

Agriculture & Industry Survey

India's Leading Business Magazine for Agriculture



Ajit Ingle

CEO of Atuofert Agrimations Equipments OPC Pvt Ltd in Nashik, Maharashtra. His interests lie in irrigation, fertigation system, precise fertigation system, and nutrient management in agriculture crops. He explains the entire process of fertigation, how it is useful for farmers and the benefits.



Surajit

Vice President, Farmsio AgriTech, Chennai, Tamil Nadu, interested in product development, climate smart agriculture, traceability, and value chain development. He discusses at length about climate smart and sustainable agriculture practices in a recent interview.



Dr. Kavitha Sairam

CEO and Co-founder, FIB-SOL Life Technologies Chennai, Tamil Nadu explains about Eco-Friendly farming with less chemical input and using biotechnology as an intervention tool.



Aruneswar MGB

Founder - Grow Your Farms, Tiruchirapalli, Tamil Nadu talks about the scenario of farming in India and how farmers can be turned from mere producers to entrepreneurs.



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AGRITECH

Need for a scalable model to deepen the penetration

Almost after a year of passing the farm bill amendment laws, India is still divided on the bill. In the politics of states vs. center, the ultimate sufferer is that small and marginal farmer. While, technological advancements are facilitating farmers to eliminate the middlemen with ease and the amendments provided the window wherein they can sell the produce to anyone directly and even enter into the contract manufacturing; however, the reality of this happening seems to be farfetched yet.

One of the biggest fallouts of the pandemic is the digital transformation in every sector across the value chain. This is true of even the agriculture sector. Despite a pandemic-hit year, the volume of venture capital and private equity deals in the sector nearly doubled between 2018 and 2020. Against just 17 deals in 2018 worth USD 69 million, there were 32 deals worth USD 163 million in 2020 according to a data. While the investment in agritech is constantly on the rise, it is still just 1% of the total potential of the segment as reported by E&Y in their August 2020 report. Yet, the data further analysed, suggests that the penetration at the root level is just 9-10%. The sector which contributes 16% to the GDP and employs ~45% of the Indian workforce is far from leveraging the benefits of technological innovations offered by these start-ups.

Three major reasons for limited penetration are lack of awareness at the grass-root level, issues of land ownership that prevail in India, and limited channelized efforts leading to fragmented results for the diverse market.

Innovations are successful when they reach actual users. Some fantastic innovations have happened in the agriculture space and many new developments are still happening. Things like near to accurate weather predictions facilitating the seed sowing, crop management and yield improvement, water table mapping, rain harvesting, soil condition analysis, all are possible today using artificial intelligence (AI), machine learning (ML) tools, and other such technological advancements. IoT is the latest. However, there is a need to simplify and convert all these analysis into a usable language that farmers can utilize and put to application. Explaining the science behind the analysis is essential to enhance the acceptability of the farmers. And lastly, they need to be equipped and educated with tech-enabled devices.

Traceability, which is one of the best solutions to assure the quality of the products and increase the acceptability of the product in the international market, is possible today through various means including RFID tagging, blockchain-based tools, and distributed ledger techniques (DLT). Even, food factories that grow plants in greenhouses, under hydroponics and other media, completely controlled by IoT exist in this country. But they are far and few; for farmers to invest in these, there is no real incentive.

At OmniActive, we are working with 10,000+ farmers on a contract farming basis to grow the specific quality of marigold flowers to produce Lutein. We have set up a close community group of these farmers and designed an internal app called CropIn. Through this app, farmers receive updates on different weekly activities including GEO tagging, area mapping, crop management advisories, and so on. Good Agriculture Practices are explained by our Agriculture Field team and regular training is provided to the farmers. Cloud-based programs are configured within this application making even reporting easy for the farmers.

Read full article @ <https://bit.ly/3ai6jtf>

Source : TOI

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Five indigenous crops that are disappearing from Indian farm



Agro-biodiversity suffers significantly when crops disappear. Several indigenous crops are disappearing in India's south, central, east, and north-east regions. Some are being phased out of community usage due to monoculture cultivation's dominance, while others are being phased out due to hybrid varieties' popularity. Also to blame is the government's lack of support for indigenous types.

When particular crop types become extinct, so does the mini-ecosystem of insects, animals, birds, and plants that they support.

FIVE CROPS THAT ARE ON THE VERGE OF EXTINCTION

Karhani Rice

Location: Gaurela-Pendra-Marwahi district of Chhattisgarh

Reasons for the fall include the government's promotion of hybrid paddy, low yields, and the lack of a minimum support price (MSP).

The Gonds cultivated this black rice type, which has a blackish husk and pink rice. For many years, the adivasis have been nurturing it. It grows on upland plots and thrives even in places with little rainfall. It is extremely nutritious, but it is becoming increasingly uncommon as the government is pushing hybrid paddy types.

The yield is 1-1.5 quintals per acre, which is lower than paddy and also less expensive. When seeded in the monsoon, it matures in two months. Most farmers choose to plant crops that earn the government's minimum support price.

Moth Bean

Location: Arid and semi-arid areas, particularly in Karnataka's central and northern regions. Consumers moving to toor dal, shifting rainfall patterns, and a change from multi-cropping to mono-cropping are all contributing to the drop.

Moth bean, also known as matki dal, has been displaced in fields and on menus by toor or arhar dal, which has become a staple despite its higher cost. The nutritious bean has been overlooked by even agriculture institutions. The government has been pushing toor and moong to the disadvantage of matki. Because of BT cotton, maize, and sunflower, moth bean farming is declining in Karnataka. Moth beans were cooked in dals or sprouted and used in recipes like misal from Maharashtra.

Meher Dhan

Location: Dantewada district of Chhattisgarh.

Reasons for decrease include a lack of a market and merchants' rejection of this black rice type. Farmers attempted to revive this red rice with a black husk in 2016, as meher dhan is a dryland paddy type that requires less water.

Farmers attempted to sell it two years ago, but traders refused to buy it because it was black. It is an early cultivar that is available in October after being seeded in June-July. There is little incentive to expand a market if there isn't one. Farmers returned to paddy last year and increased their output and earnings.

Kangu, Gathia and Janaha

Location: Niyamgiri hills in Odisha, encompassing the districts of Rayagada

and Kalahandi

Lack of seeds, monoculture, and commercial farming are all factors contributing to the decrease.

Odisha's Dongria Kondhs have long grown a variety of indigenous crops such as janaha (sorghum), gathia (pearl millet), and kangu (foxtail millet). Many of the Dongria Kondh adivasis' favorite crops are becoming extinct. Pineapple, ginger, turmeric, and eucalyptus monoculture plantations for economic interests are driving these crops to extinction. These crops and tribals have a synergistic connection. When they lose a crop, they also lose a piece of their culture. The Dongria Kondhs, for example, rejoice when finger millet is harvested. The event is not held without the crop.

Khaw Pnah Saw

Location: The Jaintia Hills and Ri-Bhoi district in Meghalaya

Reasons for decrease include a preference for white, non-sticky rice and labor-intensive farming.

The Bhoi, Khasi, Jaintia, and Garo tribes of Meghalaya produce this red sticky rice, or *Oryza sativa glutinosa*, on a small scale, and it is currently only offered at weddings, funerals, and festivities. People nowadays choose softer, less sticky types for everyday meals. Growing this paddy is similarly labor demanding, and the market demand is low. To ensure the crop's survival, the community saves the seeds. Folk rice varieties are beneficial to the environment because they adapt well to local conditions, are high in micronutrients, and help to diversify agricultural yields.

Source : krishijagran.com



of India. India exported 12.84 million tonnes of rice in the first seven months of 2021, up 65% from a year ago, according to provisional data from the commerce ministry.

At least one million tonnes of rice would be shipped from the deepwater port in 2021, said M Muralidhar, chief operating officer of Kakinada Seaports Ltd.

SHIPPING SHAKEUP

Despite extra port capacity, Kakinada's loading rate still lags well behind Southeast Asian ports due to a lack of dedicated rice-handling infrastructure.

"Here in Kakinada, it takes nearly a month to load around 33,000 tonnes of rice from the time we drop the anchor. In Thailand it takes only 11 days for the

India may corner nearly half of global rice trade as exports soar to record

India could account for as much as 45% of global rice exports in 2021 as expanded port-handling capacity allows the world's second largest rice grower after China to ship record volumes to buyers across Africa and Asia.

The world's top exporter could ship as much as 22 million tonnes of rice this year, or more than the combined exports of the next three largest exporters Thailand, Vietnam and Pakistan, said Nitin Gupta, vice president of Olam India's rice business.

"Along with traditional buyers, this year China, Vietnam and Bangladesh are also making purchases from India," he said. India's exports in 2020 jumped 49% from the year before to a record 14.7 million tonnes, as shipments of non-basmati rice spiked 77% to a record 9.7 million tonnes. In 2021, non-basmati rice shipments could nearly double from a year ago to 18 million tonnes, while premium basmati rice exports are seen steady at 4 million tonnes, Gupta said.

The U.S. Department of Agriculture projects global rice exports of 48.5 million tonnes in the 2021-22 season.

LOGISTICAL BOTTLENECK

Indian rice has been consistently cheaper than supplies from Thailand and Vietnam since last March, while global demand for rice has scaled record highs.

However, limited infrastructure at Kakinada Anchorage, India's main rice port, led to persistent congestion and lengthy loading delays last year, prompting some buyers to switch suppliers.

India was offering a discount of more than \$100 per tonne over other exporters, but much of the discount was wiped out by higher demurrage charges tied to the delays, says exporter Brahmananda Gudimetla.

To ease the congestion, the southern state of Andhra Pradesh in February allowed the use of an adjoining deepwater port at Kakinada for rice shipments.

"Vessel waiting period has gone down after the deepwater port started handling rice. Demand that could have shifted to other countries remained with us," said B.V. Krishna Rao, president of the Rice Exporters Association



same quantity," says Fahim Shamsi, captain of a ship that was loading rice at Kakinada this month.

Strain on the Kakinada port has increased after the cost of shipping rice by container surged, forcing rice shippers to switch from containers to bulk vessels, said Gupta of Olam.

Kakinada can export an additional 2 million tonnes of rice if infrastructure was upgraded and the process mechanized, Rao said.

India's exports of non-basmati rice go mainly to African and Asian countries, while premium basmati rice goes to the Middle East, the United States and Britain.

By Rajendra Jadhav

Source : www.reuters.com

- **Rice exports seen at 22 mln T vs 14.7 mln T yr ago**
- **Deepwater port helps India to export more rice**
- **Exports cap global prices amid thin supplies from rivals**

Cinnamon cultivation introduced in Himachal

Commercial cinnamon cultivation can cut down India's import of cinnamon that amounts to a whopping ₹909 crores per annum

The CSIR's institute of Himalayan Bioresource Technology (IHBT) has introduced cinnamon cultivation in Himachal Pradesh on pilot basis.

If successful, it will be launched on a commercial scale, eventually cutting down India's import of cinnamon that amounts to a whopping ₹909 crores per annum. The cultivation was launched on Wednesday with state agriculture minister Virender Kanwar planting the first sapling in Una district.



Cinnamon, popularly known as dalchini, is an evergreen bushy tree whose bark is primarily used as a spice, said IHBT director Dr Sanjay Kumar. In addition to its culinary uses in Asian and European recipes, cinnamon has critical applications in medicine and in boosting immunity. The true cinnamon is derived from *Cinnamomum verum*.

Cinnamomum cassia is yet another species used in place of true cinnamon, but has high coumarin content which

is not good for health and the variety is banned in the United States of America, Ireland and the European Union.

True cinnamon or *Cinnamomum verum* is grown mainly in Sri Lanka, while minor producing countries include Seychelles, Madagascar, and India, said Kumar, adding that India imports 45,318 tonnes of cinnamon annually from China, Sri Lanka, Vietnam, Indonesia and Nepal.

No organised cultivation in India
Of the total imports, 37,166 tonnes of C cassia are imported from Vietnam, China and Indonesia. There is no organised cultivation and processing of cinnamon in the country.

"Realising the large import of cinnamon in the country and that the one imported in India is C cassia and not C verum, it was envisioned to extend its production after identifying the potential areas for cultivation," said Kumar. Our data suggested, he said, districts of Una, Biltaspur, Kangra, Hamirpur and Sirmour in Himachal Pradesh that have potential areas for cinnamon cultivation.

