cost and how much you want to give.

EDTA are common chelates used. Organic chelates are also available. It could be a mixture of individual nutrient or mixture. The need of the crop varies in each state. Crop specific multi micronutrient mixtures / grades are available. Majorsol is designed for wheat or paddy. Hortistar is for horticulture crops. Grapemin is for grapes, and Canemin is for sugarcane.

Micronutrient deficiency in plants have a rippling effect on human health. We all eat plants, and the vegetables, fruits, and cereals are the only source of micronutrients for humans. They play a huge role in human health. WHO says that Iron and zinc deficiency are among the 15 major leading risks to human lives, and fatality due to anaemia. Iron deficiency leads to low IQ, physical weakness, fatigue, and lifestyle disease. Zinc deficiency affects the immune system, reproductive psychology, dark vision adaptation, insulin storage and stunted growth in children. Copper insufficiency leads to infant malnutrition, magnesium in low birth weight of children and maternal mortality, calcium in osteoporosis and weak bones, manganese in cartilage disorders, and boron deficiency in affecting hormone metabolism. It is possible to increase the micronutrient availability levels as per human need through various programmes like fortification and supplementation. If you are able to give the plants the required micronutrients, they will also be available to humans

When horticultural crops are in small stage and till production stage, what

micronutrients would you suggest?
Every crop at each stage requires all the elements. More or less the micronutrient demand for the crop is same throughout. NPK keeps changing at all stages but is required at all stages. If you talk only about micronutrients, you have to give the mix in all stages. In the general life cycle of plants, we give 3 to 4 sprays of micronutrients, either as foliar spray or drip, and foliar spray will help in curing deficiency, irrespective or species or variety.

What is the toxic level?
It is different for any nutrient. It differs for every element.

According to your table, 72% zinc deficiency in soil is identified in Karnataka. Would that mean the food crop grown here will have zinc deficiency affecting the health of people?
It could be. When you do soil sampling, when you realise the deficiency, you do not leave it at that. You incorporate the deficiency in your nutrition program and decide how much nutrition you have to apply. We have not done anything about Karnataka soil. You have to decide the nutrition program based on the soil analysis.

Do you advise soil testing for micronutrients? If yes, can you suggest some private labs in Karnataka?
I think when you give for soil testing and indicate the entire nutrition range, they will do the testing for micronutrients also. I am not aware of the labs in Karnataka. But any kind of government agricultural university can help you. Labs that do testing for NPK will test for micronutrients also.

Considering micronutrients vs hormones to plants, how does it affect the plant growth? Today, farmers buy hormones in the market and apply just to increase the production. Will a perennial plant be affected later?

It is something like two separate groups, not replaced by one another. Micronutrients are needed for the overall growth of the plant at all stages and its development. For example, Boron is needed for pollen development and sugar transportation. But hormones are needed for specific action within the plant, and they are produced inside the plants. Micronutrients are not produced within the plant. Hormones are present within the plants, and if you give a little bit of hormone, it is going to aid in flower, root, and shoot development or fruit seeding. It is something like nutrient groups protein, carbohydrates etc. vs the hormone group, you cannot substitute one for the other. Micronutrients help in other things other than only reproduction or something the hormones do specifically. While hormones are part of regular physiology, micronutrients help and co-factor for enzymes to bring about lots of changes in plants.

CONTACT : Dr. Shama Afroz Zaidi
Sr. Manager (R&D)
Aries Agro Limited
Email : szaidi@ariesagro.com
Phone-9833066234

One third of food produced globally does not get consumed - so how can we reduce food waste?

The COVID pandemic has shown the fragility of our global food supply chains, with many supermarkets and restaurants in almost every country having experienced food shortages. Millions of people in the UK alone have experienced severe food insecurity during COVID-19, according to a recent report by the country's Foods Standards Agency. But food shortages were prevalent long before the pandemic.

At the same time, one-third of all food produced each year is squandered or spoiled before it can be consumed. Research also suggests that high-income countries waste as much food as sub-Saharan Africa produces.

This food waste then ends up in landfills to rot – which releases greenhouse gases. And when this is combined with the amount of energy it takes to produce, manufacture, transport and store this food, it contributes a staggering 3 billion tonnes of carbon dioxide to our planet. To put that in context, if food waste was a country, it would be the third-highest emitter of greenhouse gases in the world, after the US and China.

But the good news is there are numerous techniques, technologies and policies that together could help reduce global food waste at every point in the process of producing and consuming it.

WHY IS FOOD WASTED?