"Accordingly, we made efforts for introduction and processing of C verum in Himachal Pradesh. This project has been conceived by CSIR-IHBT and is being implemented in association with ICAR's Indian Institute of Spice Research, Calicut, Kerala and Department of Agriculture, Himachal Pradesh," said he. Earlier this year, the IHBT had successfully launched cultivation of monk fruit in Kullu of Himachal for the first time in India.

Can India mend its frayed cotton sector in time?

World Cotton Day is celebrated on October 7 following a resolution adopted by the General Assembly of the United Nation (UN) in 2019. Countries across the world celebrate the day by focusing on sustainable cotton production and recognising the contribution of 27 million smallholder cotton growers, cotton scientists, ginners, spinners, yarn manufacturers and businesses to the cotton-textile value chain and economic development.

In 2019, during the UN-organised global celebration of cotton and its stakeholders, the World Trade Organization (WTO) collaborated with multiple agencies such as Food and Agriculture Organization (FAO), United Nations Conference on Trade and Development (UNCTAD), International Trade Centre (ITC) and International Cotton Advisory Committee (ICAC) as part of the initiative by four African countries — Benin, Burkina Faso, Chad and Mali (known as the Cotton Four or C-4 countries) — that led to the institution of 'World Cotton Day'. Since then, the rise of African countries is reflected in the growing importance of cotton as a global commodity, and their quest to unshackle cotton production by adopting innovation and technologies.

Read full @ <https://bit.ly/3FqYxM4> Source : www.thehindubusinessline.com

Source : www.hindustantimes.com

Dairy.com

America's largest independent dairy supply chain technology provider, enters India with the acquisition of Mr.Milkman

America's leading dairy technology, services, and intelligence provider, Dairy.com, has made its first investment in India with the acquisition of Mr.Milkman, India's leading last-mile dairy supply chain SaaS platform. The company has acquired a 100% stake in Mr.Milkman to strengthen its integrated supply chain solution offerings for dairies worldwide.

The two companies will use their combined agribusiness technologies, development resources, and industry expertise to enable and innovate last-mile dairy supply chain solutions for markets in India and abroad.

India is the world's largest producer and consumer of milk and dairy products. Dairy is one of the most sizable agribusinesses in India, and the industry is valued at Rs.11,357 billion. Rs. 11, 357 billion- Additionally, there is huge growth potential with value-added products such as cheese, yogurt, probiotic drinks, flavored milk, ice cream, and other products in the segment. Dairy.com and Mr.Milkman are positioned to thrive in India as their solutions are ideally suited to successfully supporting the country's exponential rise of e-commerce and its increasing consumer demand for convenience, value, food safety, ease of payment, and product variety from the industry.

"Indian dairy sector and milk brands in India will need to employ technology at every level, right from procurement of milk to last delivery mile in order to grow and be successful. Milk brands in India and around the world operate on slim margins, and since milk prices

have a cap, the only way to grow profits is to become more efficient - which can only happen through the implementation of technology," said Mr.Milkman Chief Executive Officer and Co-founder Samarth Setia. "Our entire company is proud to be joining the talented Dairy.com team to accelerate the development of our last-mile delivery solution to meet the rising customer needs. We also look forward to providing some



Dairy.com

of the most advanced solutions Dairy.com has to offer to the milk brands in India."

Mr.Milkman's Dairy.com colleagues are equally enthusiastic about the future for their joint efforts, including Dairy.com Chief Executive Officer Scott Sexton. "We are very excited to invest in the continued success and incredible growth at Mr.Milkman," he said. "Our entire global team is committed to developing innovative solutions that empower supply chains to feed a growing world, and Mr.Milkman is a natural addition to our AgTech solution portfolio."

Already used by over 60+ Indian dairy brands, Mr.Milkman enables dairy food product companies to efficiently manage multiple aspects of dairy distribution, supply chain, customer subscriptions and delivery requests.

In addition to being cost-effective to implement, Mr.Milkman is a pre-built alternative to food delivery aggregator apps and includes payment processing capabilities.

In the future, the combined entity will look to optimize and digitize several areas of the agriculture supply chain in India, North America, and Europe. Dairy.com has extensive experience in multiple agribusiness areas and sectors, including first mile, plant operations, payments, quality control, risk management and transportation, and employs over 200 people worldwide.

About Dairy.com

Dairy.com is the leading provider of technology, services, and intelligence platforms to the dairy industry. Our mission is to enable the supply chain to feed a growing world. Every day, we help our clients deliver nutritious and delicious dairy products to consumers worldwide, connecting every stakeholder in the supply chain from farm to table.

About Mr.Milkman

Mr.Milkman is a state-of-the-art SaaS platform that empowers dairies and other industries to manage customer subscriptions and deliveries with unrivaled efficiency. From the farm all the way to the end consumer, the real-time analytics platform easily tracks all sales data, provides a complete performance overview, and enables informed business decisions.

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Source : Dairy, LLC (www.ky3.com)

Online Meetings



www.agricultureinformation.com

Upcoming events

OCTOBER 11, 2021

3:00 pm

Dr. R. Chitra on "Cultivation of tamarind trees" -- Assistant Professor (Hort.) at Tamil Nadu Agricultural University in Periyakulam, Tamilnadu.

05.00 PM

Mr. Sudhanshu Kumar on "Use of modern technology in banana" -- Owner of Orchards of Nayanagar in Samastipur, Bihar. He says when we do any agricultural work without the use of technology we always miss out on the real profits. By real profits I mean minimum input maximum profit. The use of technology works like a double edged sword.

OCTOBER 12, 2021

3.00 PM

Mr. Kishan Makani on "Opportunity and Government incentives for food industry" -- Co-Founder of Alliance Engineering Consultant in Gandhinagar, Gujarat.

05.00 PM

Ms. Kritika on "Mushroom cultivation as a commercial enterprise" -- Student of Lovely Professional University in New Delhi.

OCTOBER 18, 2021

3:00 pm

Mr. Thiruvikram CS on " Domestic market for cut flowers" -- Proprietor of Avanthika Flowers in Hosur, Tamilnadu. His interest is on opportunities and challenges in flowers.

05.00 PM

Mr. Rameshwar Shirsath on "Talk on innovative agarwood cultivation" -- Founder Chairman of Agarwood Agro , Hi-Tech Agro Associates and GreenX Solutions. His interest is on innovative farming and agarwood cultivation.

OCTOBER 19, 2021

3:00 pm

Mr. Jitender Choudhary on "Business opportunities in freshwater pearl culture" -- Proprietor of Biva Pearl Farm in Ghaziabad, Uttar Pradesh. To know more <https://bit.ly/3Bo6rDr>

OCTOBER 22, 2021

3:00 pm

Dr. Ambika H D on "The role of algae in agriculture" -- Entrepreneur from Germany.

05.00 PM

Mr. C. Thatchinamoorthy on "Climate change and climate smart agriculture practices" -- A Ph.D. Research Scholar and Faculty of Agriculture at Annamalai University in Chidambaram, Tamilnadu

OCTOBER 25, 2021

3:00 pm

Dr. K. Prasad on "Postharvest technology of horticultural crops" -- Assistant Professor cum Scientist at Dr. Rajendra Prasad Central Agricultural University in Pusa, Muzaffarpur.

OCTOBER 26, 2021

3:00 pm

Ms. Keerthi Tanneeru on "My experience in setting-up Farmer Producer Organisation(FPO) " -- Director of Operations at Future AgriNest Farming Solutions Private Limited

OCTOBER 27, 2021

5:00 pm

Dr. Devesh Thakur on "Desired traits needed to become successful agro entrepreneur" -- Assistant Professor at CSKHPKV Palampur in Himachal Pradesh.

OCTOBER 28, 2021

3:00 pm

Mr. Gade Ramana Reddy on "Services of Agri-Clinics to the farmers" -- Agri-Clinics are envisioned to provide expert advice, support and services to the farmers ..

OCTOBER 29, 2021

3.00 PM

Ms. Meghna Singh on "Different methods of managing farm waste" -- Ms. Meghna Singh is Senior Assistant Professor at IMS Engineering College in Ghaziabad, Uttar Pradesh.

05.00 PM

Ms. Jeevitha on "Herbal Soap manufacturing and marketing" -- Proprietor of Newlookherbs in Pondicherry. Her interest is on herbal soaps.

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

Online Meetings



www.agricultureinformation.com

Recently Completed Meetings

Mr. Jitendrasingh Rao on "Everything about shade net agriculture"

Mr. Jitendrasingh Rao is the Concept Promoter at Aatreyas Agro Organic Pvt. Ltd. in Gandhinagar, Gujarat. To know more view <https://bit.ly/3EBNPBS>

Mr. Samiuddin S.Kazi on "Crop nutrition management for fruit pruning in grape"

Mr. Samiuddin S.Kazi is the General Manager & Head Agronomy of Fertis India Pvt. Ltd. in Hyderabad, Telangana. His interests are crop nutrition ,crop management , farm mechanization, horticultural operations.

Mr. Arvind V on "Amla softwood grafting"

Mr. Arvind V is the Proprietor of AVR Nursery in Salem, Tamilnadu.

Dr. Priya P on "Improved agronomic practices in Safflower"

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.

Dr. Rajeshnallaiah on "Farming on terrace"

Dr. Rajeshnallaiah is the Director & CEO at RNR Agri Developers in Madurai, Tamilnadu. He is into providing terrace garden training. To know more view <https://bit.ly/3vvPKCc>

Mr. Ameya Padma & Ms. Jyoti Padma on "Indian breed cow farming & its uplifting (with business model)"

Mr. Ameya Padma & Ms. Jyoti Padma are the Proprietors of Sree Balkrishna Dairy Farm (BKD MILK) in Thane, Maharashtra. To know more view <https://bit.ly/2VAM9Hg>

Mr. Yogesh Thite on "What are the modern and commercial aspects in dairy farming?"

Mr. Yogesh Thite is the CEO of Meticulous Business Plans in Pune, Maharashtra. To know more view <https://bit.ly/3xOKBb1>

Ms. Saroj Patel on "Satavari (Queen of herbs) medicinal properties and its commercial benefits for farmers"

Ms. Saroj Patel is the Managing Director of Amritanjali Ayurved (Op) Pvt. Ltd. in Udaipur, Rajasthan. To know more view <https://bit.ly/3800WRK>

Mr. Nitin Singhal on "Soil borne disease management"

Mr. Nintin Singhal is the Director of Huntin Organics Pvt. Ltd., in Faridabad, Haryana. To know more view <https://bit.ly/3y1nlke>

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

Dr. Sivalingam Elayabalan is the Technical Director / Agriculture Scientist at Sankar Bio-Tech in Hosur, Tamilnadu. His interests are on Agricultural Biotechnology (Plant cell, Tissue culture and Molecular Plant Virology); AI technology for banana pest and disease detection; Mass production of bioinoculants and plant cell line development; Promotion of organic banana cultivation; Import and Export of planting materials ,fruits .

Dr. Madhumita Dash on "AI and IoT in solving major agricultural challenges of today"

Dr. Madhumita Dash is the Principal AI Research Engineer of Fasal / Wolkus Technology Solutions Limited in Bengaluru, Karnataka. To know more view <https://bit.ly/3kXSgy3>

Dr. Sheshagiri Gubbi on "Soil health as a means to make agriculture a profitable business"

Dr. Sheshagiri Gubbi is the Co-founder of Sirisamashti Krushi Pvt Ltd., Koppal, Karnataka. To know more view <https://bit.ly/3zNd69v>

Mr. Shaji GR on "Scope of Jack fruit value added products after pandemic"

Mr. Shaji GR is the Director of Prapancha Greenmart Chakkamukku in Kollam, Kerala. To know more view <https://bit.ly/3BA7SP1>

Mr. Chinmay Rajwade on " Whole process of setting-up a hydroponics farming business"

Mr. Chinmay Rajwade is the Head of Projects at Hyperfarms Private Limited in Bengaluru, Karnataka. To know more view <https://bit.ly/3h6GUqz>

Mr. R S Venkatraman on "Tamarind : Demand and uses - Domestic and export markets"

Mr. R S Venkatraman is the Proprietor of Natura Food Products in Bengaluru, Karnataka. To know more view <https://bit.ly/3t08uu8>

Mr. R. Kantharaj and Ms. Sunitha H R on "How to get organic certification for the farm produce and processing units"

Mr. R. Kantharaj is the CEO and Ms. Sunitha H R is the GM of Grameena Unnathi in Bengaluru, Karnataka.

Mr. Anant Harihar Bhakare on "New technology in horticultural crops"

Mr. Anant Harihar Bhakare is the Director of Shree Krushi Hub in Nashik, Maharashtra. His interest are New technology in horticultural crops; High yielding and early to start; High density plants;...

Mr. Ramakoti K.Venkataramana on “Low budget natural farming”

Mr. Ramakoti K.Venkataramana from Ongole, Prakasam Dist in AndhraPradesh is a retired Scientist from CSIR-Indian Institute of Chemical Technology, Dept.of Science and Technology, Hyderabad, Telagana.

Ms. Archana Agrawal on “Aloevera gel extraction and marketing”

Ms. Archana Agrawal is the Proprietor of CitSpray Aroma Sciences MANGALAM AGRO in Nagpur, Maharashtra. Her interest is on uses of essential oils which are produced from aromatic farming like eucalyptus oil lemongrass oil tulsi basil oil lavender oil etc. To know more view <https://bit.ly/2WsXXvH>

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

Mr. Sumeet Deshmukh on “Use of solar fencing in farming”

Mr. Sumeet Deshmukh is the CTO of Krushi Store Enterprises in Amravati, Maharashtra. He says solar fencing is a modern technique to fence a farm in low budget but using high-tech components at the same time. A lot of farmers are moving towards it because of higher reliability, low cost and cost to benefit ratio.

Mr. Anjil Anvin Jain on “Precision farm machines which allow farmers to work in a smart and fast way”

Mr. Anjil Anvin Jain is the Founder of Vinglob Greentech (I) Private Limited in Ahmedabad, Gujarat. They are into manufacturing precision farm machine which allow farmers to work in smart and fast way. To know more view <https://bit.ly/3jgNVpW>

Dr. Yugraj Yadava on “Value chain in marine fisheries in India”

Dr. Yugraj Yadava is the Director of Bay of Bengal Programme Inter-Governmental Organisation in Chennai, Tamilnadu. To know more view <https://bit.ly/3sLLEWU>

Dr. Prasanna Kolar on “Growth performance of oilseeds among leading states in India”

Dr. Prasanna Kolar from Bengaluru, Karnataka has done his PhD(Agricultural Economics) at Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur. He says, his study includes soybean, groundnut and rapeseed-mustard crops as major edible oilseeds among leading states of India. Data on area, production and productivity for these oilseeds were collected for the past 23 years. Statistical tools like compound growth rate and cuddy della valle index were used for the analysis of the data.

Mr. Devvrat Sharma on “How to make beekeeping a successful venture ?”

Mr. Devvrat Sharma is the Proprietor of Hi-tech Natural Products (I) Ltd. in Dilshad Garden, Delhi. His interest is on beekeeping.

Mr. M.G.Sathyanarayana on “Commercial cultivation of different varieties of tissue cultured bamboo (Dandrocalthas Family) plants”

Mr. M.G.Sathyanarayana is the Convener of Farmers Organisation at Bharathiya Kisan Sangha in Puttur, Dakshina Kannada District, Karnataka. Mr. M.G.Sathyanarayana says when greenery coverage of earth decreases climate changes. This leads health disorder in all living beings including human. To cover more greenery, bamboo (Dendrocalthas Family) plants are easily, quickly, economically growing grass.

Dr. Manoharan Krishna on “Global opportunities for scientific and exportable organic agriculture”

Dr. Manoharan Krishna is an International Organic Agriculture Scientist Agripreneur and Businessman Vellore Tamil Nadu. He is also the Founder & Chairman of Naturaa Agrorganica in Vellore, Tamilnadu. Dr. Manoharan Krishna has done various International Research Projects for NASA, ISRO, WHO, BASF, Merck, Bayer, UNESCO, SPIC & others and now is an International Agriculture Consultant .

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>

Mr. Sai Krishna on “How breeding is done for oil quality in mustard”

Mr. Sai Krishna is Jr. Breeder at Mangal Murthi Seeds at East Godavari District in Andhra Pradesh. Mustard oil is intensely concentrated with anti-nutritional components like erucic acid and glucosinolates that makes the oil inedible for human consumption.

Mr. Chandrashekhar on “Important organic agriculture inputs”

Mr. Chandrashekhar is the Manager at Karyon Organic Pvt. Ltd., in Ranebennur, Karnataka. His interest is on organic farming.

Mr. M. Lakshmi Narayanan on “Value addition in banana”

Mr. M. Lakshmi Narayanan is an Agripreneur and studying M.Sc. (Veg-etable Science) at Lovely Professional University in Punjab. His interest is on value addition in various horticultural, agronomic crops for getting more market and credit benefits.

Mr. Sachin Bakshi on “How to do agriculture as business”

Mr. Sachin Bakshi is the Proprietor of Roots Agro in Vadodara, Gujarat. Mr. Sachin Bakshi says often people do not take agriculture seriously, while agriculture and related industries contribute a large percentage in our GDP.

Online meetings are available only for Premium Members



Aruneswar MGB

Founder - Grow Your Farms
Tiruchirapalli, Tamil Nadu



Mr Aruneswar MGB from Tamil Nadu is a B.Sc (Hons) Agriculture graduate from Lovely Professional University. He is the Founder of Grow Your Farms an AgriTech Startup, based in Tiruchirapalli, Tamil Nadu and an Incubatee of MANAGE CIA, Hyderabad. Grow Your Farms is a new age AgriTech Startup Providing Research based scientific advisory to farmers, FPOs, FPC, Farmer Cooperatives, etc, along with integrating both backward and forward linkages in order to bring down the production costs and bring up more return on investment in synergy with both farm economy and environment. He is of the opinion that sustainability and development are the need of the decade to ensure better and safe future for the agriculture sector and the farmers. Sustainable agriculture is an holistic approach to solve the major existing problems in agriculture and allied sectors. He talks about the scenario of farming in India and how farmers can be turned from mere producers to entrepreneurs.

Conventional farming practices make soil infertile, and unfortunately our farmers are habituated to conventional farming. As far as agriculture is concerned, soil gets the first priority. Over a period of time, it has been found that conventional farming is not good for soil and made agriculture as contributor for almost 18% of greenhouse gas emission. Thus the sector while being more vulnerable to climate change threats it is also an one of largest contributor for climate change. When we (his AgriTech Startup team) met farmers, we found that they lack knowledge and skills on good and better agricultural practices which restricts the scale of business and the opportunity of conserving soil biodiversity. There is a widespread lack of extensional services especially to small and marginal farmers. They neither have access to financial support from formal institutions like banks nor have sufficient backup with them. So they are forced to borrow from moneylenders, pay huge interest, and get into debt burden. It requires lot of effort and external support to change this scenario.

About 86% of the farming community comprises of small and marginal farmers. They lack investments and so cannot scale further. Consumers also loosed their trust on conventionally grown produce due to its quality and contamination. Thus, there is huge demand for healthy produce. But the farmers are forced to accept whatever is available in the fertiliser shop or neighbouring farmers. The seeding materials they use are more prone to pest and disease.

There is need to ensure access to quality agriculture inputs to support farmers in adapting to conservation agriculture. Farmers don't have access to market as well. They are forced to sell the produce in the field itself, though the government is taking some steps to curb it. The research institutions across the country somehow address the problems of small and marginal farmers. But it is only the medium and big farmers who are capable of getting easy access to these institutions and get benefited.

Small and Marginal farmers are unable to overcome the risk and vulnerability due to their lack of capacity to address them, to deal with them. During certain periods, the prices



of the agriculture produce either soars up or drops terribly. This is mainly due to the absence of market linked production and extension and their inability to overcome natural calamities such as heavy rainfall, cyclone, or drought. They are unable to overcome such risks, and so they are becoming highly susceptible to it. In Grow Your Farms we help the farmers in market linkage with our market intelligence system and efficient supply chain.

The status of small and marginal farmers are very simple to describe – lack of investment, low level of technology use, lower productivity, lesser output, and less income. These factors have converted the farmers into nonviable producers over a period of time.

We(His AgriTech Startup) in India are focusing on bringing sustainability, productivity & profitability in agriculture by turning farmers from mere producers to successful entrepreneurs. An entrepreneur is one who knows how to get things done, what to do, ready to take risks, and capable of overcoming risks by knowing market needs. Farmer is also an business man we need to remember that, so we need to bring entrepreneur type of upgrade among farming community in order to bring any considerable growth and development. But majority of farmers do not aware of changing market demand or consumer needs. They become vulnerable as they do not know what to do, what to apply, and how to overcome the risks. Agricultural Extension and Advisory Services can act as catalyst to transform the Indian Agriculture by turning farmers from mere producers to entrepreneurs.

When making small holdings economically viable and environmentally sustainable there is a huge challenge in it, and there exists a huge opportunity for agriculture extension functionaries, agronomists and entrepreneurs to take this challenge as mission and achieve better growth and development. So our scientists, academicians, and institutions are working to combat the existing problems of the farmers. Many innovations have come, and it is continuing. But situations have not improved much. Our agriculture GDP contribution is still below 18%, and 22

to 30% of population is under poverty. Productivity is nowhere compared to developed and neighbouring developing countries. The problem is the poverty and inability of the farmers to deal with the increasing challenges.

Studies suggest that the growth in agriculture rejuvenation helps in decline of poverty faster. Our measurement of poverty is only economic conditions – average income, and consumption. 2/3rd of the small and marginal farmers are poor on the basis of multi dimensional poverty. Why Poverty exists? Poverty doesn't exist because there aren't enough resources and wealth in the world. Poverty exists because of the inability of the poor to command over the resources that they need not to be poor, not to go hungry, not to have enough income. These small and marginal farmers are poor because of the absence of livelihood capitals.

To eradicate poverty and scale agriculture as a successful sector, it is necessary to work more on farm assets, capitals, labours, and transfers. It has been recognised that financial capital alone is not enough to elevate the poor from poverty. People's capacity to address poverty is linked to capital and labour. We

CHALLENGES IN CONVERTING THE FARMERS FROM BEING PRODUCERS TO SUCCESSFUL ENTREPRENEURS.

- **Optimize benefits through effective and efficient marketing of surplus generated through increased production.**
- **Changing mindset of farmers on organic or conservation agriculture.** They think it gives less yield and so uneconomical. It is not so. There are many farmers who practice organic cultivation and earn more than conventional farmers. Studies show that over a period of time, organic agriculture or conservation agriculture increases the yield of land and productivity of soil.
- **Big challenge is to integrate small land holders with agriculture market.** The lack of enough infrastructure and knowledge are the main barriers.

can clearly see and feel poverty when we visit marginal farmers and farm labourers, this is what needs to be changed and addressed. There are cash transfer and social assistance programs in our country, such as Kisan Credit Card, and Mahatma Gandhi National Rural Employment Guarantee Scheme, pension for elderly and vulnerable people, and midday meal scheme. This shows our policies in dealing with poverty is still on economic basis. But we need to address all the 5 types of capitals which I have listed to eradicate poverty. Now the country is seeing growth of Startup Ecosystem with the massive support by government institutions and favourable policies, the startups have the potential to come up with better solutions to address these problems. FPOs are good concept towards ensuring livelihood capitals.

If we ensure livelihood capitals, small and marginal farmers who are in poverty can be upgraded to lead a very good life. We need better mechanism to address poverty and scale their growth and development. We have to find out different means to solve these problems and challenges in a better way. When we think of how we can turn a farmer from being a producer to successful entrepreneur, agricultural extension can play a key role.

Agricultural Extension and Advisory Services are central to transforming the smallholder farmers from unproductive producers to successful entrepreneurs. The extension and advisories are needed because small holder farmers suffer from food insecurity, they are vulner-



Agri Startup

able to global and local challenges, have inability to overcome risks and vulnerability, and there is lack of adaption of agriculture innovations due to lack of funds. There is dearth of information and advisories. Agricultural Extension and Advisory Services have the potential to address these issues by integrating different stakeholders. We (his team) noticed that farmers are in need of advice and ready to adapt to good agriculture practices (GAPs), but they face the lack of Agricultural Extension and Advisory Services at their doorstep which otherwise would help to increase productivity of farm and their adaption to sustainable agricultural practices, organic or conservation agriculture depending on the farm.