According to the Food and Agriculture Organisation for the United Nations, lack of infrastructure, limited knowledge on storage and food handling, combined with unfavourable climatic conditions, can lead to a lot of food spoilage and waste in low-income countries.

On the other hand, in high-income countries, aesthetic preferences and arbitrary sell-by dates mean food easily becomes waste. Cosmetic blemishes,

- **Millions of people in the UK alone have faced great difficulty with food insecurity during COVID-19; however this is not a new problem.**
- **While many people in the world are hungry, one third of all food produced on an annual basis does not get consumed.**
- **As wasted food rots in landfills, it releases vast amounts of greenhouse gases.**
- **Solutions to reduce food waste could involve more innovative farming technology, highlighting the potential money shoppers could save by not wasting food and converting food waste into renewable energy.**
- **It's also important for people to personally be responsible for not wasting food; for example, planning meals around sell-by dates and not avoiding fruit and veg in a supermarket because it is misshapen.**

produce that is too ripe, too big, too little or even the wrong shape can lead to perfectly good fruits and vegetables going to waste.

As the global population continues to increase, it places real pressure on world food production. Indeed, the industry will need to grow by at least two-thirds by 2050 to ensure adequate nutrition for everyone in the world.

Yet, despite the dire need to become more resourceful, food waste and loss is at an all-time high. Making it clear that unless prompt action is taken, food shortages will soon become a long-term reality.

WHAT CAN BE DONE?

The key to tackling this issue is to have a resilient and resourceful "farm-to-fork" approach to help reduce food waste and to ensure the future of food security. Here are some things that can help combat food waste:

AI DRONES AND PRECISION FARMING

Collaboration with food producers and more investment in technological applications and overall infrastructure at the earlier stages of the food supply chain can drastically improve food waste and loss in low-income countries. This is important because plant diseases and pests – along with poor harvesting techniques – can be a big factor in the high levels of food waste at this point in the food supply chain. Our research also indicates that artificial intelligence (AI) powered drones can help farmers become more resourceful and reduce the overuse of pesticides in food production. This is important because pesticides can adversely affect the food ecosystem. They pollute water, deplete soil fertility and contaminate turf – all of which can result in food loss and waste. This approach also enhances crop yield and reduces operational costs as well as improves the health of livestock. So it's also better for the environment.

TARGET SHOPPERS' WALLETS

A big part of the food waste problem is changing how we shop and view food and our mindset around what constitutes waste. But research shows the best way to tackle food waste among consumers is to highlight the potential money that can be saved as well as the "feel-good factor", or moral value, of doing a good thing for the environment.

A recent study with households in London, UK and Ontario, Canada, found that a two-week money-based intervention – called "reduce food waste, save money" – helped participants to throw away 30% less food. Participants were given local information on food waste and costs, along with tips on how to improve food planning, efficiently purchase, store, and prepare food – and how to use leftovers to create new meals. Similarly, new technology can help commercial kitchens reduce food waste by directly connecting behaviour changes to increased profits. For example, the Winnow software system calculates the costs of discarded food, correlating food waste to sales. This AI-powered system has allowed Ikea stores to reduce food waste by 50% in 2020, saving 1.2 million meals in the process.

CIRCULAR APPROACHES AND UPCYCLING

A more creative approach to food waste comes via a circular food system, which prevents food waste from being discarded. It can, for example, be converted into renewable energy. Waste can even be transformed into more food for humans (for example, tofu from leftover soybeans), as well as animal feed.

PERSONAL CHANGES

While the problem of food waste can feel quite out of your hands as a consumer, there are things you can do to help. Things like supporting businesses or restaurants that use waste foods in their products or meals. Planning your meals around sell-by dates. Not throwing out food if it's a bit wilted or bruised and only buying what you need – especially on special occasions where food can often go uneaten and to waste.

You can also show supermarkets that "wonky" fruit and veggies are just as good as the "normal" shaped produce by buying these over the perfect looking pears or potatoes. Ultimately, it's not going to be any single thing that solves food waste, but a collective approach can enable us to make the changes that need to happen.

Source : World Economic Forum

Question

Q&A

Answer

01 VERTICAL FARMING - GUIDANCE

aditya raj:Sir, I want to start Vertical Farming in NCR region. Can you help in advising the best place to get some training on this and also who can provide me a Project Report on this. Regards. Avinash

Answer 1 - garao56: W hat type of plants to be grown under vertical farming .