There are a few points to consider on how extension and advisory services can help in overall development in agriculture.

The Agricultural Extension and Advisory Services induce innovations and make the farmer adapt to ever increasing local and global challenges. New technologies and concepts of conservation agriculture are introduced to farmers thereby reforming them. As strengthening the human capital the agricultural extension can build the capacities of the farmers by training them to experiment and adapt GAPs and right technologies with their field. They can help address their existing prob-



lems and scale the business. The agricultural extension and advisory services help them to think and act beyond agriculture. It is required in agriculture allied activities too. Agriculture cannot flourish all alone. If a farmer wants to practice organic cultivation, he needs to have at least a few cows and poultry to make the farm sustainable and independent of high cost external inputs, thereby reducing the production cost. The extension services also induce entrepreneurship among farmers and rural youths through market linked extension. They can identify innovative and progressive farmers and help them further improve their adaption of better technology and techniques, and make their success a model that helps to encourage other farmers. They will be brought into group and good agriculture practices can be introduced and link them to potential markets.

The Agricultural Extension and Advisory Services help in promoting the use of information and communication technology (ICT) which have a great scope and can reform agriculture of India. With urban consumers expecting transparency and trust of the produce

is increasing, Block chain can enable the consumer to know where the produce is coming from, thus builds trust among the farmers and consumers. So ICT can be promising technology as seen in the last few years with so many start-ups coming up. But as of now it is possible only for a big farmer. Agricultural Extension and Advisory Services helps the farmers and farming systems being climate smart. Innovations are needed to mitigate climate change impacts in farming.

Why to shift from conventional to conservation agriculture?

Shift to conservation agriculture is not just to address the climate change or global warming but also to address poverty and scale agriculture as a successful enterprise. The consequences of conventional agriculture are:

It leads to soil erosion, makes soil infertile, and pollutes the biodiversity. The whole eco system is destroyed, as the soil losses its natural production capacity and the production cost goes up. So we need to adapt to the sustainable conservation agriculture to change this unsustainable system. Farmers are showing inclination towards the change. The practices of conservation agriculture include no tillage or reduced tillage, crop rotation, cover crops, integrated disease and pest management, better use of technology, and innovation. Conservation agriculture can be a way forward in mitigating the existing problems of agriculture as a sector in the country. Conservation agriculture protects the soil, farm eco system, and it is sustainable. It is sustainable because it ensures overall improvement in a continuous cycle of process. Whereas conventional practices shows reverse trend and is not sustainable. By no means there will be low output with conservation agriculture.

Over a period of time, it tends to increase the productivity and yield. It reduces the production cost by half over the years. There are a few issues

FIVE LIVELIHOOD CAPITALS:

- **Financial:** Financial capital deals with the access to finance, credit or from formal institutions or government, such as banks or cooperative societies which would help to scale the business and improve the capacity to generate income for the farmers.
- **Human:** Human capital deals with educating the farmers to help them make use of the resources better. Those who are better educated, trained and skilled are better able to make use of other capitals including finance.
- **Social:** Social capital deals with grouping the people to share values to address common goals. Government, farmers producer organisation, self-help groups, and farmer cooperatives should provide techniques to eradicate poverty.
- **Physical:** Physical capital deals with infrastructure like building warehouses, transport, and other facilities that require lot of private investment, interventions of entrepreneurs, and government support.
- **Natural:** Natural capital deals with different features of the environment that would impact the nature of farming. For example Indo-Gangetic Plains are more prone to flood which causes problems to that region farmers.



in the initial phase, such as the conversion period which can differ from 1 to 3 years, during which there farmer need little investment and inputs. For this also government has a few schemes to benefit and encourage the farmers. The scheme called Paramparagat Krishi Vikas Yojna (PKVY) helps the farmers in getting the organic certification and during the conversion period the scheme gives financial assistance and training to the farmers. They also help in marketing their organic produce across the globe.

Conservation Agriculture also can help India to achieve Sustainable Development Goals (SDGs). We have plans about achieving 17 Sustainable Development Goals through agriculture. When we talk about turning farmer to a successful entrepreneur it helps to address Sustainable Development as well. Because the efforts to achieve one goal will help us to achieve another goal. For example in the goal no.1 the efforts to reduce poverty is also helps to achieve goal no. 8 which is decent work and economic growth and goal 10 which is reducing inequalities. It also achieves zero hunger the goal no.2. Thus we can achieve sustainable development goals by achieving various heights in agriculture.

We have a huge investment potential in agriculture sector and it can contribute to above 25% of GDP. So the reversal of Climate change mitigation, poverty eradication, food and nutrition security, reducing global warming lie in the hands of farmers. Dramatic changes are happening across the globe due to globalisation, liberalisation, and rapid urbanisation. Farmers want to inten-



sify existing patterns of production and diversify the farm enterprises. The tech savvy farmers are more ready to accept and adapt to the changes. We have to use this opportunity to scale the business to raise the living standards of the poor and vulnerable farmers. Agricultural extension and advisory services, and entrepreneurs can play a pivotal role in achieving this mission. We just need to identify the issues according to local environment, needs of farmers, their intention in farming, and suggest changes accordingly.

Conventional agriculture is not satisfying when compared to conservation agriculture, why it is not satisfying for the farmers?

The main defect in conventional practices is over tilling of the land and improper application of chemicals. It is unsustainable. Soil is degraded and loses its fertility. It is the top layer of the soil which sets the basis for the humus. The health of the soil lies in the humus, where microbes present in the soil. In conventional farming the microbes get eroded and run off through water with soil when there is heavy rains. One cm of soil takes one thousand years to get rejuvenated. This makes conventional agriculture highly unsustainable.

When you say climate smart agriculture, conservation agriculture, and zero budget agriculture, it means a lot of technology. Can you use the smart technology in conservation agriculture?

Right now in India, modern technology such as technology enabled precision farming is not affordable to small and marginal farmers, but it is slowly improving. A few years ago, a start-up started offering services to big farmers who had 25 acres of land, and now has come down to medium farmers that they can able to afford. So we hope this will extend to small and marginal farmers in near future.

Our AgriTech Startup Grow Your Farms is also working in mission to make technological adoption at grassroot levels even in the small and marginal farmers can afford. In conservation agriculture, big machineries need not to be used. It is a soil based approach of farming. It allows usage of chemicals in nutrient and pest management but in an

integrated manner. We need to use the mineral fertilisers and synthetic pesticides only if needed or when we are unable to control. Sustainable Agriculture doesn't necessary need to have lot of modern technological devices in it, it is just about being sustainable in synergy with both economy and environment.

Thus, conservation agriculture is adaptable even by small holder farmers. Farmer can further bear the benefits of conservation agriculture by growing cover crops between one season to another where there is a gap of 2 to 3 months. When the farmer adapts to cover crop, it creates a microclimatic conditions which helps to conserve the soil microorganisms. The conservation agriculture reduces the production cost, by almost more than half when compared to conventional agriculture. So it can be game changer for a small and marginal farmer. In Grow Your Farms we are bringing sustainable agriculture to the fields of farmers with the help of technology and extension mechanism.

Agriculture being the most vulnerable sector to climate change impacts, the sector can take this as challenge and convert this into opportunity by adapting to sustainable agriculture practices by which it can solve the various other long lasting problems along with mitigating climate change.

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Multi Cropping

Ms. Sheelu Francis

President of Women's Collective
Chennai, Tamil Nadu.



Working towards achieving recognition of women farmers, food security at household level, ecological farming, traditional seed preservation, and multi-cropping. She talks at length about the various measures her organisation is taking towards achieving collective farming, with focus on women farmers.

Women's Collective is involved in multi cropping since the last 10 years. There is a lot of problem in agriculture in Tamil Nadu. Here after the advent of green revolution, there is a total change in the agriculture pattern. Men have shifted to cash crop cultivation, and this has led to food culture change and increased malnutrition and anaemia among children and pregnant women. Climate change also has caught up and creating a lot of problem for agriculture. Production has come down while input cost has gone up because of which able-bodied men have shifted to cities in search of jobs. Women are left with no option except looking after family and agriculture in villages to fend for themselves. We started with women in the village level. Nearly 10% of the women had ownership of land. We started working with agriculture labourers and started multi-crop farming.

The main reason for this is that one crop will help the other crops by providing nitrogen, required support and shade. We began educating people especially women in multi-cropping and about coming together and cultivating. We have conducted different kinds of training programs at the village level. The purpose is to encourage growth and optimise the overall output. Pulses provide the nitrogen in soil to other plants, and big leafed plants provide shade that is deterrent to weeds and repelling beetles, snails, and moths, and

even fungal attack. We grow marigold, maize, and castor plants around the plots so that it stops wind, insect, and pest attack.

The benefits of multi-cropping include attracting pollinators, repelling pests, providing beneficial nutrients, shade, and support to smaller plants. We don't have any lines in the field except for border plants. People just broadcast seeds after ploughing. The different kinds of crops that we cultivate include millets, pulses, dryland paddy, oil seeds, vegetables, greens, and tuber plants. While millets have more protein, minerals, iron, calcium, and fibre, wheat and paddy have more carbohydrates, less fibre and iron content. Paddy has 0.2% fibre only and 0.7 mg of iron in a gram. We focus on millets more because it is a climate resilient crop needing less water than crops like paddy and wheat.

Our training in Vellore, Tamil Nadu, focussed on natural fertiliser and pesticide making using cow dung, cow urine, local mud, and pulse powder. We make jeevamruth and ghanajeevamruth from these. We facilitate them to make them use for plants. Farmers learn to make fertilisers.

Women who have their own land cultivate multi-crops. Others come together, lease a land, and cultivate. The main focus is on food production and food security at household level. It is a subsistence farming and food

production is for consumption and not for market. So there is no question of producing more and selling at market. Since we are into multi-cropping, we produce many kinds of grains and pulses and have nutritious food security at households. Women grow smaller plants and put support or pandal to climber plants. It gives the shade that small plants need when the temperature is very high.

Women take up exchange visits to other lands to learn about multi-cropping to do in their lands. A woman, Ms. Palaniammal from Kottapatti, has 60 acres of land and has grown 27 varieties of crops. She has a small compound around which she grows coriander and vegetables that need more water so that she can use the farm pond water later when water shortage comes in.

In places where water is available, we grow crops which need water nearer the channels that take water around, and plants that need less water are grown in far away places. They do rotation of crops and greens, and within 30 days they get money from them. After the first harvest they grow vegetables so that there is always a rotation of crop in the field.

In some places like Chengalpattu, people are cultivating fruit bearing

trees such as banana, mango, and guava in the middle of the field. In their shade, they grow crops like cabbage and potato depending on the area from where they are and climate. In Kanchipuram district, they have grown brinjal, ladies finger, paddy, chillies, gooseberry trees, beans, groundnut, and other vegetables. In a collective farm near Thiruvallur district, women have taken land on lease for 3 years so that they can reap the benefits of the crops. In Thirunelveli, people have grown different kinds of millets. Sometimes maize is planted as a windshield. It will not affect the other plants on the bunds which become strong. Women prepare the plot, cultivate, and do the weeding also.

After our efforts for 8 to 9 years, we have now negotiated with the local collectors, particularly in Vellore, Dharmapuri, and Thiruvannamalai districts to have the market at the collector's office. They are subsistence farmers who cultivate sufficient only for their family. Sometimes they may get more vegetables being collective farming which they cannot consume. So we have facilitated with the government to have a market called "Our Market".

The collectors have given space in the office, and since it is all natural produce, women take the produce there and sell them.

We are into traditional seed saving also because we have lost all traditional seeds due to green revolution and gone for hybrid seeds, even in the case of vegetables. People go to market and buy seeds which are very expensive. So we helped women to save their own seeds which is called seed saving, and we are particular about reviving traditional seeds. We have identified villages where they preserve traditional seeds. We borrowed and cultivated with them in some villages. Now each of our members has got more than 25 kinds of seeds saved during each season. We conduct what is called a seed festival or biodiversity festival where women members and farmers from various villages carry their seeds in procession and exchange the seeds which ensures biodiversity in their field.