02 JACK FRUIT PROCESSING

rvs030791: *Want to start Jack fruit processing plant .I need a detail list of what all products can be developed and also it's export potential. I appreciate any consultancy which has very good knowledge with that field Please leave your mail id and contact detail .*

Answer 1 - maitys : Food processing has no limit on innovate; for one who is from food technology background!
Jackfruit is called as noble fruit in the west, having great potential for numerous value additions … ethnic or high end, but not feasible or profitable for home scale manufacturing.
Raw or green fruit based : vegan mock meat, pickled raw jackfruit, dehydrated raw jackfruit flour, jackfruit flour based snacks, baked goodies, pickles, canned raw jackfruit etc.
Ripe jackfruit : Frozen ripe jackfruit chunks, Jam, Jelly, Squash, Leather, Candy, Candied jackfruit, Pulp, Chocolate, Baked goodies, Wine, Vineger, Vegan Honey etc.
Jack fruit seed : low fat vegan milk, flour, baked goodies etc.
Tender green leaves : Fresh vegetables, Idly steaming container.
Jackfruit waste : peel and central axis of the fruit for extraction of pectin, cattle feed.

03 SUGGESTION -- MULTILAYER ORGANIC FARMING IN COASTAL AREA.

Answer 1 - TS : Hello All, The location of the land is near Bhubaneswar, Odisha within 30-35 km from the coast. The area of the land is ~10 acres, soil is very fertile with access to plenty of water resources; major markets are also very nearby. Current plan is to do multilayer organic farming. However, the major issue is at least once in every two years a severe cyclone hit the coast (wind speed reaching 200-250 km/hr) damaging all agricultural crops in the area. Is there any suggestion on types of agricultures or kind of crops that can be grown to provide good returns? Any suggestions on live fence trees that can act as solid wind breakers? Thanks,

Answer 2 - garao56: Generally wind breaks can be planted in and around the field ,

05 NEED SUGGESTIONS- PERMACULTURE?

kashwee : *Hello, Happy Sunday! Hope you are keeping safe through these pandemic times.This is my first post here, requesting help with ideas and suggestions, I don't know if I am posting it in the right topic section. we have a history of farming, traditionally paddy is grown. however want to experiment with permaculture kind of farming in a land of about 5000 sq ft to start with.The plots are separated by 30 ft road, a residential land in a village. Plan is to get returns all round the year, quarterly or twice a yr from interplantatation, and returns after 7-10 yrs for main plantation, to be noted, experimenting only. Please share your valuable suggestions.*
Main factors- Water isn't an issue, at any time of the year, hopefully we preserve it.
We need low maintenance kind of ideas, since we are on and off the village and an extended family member of ours could keep a watch on it.
Monkeys are frequent visitors
Red to black soil
finance isn't a concern at all
Main plantation : melia Dubia or sandal wood or bamboo
inter plantation; lemon, sweet lime, oranges what else can we opt considering monkeys
third plantation ideas please?
i would be very grateful to hear out all suggestions to take this project forward.

Answer 1 - rajurajan : Are you looking for commercial income? Or enjoyment?
If commercial income, ask what you can sell in small quantities in your area, and what the prices are.
Melia Dubia is a good idea. If you plant sandalwood, you would also have to factor in security -- otherwise, you will water it for 20 years and then find it gone one morning.
You could also look at some vines that can climb on the timber

ALOVERA CULTIVATION IN NELLORE DISTRICT IN ANDHRAPRADESH.

04

kalyann: *I am from Nellore district in Andhrapradesh. i going to start my alovera cultivation in my sand field of 2acre. may i know the place to sale my alovera leafs nearby nellore and onemore thing chennai is also my near place. I am middle of chennai and nellore. please help to start the cultivation.*

shivlu: How profitable is aloe vera farming?

Answer 1 - garao56: #2 Marketing is a problem for Aloevera. Please go for other fruit crop like guava, as your lands may be situated on the river side. How to utilize the juice either to supply to cosmetic companies, medical companies or own use for preparation of drinks or other purpose to taken into account while taking up cultivation

Answer 2 - drsantos : Hi, Plan any other crop which can you sell easily. Aloevera has good market earlier. But not now.

Answer 3 - shivlu: How profitable is aloe vera farming?

06 HOW TO GET THE POTENTIAL YIELD OF TURMERIC IN ORGANIC FARMING?

infiniteg: *How to get the potential yield of Turmeric in organic farming? Can we use any biostimulant for increasing yield?*

Answer 1 - garao56: First of all convert your land into Organic farm by proper cultural practices, it will take atleast 3 years for getting standard yield. Get organic certification for quoting higher price for the produce.