In Tamil Nadu, each district has different type of millets. Dharmapuri has finger millet as main millet crop apart from barnyard millet and foxtail millet. Thirunelveli district cultivates

kodo, proso, and little millets. Trichy is famous for kadaikanni millet and sorghum. Based on the climatic conditions, millets are cultivated, and we have a millet mission in Tamil Nadu which also supports cultivation of millets. Government is giving incentive of Rs 2 thousand per acre if millet is cultivated and is particular about monocropping.

If the field has millets, oil seeds, vegetables, and greens, the government is not willing to pay the incentive. We protested by strong campaigns, and today our farmers get the incentive. Between 2014 to 2017, Tamil Nadu bagged the Krishi Karman award for cultivating most millets.

We have green gram and black gram pulses in all districts. Dharmapuri and Krishnagiri cultivate chickpeas because of the proximity to Bangalore, higher altitude, and cooler climate. There are different types of beans grown in the state, and majority of areas cultivate sesame and groundnut. Castor is the field boundary. Since different kinds of vegetables are grown for regular use, women have the vegetable seeds.





Multi Cropping



These are the various types of seeds available with us, which people exchange during biodiversity festival in each district. The benefits of multi-cropping can be seen in my own field where we have 25 and more crops. So even if 5 or 6 varieties are lost, it does not matter because we have the others. Our main grain need is met.

Depending on what is not available in their land, they exchange for what they need. When we have collective farm in villages, groups are there which lease out even 50 cents of the land to a maximum of 4 acres. We have 95 collective farms where if they have excess or do not have any particular crop, they exchange the seeds. We are able to get whatever we need at the village level and need not go to market or mandi to sell or buy.

During Covid times, only our women farmers had vegetables in the fields. They could share whatever vegetables they had with the villagers. Agriculture was the only activity continued during lockdown without any hindrance. Since they had excess millets, they could sell it at nominal price. People did not have to run to places as they had access with their village women who had stock of grains continuously.

Interestingly, because of multi-cropping and supply of seeds, many men who are farmers approached women for seeds. So women are now seed savers who can supply to other farmers. They also share the technique they follow which is beneficial to the other farmers.

Can you throw some light on the challenges you face? Have you reached everywhere or is there gap still?

In Tamil Nadu actually Women's Collective is working in 18 districts, and there is a lot of gap. We are willing to share our experiences, take people on exchange visit, and share seeds if they want. They can come and visit our multi-cropping farm. But I do not think Tamil Nadu seeds will fit in other states.

It would depend on climatic conditions. Initially when we started, we indeed got seeds from Andhra. We are continuing with those millet seeds. I am not quite sure how to involve others. We are a women's group working for all-round empowerment of women. We also take up issues of violence

on women, women farmers, nutritious food security at household level, and taking care of health of women and children. It is relatively easier for us to involve the women labourers into organizing and leasing land. It is something new and food production related.

They find it difficult as men decide what to cultivate and what not. Even if the land is in their names, they are unable to decide. It is the current mindset that cash crop is profitable, make money from them, and buy grains from market. We are slowly trying to break that. We also have male members who come to us for seeds, fertilisers, and training. They are used to using fertilisers and pesticides for 60 odd years, and to leave it and come for sustenance process is difficult.

Women are never recognised as farmers even though they do 60 to 70 percent of the agriculture work, right from planting to harvesting. Even in government meetings, we are advised to go to social welfare department or self-help group projects. Access to water and land is difficult to women farmers because they do not have lands. Getting others into our fold is difficult but we are trying to accomplish that. Working with women labourers is easier.

Your title says 20 crops in one acre. Is it 20 crops by area spacing or by type spacing? What is the service charge or salary charged by the people who work for the group? Is it





Multi Cropping



produce or money sharing? How do you make it compatible to have women workers or labourers in your organisation?

All 20 crops are intercropped. It is not type spacing. In my own farm at Ranipet district, I have cultivated finger millet, pearl millet, and different types of pulses, oil seeds, and vegetables. I have used natural fertilisers like jeevamrutha. We do not have different plots. We have crop supporting each other.

For example, we have pulses and vegetables together in one plot and maize around the plot. Beans which spreads its tentacles around maize fixes nitrogen in the soil supporting maize and vegetables. I have windshield and insect shield. I have marigold and castor around the field to prevent insects and pests entering the field. It is only one acre of land. There are other farmers who have cultivated 30 different crops. At a point of time, it became a challenge who cultivates the maximum. We have benefits as we get different types of grains, pulses, oil seeds, vegetables, and greens continuously. When we use cow dung year after year, there are lots of uncultivated greens coming up. In a collective farm, sharing is always for the produce. They have a record where all activities are recorded, number of days working, etc.

If somebody goes on a leave one other member of the family substitutes the family and does the job. Work sharing is important. Whatever produce is there, they share it equally. When they have a land on lease, 1/3rd of the produce is given to the owner, and 2/3rd is shared among the members. If there is more, they share with other groups or villagers. They do not take it to market. About gender bias, women are doing maximum work in agricultural process except ploughing and harvesting.

Nowadays ploughing is done by tractor and harvesting by machines. Women are involved in weeding and transplanting. So they are strong enough to do agricultural activities. Younger people are educated and do not want to do agricultural activities. Now, we are trying to bring them in. Their education is not lost. We are trying to practice agriculture in small fields without ploughing. Once a year ploughing is enough. If there is no irrigation facility in that land, we

may need men to cut channels. Women are able to do all the work.

Do you have a model farm in Trichy to have a look at?
We have one in Salem which is close to Trichy.

Is there anyway you can publish the model so that more people can take it up?

Yes, we would be happy to do that. There are lots of articles about the collective farming efforts. Recent one was in Guardian from London. The Hindu has also come out with an article about dalit farmers getting involved in food production. In Makkal TV there is a program every week on a village covering farmers and collecting farming. In Tamil we have a small booklet. We will try to do it in English or whatever way.

Any model farm near Hosur?

In Palakodu, Dharmapuri district, there is one. It would be the nearest for you. If you contact me, I will give you the details and fix a date for visiting there.

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tantea
A GOVERNMENT OF TAMILNADU UNDERTAKING

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Eco-friendly Farming

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In a recent interview explains about Eco-Friendly farming with less chemical input and using biotechnology as an intervention tool.

How are we going to manage eco-friendly farming, and not 'Organic Farming', she feels that with today's population and food requirement we cannot totally avoid chemical inputs or fertilizers. We need to replenish the soil with macronutrients like Nitrogen, Phosphorous and Potassium.

Biotechnology intervenes in the farming industry by providing

- Nutrition Biologically (NPK and micronutrients)
- Biopesticides
- Help Improve the immunity of the plants via various molecules

With the minerals in Urea, DAP, plants use them to grow, create proteins, enzymes, and DNA, to replicate and reproduce. Unlike human beings,

plants can produce their own food. Plants cannot use atmospheric nitrogen (70% of air) to make protein. We can supplement nitrogen and phosphorous via urea and other fertilizers. Biotechnology can help in increasing the immunity of the plants and reduce the chemical inputs into the soil.

Our atmosphere has di-atomic nitrogen. The consumable form of nitrogen is ammonium or nitrate, and the plants cannot absorb the nitrogen molecule (N₂). When lightning occurs, the atmospheric nitrogen is converted to Nitrous Acid, and it reaches the soil and converted to nitrate for the plants to use. This comprises 10% of the nitrogen requirement. Rest of the requirement is satisfied by the chemical industry. Using Haber-Bosch process, under high pressure and temperature, Ammonia and Hydrogen is mixed to form ammonia. This is an energy intensive process using lots of non-renewable energy.

There is a natural process 'Nitrogenase enzyme complex' where some bacteria work toward combining Nitrogen and hydrogen to create Ammonia.

There are two types of soil microbes (bacteria) those work on this.

- Free-living nitrogen fixing bacteria
- Symbiotic nitrogen fixing bacteria

The following is a process

on how the enzyme 'Nitrogenase' in the soil bacteria like Rhizobium, Azospirillum, Azotobacter help in nitrogen fixing. These have the capacity of converting atmospheric Nitrogen to ammonia for the plants to easily consume. Similarly, phosphate solubilizing bacteria and potassium solubilizing bacteria, convert the insoluble form of Potassium and phosphorous in the soil to soluble form for the plants to assimilate.

The above-mentioned natural process reduces the high-pressure requirement involved in the Haber-Bosch process (Chemical Synthesis of Ammonia).

The 'Nitrogen cycle' is the process where the atmospheric nitrogen is converted to assimilable form. The following is the process in which how natural resources can help in replacing chemical fertilizers to ecofriendly natural system. As mentioned earlier, it may not be possible to completely replace chemical fertilizers, but by using these soil microbes in the right mix, you can significantly reduce the chemicals and improve the soil quality and thus plant and nutrient quality.

Nitrogen fixing bacteria (rhizobium) living in the root nodules of leguminous



plants, are symbiotic organisms as the plants and the rhizobium benefits each other.

Free living nitrogen fixing soil bacteria, with 'Nitrogenase' enzyme, converts atmospheric Nitrogen to Ammonium, by ammonification and then 'nitrifying' bacteria converts the ammonium for plant assimilation. Also, there are some de-nitrifying bacteria those convert these nitrites and nitrates to Nitrogen, and release Nitrogen to the atmosphere. This process is nitrogen cycle. Another source of nitrogen in the soil is through decomposition of animal and plant remains. Natural balance of nitrogen through Nitrogen cycle would have helped to balance the amount of nitrogen in the soil and the atmosphere if the demand for food was low. To satisfy the existing demand for food, we need to use chemicals to manage the nutrient requirements.

Following are the avenues where we can harness biotechnology.

- Genetically modified plants - some countries they accept, and some do not. However, there are two areas, Nutrients and Biocontrol - where the needed genes may be added to the plants. Research works are ongoing in several parts of the world to add the gene responsible for 'Nitrogenase' enzyme so that the plant can by themselves make ammonium and proteins. Thus, they can become completely self-sustained.

- Manipulate a 'signal gene' in the nitrogen fixing bacteria, that will attract nitrogen / phosphate / potassium fixing bacteria to the rhizospheric region to provide nutrients in the natural way. This is called quorum sensing in bacteria.



- Biocontrol - We are all aware of BT Cotton, BT Maize, the toxin, which is a Cry Protein in bacillus thuringiensis, is genetically engineered in plants. This actually protects the plant from fall armyworm in case cotton and maize.

- Introducing 'Stress Response' Gene in the plants and stimulate the stress response using certain genes so that the plants can naturally imbibe the quality of immunity and survive infection or pest attack.

Apart from this Biotechnology can help in some physiological modification. It might sound simple, but there are several steps involved in all these processes. One way is to increase soil microbiome. Keep giving the soil back, its microbiomes thus reducing the chemical dependency and maintain the eco system.

Another way is through 'enzymes' - if you want to increase the carbon content you increase the decomposing enzymes in the soil and also increase nitrogen fixing and stress responding enzymes. These methods can be used in order to increase the soil quality in an ecofriendly manner.

Biofertilizers which are soil microbes that helps in nitrogen fixing, phosphate solubilizing etc. (Azospirillum, Rhizobium, Pseudomonas, Bacillus). These can be grown in large numbers and can be applied to the soil in large quantities in viable form. Biofer-

tilizers available in the markets are in liquid form, or solid form (lignite mixed biofertilizers). Problems in most cases have been the stability, because the bacteria are taken away from its ecosystem and mixed with other components, which is not good for the bacteria. There is a risk of contamination of unwanted bacteria will reduce the quality, leading to a less viable biofertilizer. You cannot keep on sterilizing your lignite press mud, vermiculite....

The biofertilizers those are available in the market are bulky in Kgs and liters. The new membrane technology where you ingraft the 10 12-13 bacteria in a very stable and viable form and in high pay loads in 1gm of film. Normally only 108 cells can be loaded in 1gm of carrier. Because of this high payload, all you need is 5 gm of the film for 1 acre of land. This film is highly water soluble and can be easily spread in the land either by conventional irrigation or modern irrigation system.

Apart from the Fiber form (which is patented with IIT, Madras), there are products available in Gel form as well. The goal is to bring down the carrier material and increase the active material, in this case - Bacteria. The biotechnology is harnessed in the process is growing them in large quantities by fermenters, concentrate them by removing unwanted materials and resuspend them in stabilizers. Anti-stress components are also added to keep the





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microbes more stable.

NPK - Gel Combo, soil conditioner /treatment than a plant treatment, 100 ml for 1 acre. You need 2 doses one on the 0th day of sowing and the next one on the 30th day. There is specific combo for pulses with Rhizobium.

These products reduce chemical inputs by 40% and promise yield increase. Trials were conducted across several crops' paddy, groundnuts, maize, wheat, tomatoes, chilly, bananas, cotton, and sugarcane. In most cases, the yield increase averaged about 30% and 20% cost reduction. This information is available on the website www.fibsol.com. Products can be ordered from the website.

SOIL-STAR PLANT GROWTH PROMOTERS

Suitable for all crops



They are now entering in the distribution channel also.

Where can we get the NPK - Drop combo in Bangalore?

The product can be ordered from website www.fibsol.com

For Sugarcane crop in Maharashtra, what is the combination that you are suggesting? For the whole year can you suggest some program?

The recommendation is NPK - Gel Combo. The inputs will be Azotobacter vinelandii, Bacillus megaterium, controls can be provided, based on the soil indicators. Some manure can be added to decrease chemical inputs up to 40%.

Is it possible for you give a program/schedule for application of complete soil

conditioning and fertilizing for all year around sugarcane crop?

Yes! Reach out to me for a complete protocol for new plantation and re-plantation along with biocontrol and micro-nutrients recommendations. We do not recommend replacing chemical fertilizers considering the huge food demand. The number of plant cycles in a year has increased like 2 crops of sugar cane in a year. If needed, you can try complete organic farming in 1 acre, where we can give complete package along with vermicompost / manure that you can add. For this cycle, for the rest of the 4 acres, a combination approach can be considered for reducing the chemical inputs by 40%. Once satisfied, we can completely move on to organic farming of sugarcane.

Do you have any representatives for Maharashtra area?

Not at this time. We are in the process of collaborating. However, Fib-Sol can be reached through our website www.fibsol.com. We are looking for somebody.

For a banana plant 1 month old and groundnut to be seeded, what is your recommendation? What is the gap between the two?

Fib-sol products can be applied along with chemicals especially nutrients and not apply along with pesticides. There was a study done with maize where there was a manpower shortage for application at different times, but our studies show that there was no significant issue, when both were applied at the same time. Science - papers and literature available point to the fact that pesticides are designed for different microbes / pests and thus technically will not affect these microbes. However, pesticides are not generally good, they do not recommend applying biofertilizers along with pesticides. But if other circumstances forces, you can go ahead and apply pesticides and biofertilizers together. The biofertilizers can be applied along with chemical fertilizers.

Are you doing only NPK?

No! Along with NPK, we also provide biocontrol like pseudomonas VAM, Trichoderma and have an entire portfolio.

What is your solution for nematode prob-

TRI-GEL

TRICHODERMA



lem in Yelakki Bananas?

Beaveria bassiana, Pseudomonas fluorescens could be applied. For anything else, I have to check. All biocontrol can be supplied and not micronutrients. If there is a mandate, then we can look into microorganisms that can help with micronutrients. Depending on the requirement the bio controls can be supplied. You Tube has videos on how to apply them when you search for FibSol.

Are you planning to set up dealers / distributors in Bangalore?

FibSol was a research company, and it took time for us. This year we are going commercial. Now that we have marketing licenses, FCO clearances and NOCA and APEDA clearances. Anyone interested in dealer distribution can reach out to proceed further.

Is this technology effective across all types of crops?

The products from FibSol are for soil treatment. When freely living nitrogen fixers in the soil like Azotobacter, Azospirillum, they trap the atmospheric nitrogen and converts to ammonium and keeps it in the soil for plants' consumption. But for pulses legumes and groundnuts, you need to go for different combination such as seed coating as they have root nodules with symbiotic relationship. They buy the bacteria from Vigyan Kendras and apply our technology to grow and concentrate them and resuspending them.

Can you please explain how the seed coating is done?

In case of groundnut, you make a jaggery solution or take rice starch, and you mix the FibSol product (say for an acre) and then mix it will the seeds, dry in the shade for an hour and then sow them. This can be done for paddy,



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groundnut, and pulses. This is different from the coated seeds those are available are coated with pesticides.

Do you recommend any thing for other micronutrients those are not available in your portfolio? If you coming up with new portfolio, what would be the timeline?

As of now we are asking the farmers to continue with what they are using. As the demand is increasing for other micronutrients like zinc and others, we are coming up with micronutrient formulation with solubilizing bacteria. It will take some time, may be in 6 months, we will be coming up with entire package including signal molecules, bio controls and micronutrient package, at least for major crop segments. We are looking for sales team as for commercial growth.

Can the seed coating be done with fruiting seeds like Custard Apple?

Yes! it can be done with any seeds, horticultural seeds or even the trees. When the seed is coated, it is more effective, as the bacteria is at the close proximity of the seed enhancing the effectiveness. We don't recommend seed coating for any others except for pulses as it becomes cumbersome. We recommend applying on the 0th day, along with chemical fertilizers.

Can the commercially available micronutrients like seaweed be applied?

Yes! They can be applied. NPK seed coating is always recommended along with Zinc and Copper. You do not need to coat other micronutrients as they may not be that effective. If you are going for nitrogen micronutrients, seed coating is effective.

What is the shelf life?

Fiber product has stability for 2 years, Gel product about 6 months. In most cases it comes to around one year, in normal condition. It is covered by FCO, for solid and liquid category. Fib-Sol has marketing clearance for Tamil Nadu, and we work distributors with respective licenses to market in other places also. Membrane is nano.

How long are your products in the market?

Our first patent for fiber product was in 2016. The gel product is in the market from 2018. Coming up with fiber product took time as there no ma-

chinery to manufacture the fiber that is ecofriendly and water-soluble polymer. We went commercial with B2B model last year with few big companies with their market trials. There are exclusive deals with anybody yet. Gel is IP owned and now available in the market.

What are your future plans, and which states you want to expand to? And how you are planning to go about it?

Immediate target customers will be progressive farmer. At this time, we are not reaching out to individual farmers but farmer producing organizations (FPO), where the farmers are guided by experienced leaders and farmer producing aggregates (FPA), working on single crop. Trials in the delta region and few foundations, which are all on single crop - paddy, has proven data on increased yield. We have substantial beta-clients. The same can be said for Maize also. Immediate target are FPOs and FPAs along with dealers and distributors. There are around 25 paid trials and have established that the product is working will across crop segments. We are looking to expand in Western Tamil Nadu, Ghat sections of Karnataka (for coffee and tea crops), also in Telangana, Warangal, and Khammam and in Maharashtra.

Can the consumable paddy and groundnut be coated with your products?

No! These are soil bacteria; the coating needs to be done only for the seeds those are to be planted. To address the concern about the safety of the polymer, the ones that we use is currently being used in the medical industry eye drops, and gels. Another polymer that we use is a bio polymer that we eat daily. So, it is safe for us to use.

Is this different from effective microorganism?

Effective microorganisms are a consortium from a rhizospheric soil and the probiotics that we have is from

curd. The ones those are available in the market is from Japan and China, which are not suitable for us. We grow indigenous microorganism from our local environment, zonal specific, which will be more suitable for us. These are not consortiums but a culture.

Is it possible use your technology in cold areas?

It is very difficult for these organisms to survive in areas where the temperature is below 20 deg. So, it will not be viable to use this technology in very cold areas. The other options are to get the bacteria from those regions, grow them here and the get it back to them, provided that the fermenter in maintained at the desired temperature to that bacterium.

Whether the seed coating can be done for Sugarcane, maize, and paddy?

I am not sure whether that would



work on sugarcane which is a tricky crop.

Have you made efforts to cover vegetable crops?

On expanding the product portfolio to cover vegetable crops, we have been working with Coriander, Tomatoes and chilly with government and corporate trials. All of the trials are almost done and are ready to hit the market with all the support that is there.

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Parth Tripathy

CEO - Beehively Group , Ahmedabad, Gujarat

His interests include agriculture, apiculture, creating farmer and beekeeper cluster, creating market for Indian beekeepers and farmers and honey quality control laboratory. He talks about creating a market for Indian beekeeping community in a recent interview.



Beekeeping is a very important part of agriculture. I have been in the agriculture field since 7 to 8 years and working with 50 thousand farmers in my clusters. We even have a cluster with 5 thousand beekeepers. We have farms in Africa, Nepal, and Burma, doing agricultural and beekeeping activity. We came to India in 2018, and our mother company is in Africa for 10 years. We are working in 32 countries and started a replica in India.

On the commercial side, we are working on how it can be taken up by non-agriculture industry people, corporates, and service class. Those who are already in the agriculture sector can take up beekeeping as an additional source of income as it is a part and parcel of agriculture. We have created clusters of skilled beekeepers in Africa and Asia, providing beekeeping tools and equipment to enhance beekeeping methodology and to build an organic relationship between beekeepers and farmers.

We work as a bridge between end-user and beekeeper directly. We focus on promoting an organic environment for increasing biodiversity in maintaining bee population and improving remote rural beekeepers who live in conflict zone of nature and industrialisation. We focus on technique how it can be more modernized. Right now in India, it is not cruelty free. We want to focus on where bee population is flourishing and fair price be given to the beekeepers.

The vision and mission of the company is to work with beekeepers in Asia and Africa as they have lots of potential in India, provide edge-cutting beekeeping equipment, training, buyback yearly contracts, seasonal contract of honey, delivering high quality honey, adopt sustainable harvesting techniques, re-

tain natural environment, and promote natural beauty of Asia. There are other by-products of honey that can be good source of income. India is a rich country with flora and fauna and can produce honey for 10 to 12 months at least unlike other countries where beekeeping is a 4 to 6 month cycle.

The global objectives are bee conservation, working on quality, and bee programs. India is already exporting 50 thousand MT honey annually, and the Indian agriculture market is increasing rapidly. It was worth Rs. 16800 million in 2018 and improving rapidly. In countries like Nepal and Myanmar, there is lack of market for beekeeping. Indian beekeepers can be the source of marketing in these areas by creating clusters. We are procuring lot of honey from Nepal, mountain regions, and Bhutan.

We know that manuka honey is marketed very well because of its antibacterial quality. India has its own manuka hon-

ey, and many flavours that can be marketed as manuka. There are also many organic blueprints in the market. 30% of the total organic honey producers are in India. Flowering is an important part of beekeeping. When the honey is collected and taken to lab, if any residue because of pesticide is found, it may be rejected in the export market. The organic land cluster is huge in India that can be used for our benefit. Agriculture and beekeeping go hand in hand.

There are many flavours of honey available in India, Nepal, Sri Lanka, and Myanmar. There are always doubts if we are adding flavour or if it is natural. Basically if within the vicinity of 100 kms, a lichi plantation is there with flowering season in peak, beekeepers migrate to that area, bees work on those flowers, and collect pollen and nectar. There can be other flowers in that area, and pollen count can come in the honey too. If 80% of pollen and nectar come from a particular variety of plants, it is natural honey. There are infused honey in the market that contain chemicals and flavours, but in the natural honey, the flavour is infused by the bee itself.

The by-products of beekeeping are bee wax, venom, propolis, royal jelly, bee pollen, and honeycomb. Bee wax is used in cosmetics and edible industries, and the market is huge in Europe, USA, and Gulf countries. Availability of bee venom is limited because it is a costly affair, and market is high. We supply venom collecting machines to the beekeepers. When using these, we have to ensure that the mortality rate is less. We can extract bee venom in specific seasons only. Propolis is a highly demanded product in the market. It has the qualities of antibacterial and antiviral. They are made by bees by

u t -

ting a cement on the bark and hives. Royal jelly is the bee milk given to the young ones and cocoons. While all other bees drink honey and eat pollen, queen bee has royal jelly. There is good market in future for royal jelly and venom. Many retail FMCG markets add propolis in tooth paste and royal jelly in protein powder. India is picking up pace in producing protein powder from pollen. Honeycomb has market in Gulf and hotel industry. It is effective if done in the right way and requires cold chain facility to be moved to places. From a single box of beekeeping, you can get 7 products including honey.