Answer 2 - yogikm: Strictly increase the aeration and micro nutrients content of soil.Use only organic manure from your own land.
Never uses chemical ,use drip irrgation for soil to retain moisture content.

Answer 3 - garao56: Abundant manuring (FYM - 10 tons per acre) and other organic growth stimulants and with timely irrigation yields can be maximized

trees ... e.g.. pepper or vanilla. You could look at some shade tolerant species like nutmeg or cocoa for the understorey.
Also medicinal herbs or spices like turmeric.
They all work together well.

Answer 2 - garao56: The following is a list of seven different functions that a Permaculture tries to include:

1. Food Staples, legumes, fruits, vegetables, and fats
2. Food for the soil Legumes and organic matter that provide nutrients to the soil
3. Climbers Important for making the most of vertical space
4. Supporters Plants that provide support to climbers
5. Miners or diggers Deep roots or tubers that open the soil and bring up nutrients from deep
6. Groundcovers Protects soil, provides shade, holds moisture, and suppresses weeds
7. Protectors Protection for others in the system (Repellents, attractors, live fencing, etc.)

Answer 3 - maitys: 1970s by David Holmren and Bill Mollison, two Australians conceptualized to utilized a piece of land in a holistic manner, integrating every animal and plant living on it, and combining that with social structures designed to foster long-lasting agriculture as well. A few principles of Permaculture as described by David Holmgren.

1.Observe and interact – by taking the time to engage with nature we can design solutions that suit our particular situation
2.Catch and store energy – by developing systems that collect resources when they are abundant, we can use them in times of need
3.Obtain a yield – ensure that you are getting truly useful rewards as part of the working you are doing
4.Apply self regulation and accept feedback – we need to discourage inappropriate activity to ensure that systems can continue to function well
5.Use and value renewable resources and services – make the best use of nature's abundance to reduce our consumptive behavior and dependence on non-renewable resources
6.Produce no waste – by valuing and making use of all the resources that are available to us, nothing goes to waste
7.Integrate rather than segregate – by putting the right things in the right place, relationships develop between those things and they work together to support each other
8.Use and value diversity – diversity reduces vulnerability to a variety of threats and takes advantage of the unique nature of the environment in which it resides

In brief –
Permaculture is lifestyle rather than just a homestead garden ,philosophy of sustainable and holistic lifestyle.
Hügelkultur another homestead garden concept introduced by Herrman Andrä in Germany in 1962 just by observation of the diversity and flourishing plants growing in a pile of woody debris-he chalked out the concept of "mound culture" !
Dr. Rudolf Steiner is considered as a father of Biodynamic farming- is a form of alternative agriculture that takes an ecological and ethical approach to farming, food, and gardening.
Masanabu Fukuoka a farmer and philosopher in Japan conceptualized No-till or Natural Farming .
There is no such "one size ,fits all " templates or plug-n-play when it comes to agriculture or farming – what works for one farmer, in one location , with a specific crop or multi plant species , doesn't typically translate to another region.
No two farms or farmers are alike.
Nature never creates 2 small grains of sand or plants as same that is what we call diversity ....farming is all about maintaining diversity in the creation !
We humans invented a concept of duplicate ,triplicate , xerox ....
Start with your own without taking any cue from anywhere....soil your own hands , nature will teach you one lesson at a time

07 LEMON GRASS CULTIVATION AND DISTILLERIES - SALE AND BUY BACK

roopanrk: *Hi there,We are looking to have a Lemon Grass Distillation Unit in Karnataka. We are looking for Information on*

1. How lemon grass can be grown and have netwrok of farmers
2.Who are the machinery providers for Distilling Unit?.
3.Where can we find the subsidy information on Lemon grass and such investment
4. How to contact AYUSH department on lemon grass oil buy back?.
5. Is there anyone around who have such distillation plant so that we can have a visit and see around?

Answer 1 - empero : Hello, I am manufacturers of essential oil distillation plant, capacity 1 ton (potstill) cost Rs.12 lac and yield% of oil from lemongrass 7%approx.I can provide a sound cultivation

Question

Q&A

Answer

network in Karnataka and project report,plant machinery and buyers in Karnataka.

Answer 2 - darshanprabhu : We are interested in taking your services, kindly contact.