Warehouse, cold storage, and packaging are important parts of beekeeping business. In India there are lots of warehouses providing honey storage, but no cold storage. Many countries follow food safety initiative of farms to make everybody involved in food supply follow safety measures. We have one best hi-tech warehouse in India, capable of storing 10 thousand MT raw honey and bee by-products. We can improve hygiene and keep contamination at bay to ensure the products taste the way they should. Honey has an important factor HMF. If it increases due to heat or fluctuation in weather, cold storage comes to play an important role. Frequent temperature changes and overheating harm the biological activity substance in honey and its by-products. We control the temperature in the cold storage -- conducive to raw honey to preserve the nutritional value.

We have to take special care about the hi-tech packaging material -- Packing raw honey and by-product, we usually use 300 litre MDS barrel for exporting honey which is epoxy coated and food grade. This is MS drum used especially for honey. Human intervention is very minimum to maintain quality. Since honey is sweet and nutritious, in bulk or retail supply, it is important to have hygienic and good packaging to sell in the market.

In Beehively, we have our own cab for bee and queen bee multiplication. We adopt beekeeping practice and increase the

number of cabs, bee colony, and boxes every year. In India if we want to buy bees, we can get a set of bees, but no queen bee. In other countries, we get single queen bee in a cell for multiplication. The *apis mellifera*, *apis dorsata* and *apis cerana* are important bees, especially *apis cerana* is very important species.

About our turnkey projects, we do not just produce honey. We do not buy honey from traders. We have our own beekeeping units and motivate others into this. We provide turnkey projects from start to end. We provide cabs, training, and help in getting subsidy from government apart from boxes subsidised by government. KVIC works hard in getting subsidised boxes and beekeeping equipment. You can avail the facility, apply for boxes and you can get funding from government for the beekeeping project. And for beekeeping, you do not need lot of land, you have to migrate boxes according to the floral chart available with us or government.

We have a movable unit with filtration equipment. It will give the beekeeper farm to process and harvest honey. Initially quality test has to be done during filtration period.

The next one is centre unit, where you can connect with the beekeeper, you can also do beekeeping, and you can have centre unit. There it will have a hi-tech warehouse with filtration equipment and storage facility for the final product. It will have the lab test at the second level to check the purity and source of honey. After this, it will be filled in the food grade barrel. So you will be a commercial beekeeper, do migration, and have small, big, and tribal beekeepers in your cluster. You can also have a unit with warehouse, cold storage facility where you can do processing, packaging, and retailing. We have a storage in Gujarat. We are supplying honey in



Bee Keeping

European countries and Gulf countries. We will soon be entering retail market which is not there in India now. After covid, lot of people are asking for quality honey, which is good news.

We want to complete all our initiatives by 2022. We are creating research education awareness among people about honey that it has a source and comes directly from the beekeeper and not from trader. The beekeeping industry is not in a healthy state because of the middlemen. They get the major chunk compared to the beekeeper. Lots of exploitation is happening. We have to eliminate the middleman cycle and connect directly with the beekeeper and end-user who should know where the product comes from.

Our buyback business model points out that any grower should have a market to get surety that the next season will be better. We give 100% buyback not for honey alone but for all by-products. According to the floral activity we are doing. We have temporary centres where the beekeeper brings raw honey, and we take 20 - 25 kg baskets directly from them which depends on the beekeeper, process he follows, and the filtration of honey.

In India good quality equipment and expert training are missing. India is producing honey stored in brood chamber. Super chamber honey is pure and hygienic. That is what we should consume and not disturb the honey in brood chamber. Even if the government is providing super chamber, beekeepers are not using. Super chamber is not only to increase the quantity but also to improve the quality, and international markets accept if the honey is taken from super chamber. We are working closely with tribal and expert beekeepers where we are developing technique to commercially do the queen bee rearing and supply to other regions. We do not stop with apis mellifera rearing but other varieties too. Apis dorsata is available in all jungle regions. We work closely in that area to harvest honey and improving the number of bees. Apis cerana, a stingless bee and apis dorsata are the important varieties.

Agriculture is a beautiful industry, and you are helping nature to thrive. It de-

pends on pollination by bees, and production of quality fruits, vegetables, and grains are decreasing due to de-pollination. Apis dorsata population is declining so much we are not able to do the census. We are spreading awareness in the rural and urban areas to provide pollination service and send bee boxes there. In Himachal where apples are grown in plenty pollination service is given.

For testing the honey brought by the beekeeper, the charge per sample . We work with log hives in Himachal and Uttarakhand which is a traditional way of working with bees.

Do you have data on per capita consumption of honey in India and abroad?

In India before Covid, it was approximately 60 g, and now 100 g. Germany is the highest consumer with 3.5 to 4 kg per capita, and many countries in Africa use 3 kg, and USA 4 kg.

What areas do you operate?

We operate in all regions, and we have tie up with farms and migrate boxes as per floral activity. In Ahmedabad we have office and cold house and warehouse.

Is beekeeping possible in rice and cotton farms?

In rice, cotton, and wheat, pollination is not done by bees. In sunflower, bees give pollen, nectar etc.

What are the investment requirements to set up a beekeeping unit to make it commercially viable?

In Gulf of Kutch, Gujarat, there is not much vegetation. When we find farmers and beekeepers suffering, we want to make their lives sustainable and flourishing and get good quality product. So we started creating cluster of tribal beekeepers, went to forests to create clusters You need not focus on tribals in that area alone but explore various pockets and forests nearby and connect tribals. If you have beekeepers



or farmers in small quantity, this is the only way to generate sustainability in their life.

What are the steps and investment? Do we get government support or invest ourselves?

If you have beekeeping boxes already and tribal sources, when honey comes directly from the forest, you should ascertain the source of honey. You have to evaluate what quantity you can fetch in a year from that particular region. Based on that your commercials can be defined.

Do you provide training?

Yes. KVIC and agencies like CBRTI, Pune provide training.

How does buyback work?

If there is an existing beekeeper, we go to the field and have a small audit on beekeeping activity, harvesting method and test the sampling of a particular season. If they are approved, we start purchasing honey from him and guide him on how to increase the quantity.

Will you provide equipment, super chamber, and others for harvesting honey?

Yes, we provide equipment and details where to get subsidised equipment if they are not financially sound to buy from us. We guide how to get from government bodies and KVIC specialised beekeeping tools and boxes. Training is included.

What is the price of super chamber?

Government is providing at a subsidised price of Rs. 3.5 to 4 thousand per box with super chamber, bees, and equipment, including queen bee.



Bee Keeping



protecting their colony from virus attack. Only 20% of the products we can take for ourselves.

Do you help in processing and refrigeration?

Yes. We can align you with companies that have machines for processing. We can align you with a consultant if your project is big. He can help you in

deploying machine. In cold chain also we work as per the requirement. It is not needed in all regions where temperature does not go beyond 30 degrees.

On a buyback, what is the price for 1 kg honey?

Each flavour has different price. Kashmiri acacia and cedar honey are premium honey. Rs. 120 per kg is the buyback price if we pool.

Which are the best local flowers to grow for honeybees?

Genda flowers which are planted away from the field, basil, thyme, coriander, and fennel are some of the flowers of medicinal plants bees are easily attracted to.

How do we prevent bird eating bees, as prevalent in Himachal?

It is a natural process, and we need not

interfere with it. We have to work in a way that these also flourish.

How to overcome the climatic changes?

We start adopting modern beekeeping techniques and on what will help the bees during climate change, the number of plants having flowers round the year. We focus on the strength of the bee colony, which if strong, can overcome the change. If fragile, it is difficult to survive the climate change.

Can you plant creepers in the farms, such as parijatha or wine trumpets?

I have to check if these flowers have patterns in them to attract bees. Winter flowers depend on your region. In South India, you get flowers in different seasons, but in rainy season very less species get flowers.

How do we manage the rainy season?

In India bees collect honey for rainy season. By natural feeding, creating patties with herbal sweetener made from spirulina and pollen and micronutrients to give them strength. Farmers can make them and need not buy from outside. I am against sugar syrup.

How do we control use of pesticide and prevent bees from going there?

Farmers need more beekeepers for pollination to get quality roots and improved yield. Herbal pesticide can be used. Chemical pesticides should not be used. There is no need to use pesticide during flowering time. There is a cost effective herbal pesticide in the market which kills only the bad pest and attract bees to flowers.

In case of integrated farming, how to cultivate plants to have flowering round the year?

In big areas, you can have plants with different flowering seasons. In small areas it is not possible. Apis dorsata can fly 5 kms to search for nectar and water. You need community approach to create such flowers. Bees collect pollen from large areas of coconut in South India. We cannot have a single farmer to have different flowers for all seasons.

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Is it a 5 or 10 frame?

All the frames will not have bees. Only 4 to 5 frames will have bees and queen to multiply in time.

How much can you harvest in a year from a box?

If you do proper migration, care, and ethical beekeeping, you can get 30 to 40 kgs from one box in a year.

If there is no migration, and we have a farm with flowers and medicinal plants, what is the yield?

Flowers are important. If you cannot provide for 10 months, artificial feeding comes in. It is done in many ways. And there are people who do it by giving patties from herbal product and pollen. It is good, but it can sustain for 1 or 2 months only. Based on the flowering pattern of that land and season only you can do the sustenance of it.

How many boxes can be put in 40 acres?

You can have 3 to 4 ft minimum between boxes. You can have 2 thousand boxes, but make sure there is food and water in that area.

Does super chamber have fittings for all products in the same chamber?

There are various settings for each product, and you need to buy them separately.

Since mortality rate is more, is beekeeping a complex process?

Yes, one venom machine is Rs. 12 thousand per box. You cannot take venom or propolis all through the year. Pollen is needed for bees and propolis for





Bee Keeping

The buzz of the bees drowned out the hum of the robotic arm, which worked with an efficiency no human beekeeper could match.

One after another the machine scanned stacks of honeycombs that together could house up to two million bees - inspecting them for disease, monitoring for pesticides and reporting in real time any hazards that threatened the colony.

The next-generation hive was developed by Israeli startup Beewise, which says that this kind of around-the-clock care is what is needed to minimize the risk of colonies collapsing.

There has been a drastic fall in bee numbers around the world, largely due to intensive agriculture, the use of pesticides, pests and climate change.

Companies have been pursuing different technologies to try to slow down mass colony collapse, like placing sensors on traditional wooden beehives, or methods to cope with the loss of bees, like artificial pollination.

At roughly the size of a cargo trailer, Beewise's hive houses 24 colonies. Inside, it is equipped with a robotic



ROBOTIC Beehive could save colonies from collapse

- An Israeli start-up has developed a robotic bee hive to minimize the risk of colonies collapsing.
- The hive is roughly the size of a cargo trailer and houses 24 colonies.
- It is equipped with a robotic arm that slides between honeycombs, computer vision and cameras.
- There has been a drastic fall in bee numbers around the world, largely due to intensive agriculture, the use of pesticides, pests and climate change.
- Companies have been pursuing different technologies to try to slow down mass colony collapse.

arm that slides between honeycombs, computer vision and cameras. Color-coded openings on the sides allow bees to come and go.

"Anything a beekeeper would do the robotic mechanism can mimic and do it more effectively without ever getting tired, without going on vacation and without complaining," said CEO Saar Safra.

This includes harvesting honey, applying medicine and combining or splitting hives.

Beewise has already raised \$40 million of funding from private investors and over 100 of its systems are in use in Israel and the United States.

Reporting by Ari Rabinovitch
Editing by Raissa Kasolowsky

Source : World Economic Forum





This African company is producing cashew nuts sustainably

- The global trade in cashews is booming, more than doubling from 2000 to 2018.
- But farmers often miss out on the earnings from this crop.
- Tolaro Global, a West African company, uses sustainable methods and a community-minded ethos to produce its cashew products.
- It's part of a global shift towards sustainable agriculture.

Nuts are tasty, highly nutritious, and – whether used whole or as an ingredient – they are big business. An estimated five million tonnes of tree nuts (which include almonds, Brazil nuts, walnuts, hazelnuts, and pistachios) are produced each year and one of the world's most popular varieties is the cashew.

Global trade in raw cashews more than doubled between 2000 and 2018 to 2.1 billion kilogrammes annually. But there are problems in the global cashew supply chain, including child labour and poor working conditions.

Now a company in West Africa is seeking to change that. Tolaro Global produces its cashews through “a fair trade, thriving and sustainable farming community,” according to its founders, Serge Kponou and Jace Rabe. Crops are processed in the company's own facilities, and a range of products are sold, including cashew flour and butter, and dry-roasted nuts in jars and packets.