Answer 3 - mhammedal : Hi ya, I am producers of essential oil distillation Tutuapp 9Apps Showbox plant, capability 1 ton (potstill) fee Rs.12 lac and yield% of oil from lemongrass 7 percent approx. I will provide a valid cultivation network in Karnataka and mission document, plant machinery and customers in Karnataka.

Q08 MULTIPURPOSE HERBAL EXTRACTION UNIT ON AGRICULTURAL LAND

abhijeetk: *Please note I need guidance on multipurpose herbal extraction unit. Processing capacity 75 kg herbal input per day (24 hrs. working) (25kg. per batch X 3 batches) Maharashtra state. thank you in advance*

Answer 1 - garao56 : Please send what type herbal plants are processed

Answer 2 - abhijeetk : Thank you for the response. we would like to work on Green Tea extract powder and Liquid, Neem, Tulsi, Boswellia, Ashwagandha. I am wondering if i can do a pilot plant in my agriculture land. The pilot plant would be like 25 kg per day output for Green tea as a design.

Answer 3 - garao56 : Extraction plant can be set up on the farm land itself. Please approach us for any project report for availing bank finance

Answer 4 - shri khadag : Bank Finance for Distillation unit in Assam

Answer 5 -garao56: Please approach us for project report

Q09 GUIDANCE FOR GINGER ESSENCE OIL EXTRACTION AND GINGER POWDER EXTRACTING UNIT

arpitajit: *There is a lot of production of ginger in our place, bit there is no processing unit here. So, i want to set up a production unit for the same. So, for that i have few questions:*

**Where can i get a PROJECT REPORT for that said project*
**Where can i get machinery*
**What are the tax benefit and subsidy from the govt.*
** What is the cost of total machinery*
Hope to get reply. Thank you Regards Arpit

Answer 1 - intertrade : Talk to me for details.

Answer 2 - garao56 : Please conact us for project report an guidance. G.Anandarao B.Sc (Ag)

Q10 INTERCROP FOR COCONUT TREES

nprabhs ; *Hi, We have a coconut farm with 1 year old and our area is dry during summer situated in westernghats belt. We are looking for intercrop like trees which also shouldnt harm our coconut trees. We thought of papaya trees, but white insect will harm our small coconut trees as well. So dropped papaya trees. Any other suggestions on this? Also we do like to try exotic fruit trees if possible. Please guide.*

Answer 1 - garao56 : Generally arecanut trees are planted in coconut . Cocoa can be planted. Other crops like pine apple , zinger, tapioka, banana, Yam etc can be planted in the coconut orchards . In AP Citrus plants (lime) also planted. G.Anandarao B.Sc(Ag)

Answer 2 - tomvia : You can plant banana for three years or any seasonal veggies or fruits as mentioned by Anandarao

Answer 3 - gounder28 : Hello nprabhs, Try Taiwan Pink Koya as udupayir between coconut trees. Yields in 6-8 months of plantation and produces through out the year. The buyer comes to your farm for harvest and pickup and they pay about Rs. 45-50/KG. The plant will yield to 6-7 years and NOT much maintenance require other than pruning often.

Answer 4 - shajathali : The first mistake you did was selection of crop. Coconut is a plant of high water area lie delta, river banks. You need to give 50 ltrs of water per day now and upto 80 ltrs in future. If you give less water, you wan grow only coconut trees not coconut.
Just remove it, it is only one year old. Its my personal experience. When you don't have water to coconut itself, how you are planning for intercrop.

Q11 OYSTER AND MILKY MUSHROOM FARMING

ravi41977 : *I want to start oyster and Milky mushroom farming. But core issue is about marketing of that. My location is distt Ghazipur. It's 90 km far from holy City Varanasi on Patna route. Iam looking for buyers of these mushrooms. Any suggestions/feedback/buying interest . Kindly contact me directly. Thanks*

Answer 1 - garao56: Generally mushrooms have to be marketed locally ie., in near by cities and markets

Answer 2 - pra9626 : Hi, We required huge quantity of milky mushroom in urgent.per day asking qty of 50kgs.

Answer 3 - rohitcj : Hi, We are cultivating Organic milky/oyster mushrooms in Chennai. Our mushrooms are made in extreme hygiene condition with no chemicals involved.

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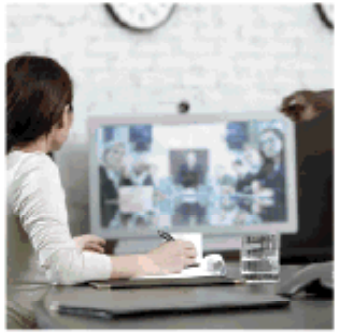

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