Exporting raw nuts – and wealth

Africa is a hot spot for cashew production, accounting for almost two-thirds of the 2000 to 2018 growth. But African farmers are missing out on the potential earnings of this crop, according to the United Nations Conference on Trade and Development (UNCTAD).

“Countries that grow cashews but don't process them at a significant scale retain only a small share of the value created as the nut travels from the farm to store,” says Miho Shirotori, who leads

UNCTAD's work on trade negotiations and commercial diplomacy.

In 2018, UNCTAD says, the export price of cashews from India to the European Union was roughly 3.5 times higher than the equivalent paid to cashew farmers in Côte d'Ivoire. That's a 250% price difference that represents a flow of wealth and opportunities, not just cashews, from Africa.

A fairer alternative

Tolaro Global, in the West African country of Benin, wants to change this. The business employs over 600 people, trades with 7,000 cashew farmers and its processing plant handles around 6,000 tonnes of raw cashews per year. Over half of its employees are women, as well as three-quarters of management, while the average Tolaro farmer has increased their yield four times, according to the website. Tolaro provides daily meals for its workers, as well as healthcare for them and their families, and free childcare in its own daycare facility. Its employees also elect their own workers' representatives to liaise with managers or handle complaints.

A shift to sustainable agriculture

The transition to more sustainable for-

estry, agriculture and commodity trade is a priority highlighted by the World Economic Forum's UpLink platform, which is encouraging participation in the Tropical Forest Commodities Challenge. Backed by the COP26 Presidency's Forest, Agriculture and Commodity Trade (FACT) Dialogue and the Tropical Forest Alliance, the challenge wants to hear about new ideas for change in agriculture and related industries.

“The objective is to shift away from clearing land for production, towards optimizing already cleared or non-forested, non-High Carbon Stock and non-High Conservation Value lands,” the challenge organizers say.

Tolaro's founders have, together with Rabe's wife Sarah, also launched a non-profit working with local women and community issues, called Projects for Progress, and a trading business called Beyond the Nut, which promotes and sells some of the products from the Tolaro factory.

This means more of the money from the cashew value chain stays not just within Tolaro, but within Benin, the company says.

Written by Sean Fleming, Senior Writer, Formative Content

Source : www.weforum.org





Ajit Ingle

CEO of Atuofert Agrimations Equipments OPC Pvt Ltd in Nashik, Maharashtra. His interests lie in irrigation, fertigation system, precise fertigation system, and nutrient management in agriculture crops. He explains the entire process of fertigation, how it is useful for farmers, and the benefits.

When farmers sow their plants, the first priority is given to land preparation, selection of a proper variety of crop, infrastructure to protect crops, and irrigation system to irrigate in the proper way. Fertigation is not thought of at the beginning of the crop. It is the nutrition of the plant that contributes to the yield. If you do not think of nutrition plan in the beginning itself, and later if you face circumstances and if you do not have strategic planning for the nutrition management, it is quite difficult to get proper yield from the plants. My first request to the growers is that they must select a proper fertigation system or method or channel for the plants in advance when they start growing the plants.

Agrimation is one of the very first Indian companies who are into the core business of supplying the fertigation system for various plants along with nutritional and agronomical support to the users of the system. After green revolution when we started using chemical fertilisers, urea, DAP, super phosphate etc, fertiliser era started. The contribution of the fertiliser to the soil was just not related to the targeted yield. Over a period of time, the growers and the industry realised that the fertiliser they applied was not in proportion to the yield targeted and started applying it in a broader or crude way which soon resulted in depletion of the quality of the soil, accumulation of the salts, and the curve of yield started declining.

Then we came up with water soluble fertilisers which are used in fertigation. Generally the granule fertilisers are not recommended in fertigation because they are partially soluble in water and

have lots of sediments because of which fertigation would remain very effective. Wherever fertigation comes, one has to think that whatever we think about is water soluble fertilisers, if not in the definition of fertigation, is not admissible. So fertigation is related to water soluble fertiliser.

Fertigation relates to water soluble fertilizer, meaning fertilisers or nutrients are given to the plants through irrigation. Whenever you give water, along with that you have to give fertiliser too. We used to broadcast fertiliser over the soil, and then over a period, we used tillage operations. Sometimes when tillage was avoided and fertilisers were lying over the soil, it got leached into the soil over a period of time especially the nitrogenous fertilisers the ammoniacal form of fertiliser which evaporated rapidly. When it comes to fertigation, you apply it only through irrigation water. Many growers misunderstand the term



fertigation as generic, but only when it is applied with irrigation of water, it is called fertigation. It is a combination of fertiliser and irrigation.

Which are the nutrients plants require – many say that plants require fertilisers, but actually they need nutrients. Just like for humans food is a source of various nutrients, plants need nutrients, not fertilisers. They need elemental nutrients.

The basic nutrients such as carbon, hydrogen, and oxygen available through CO₂ and water, and primary nutrients such as NPK needed in large quantity should be supplied. The sources are fertilisers. Calcium, magnesium, sulphur are secondary nutrients, and micronutrients include copper, zinc, etc.

by the plants. Ultimately we target to get good yields. Whatever nutrients we apply should be absorbed by the plants. Efficiency should be high to achieve the targeted results. When we apply water with nutrients, plants do not know which one they are absorbing. So they absorb the solution of water with nutrients. Whatever is going inside the plant is along with water as they take nutrients in the form of solution. We take care to get good varieties and good fertilisers. If we have to give fertigation, we have to decide which system of fertigation is needed for the plants. Farming population has not thought about this aspect. It is always troubleshooting for them. Many people have plunger pump or piston pump, they make solution of nutrients and put this near the plant

ents have not gone. Due to high concentration of nutrients, the conductivity of electricity increases and whatever the fertiliser is expected to go inside the plant does not happen and causes reverse osmosis resulting in water moving out.

As the concentration goes higher, nutrients do not go inside but move outside. Next time when you apply water, whatever nutrient efficiency is there comes down. It leads to loss of nutrients. Fertilisers get leached out along with water, and there is no proper result of fertilisers you have applied.

We apply all the nutrients by a proper system called fertigation system. We want all the nutrients around the root zone. This cannot be achieved by tradi-



Overall we have 16 nutrients in the list, 3 are freely available, and the remaining 13 we have to supply artificially.

How to apply it and calculate the quantity of nutrients? We have to calculate how much is needed to gain the targeted yield and how much is available in the soil, how much from water, and decide to apply the nutrients at different stages of the plants. We can apply nutrients through fertilisers commercially.

How to apply fertilisers - methods available with the growers are crude. I will prefer through broadcasting, through basal doses, and drip irrigation. Many apply nutrients at the time of sowing. Many believe that only applying through foliar method is useful. The proper method of applying nutrients depend on how they are absorbed

root zone, or apply all the water in the beginning and at the end of water application within a short time apply fertiliser through the pump.

One more easy and low maintenance system is the venturi pump performing on pressure differential system. When we use this, the pressure on drip system goes down and consumes pressure. You apply fertiliser at a lower pressure which may or may not reach plants. The pressure is irregular across the farm. When venturi or other methods are used, we give fertiliser in 5 minutes and think it is good for the plant.

If you take the root zone and apply water, lot of nutrients get concentrated at the root zone. At that time the concentration of nutrients is so high and no nutrients at the zone where the nutri-

tional methods. When you want fertiliser in every drop of water you have to use proper fertigation system. It is not possible by venturi or piston pump, or we have any other way. People may think we have sophisticated automated system, and many small farmers cannot purchase this because crop revenue model is such. We have various fertigation systems and these start from manual ones with multiple injectors dedicated to Nitrate, Sulphate, and Phosphate fertilisers. We have other systems where you can even correct the pH and acidic media to maintain the same for better efficacy. It is easy to maintain, you can adjust the flow based on requirement, and easy to operate. Based with booster pump that do not allow the pressure of the main line to drop, uniform distribution across the drip system, and equal



distribution of nutrients for all plants are achieved. You must have proper drip irrigation system to achieve the proper distribution of fertiliser. This is a very small and low cost system for small and marginal farmers.

We also have high end products. With multiple fertiliser tank that can be connected to fertigation system, you can achieve the proper fertigation. We have 4 injector system which is very sophisticated. Where fertilisers are applied for pH correction, you can use the higher capacity fertigation system. We have a completely automated fertigation system. In case of multiple crops in multiple areas, dedicated field valves for different fields, the nutrient requirement of these crops is different in different stages.

There are different schedules for each crop. Achieving it or applying fertilisers manually is tedious. Within a short time you have to apply fertigation, and here we have automated fertigation system. It performs like an inkjet printer taking toner from a particular cartridge for various purposes. You have to design a fertigation recipe, put in the tank, and leave it to the system. It will pick up the nutrients from the respective tank, understanding the water flow, make the recipe, and deliver to the plants. This system is becoming very popular in crops like grapes, coconut, tomato, banana, and greenhouse crops. It becomes easy for fertigation by

understanding the need of the crop at the proper stage and gives an easy use of fertiliser. You can harvest much out of it. This system is created after understanding the Indian scenario, where we know the power supply is erratic or fluctuations to the farming sector. Since most of the farmers are not much educated, he cannot read the program. The entire process is created in a picturesque way that the farmers can operate it from home. He just has to program about the concentration of the fertiliser to go to a particular crop at a particular time, and once the power resumes, the system will deliver. We have made more than 200 installations. For cardamom, grape, coconut, and pomegranate, this is the system we have developed. Mobitech Wireless System in Coimbatore is our IT partners.

What is the methodology used to pump in the nutrients? How does it change?

Any automated system does not know what is the concentration to be applied for a plant. It is fully up to the agronomist to design the recipe that will suit the proper concentration. No machine can take the decision. So here in automation, application for the recipe has been designed, and based on that, application is done on the machine. Machine certainly cannot decide what dosage to give. Its job is to deliver what you have designed.

What is the cost of the machine?

Cost of the automated system starts

from Rs. 3.5 lakhs, and the highest price of the one we did for USA is Rs. 1 crore. We have to do a proper survey of the farm, find out what is your requirement, how many fertigation tank you need, size of the system, how many valves you have, how much flow you are handling, if the valves are in one place or scattered, etc. Based on that we calculate your requirement.

Is there any possibility to have a contract service with your organization?

No. Fertigation is required every day, though we think it is not needed each day. Whenever you need the irrigation, you also need the fertigation. It is not that you need a nutrient one day and another on some other day. When you are hungry you need nutrients. Similar is the case with the plants. Many people think that the fertigation they can do once a week and they can apply water the other times.

We have to understand that whatever is going into the plant is through water. The nutrient should go with water. Whenever the irrigation goes, you have to have the water to carry the nutrient. So nutrient is required for the plant every day. Many think that they can apply different nutrients on different days. All the process in the plants happen every day, and they need nutrients along with water every day. Many people think that fertiliser application is applying what you have. Fertiliser application is what the plants need at that time. This can be achieved only through fertigation. If people think what they do is fertigation, then it is not so. What I have talked about is fertigation.

Can your system work in a sugar cane field with flood irrigation?

No. Fertigation concept starts with drip irrigation which is compulsory.

Can we do fertigation by drip and irrigation separately?

Yes, but if you see the data where the sugar cane production has increased, all the increase is due to drip irrigation.



In order to get good production, it is better to switch over to drip irrigation and then use the fertigation technique. With flood irrigation, there are problems such as accumulation of salt, silicon depletion in the plant etc. So drip irrigation has to be installed before fertigation.

Some of us had drip irrigation. But due to choking issues, we are keeping it aside. Instead of drip irrigation, we have rain gun irrigation. Will that be suitable for the system?

The issue of choking happens when you use non-pressure-compensated drip system. When droplets dry due to sun, at the end of the emitter, salt and carbonate accumulation happens leading to choking. So when you use proper fertigation system, if you can use anti-carbonate containing fertigation recipe, calcium carbonate converts into calcium sulphate which is gypsum, and choking will not happen. If you go away from drip irrigation because of this problem, use of proper filtration and anti-calcium elements can solve the issue. You can use fertigation system even if you have rain gun or foliar irrigation system. But when crops grow, application of fertiliser through foliar irrigation is difficult because there will be physical hindrance of plants. I do not recommend fertigation for foliar irrigation.



Have you implemented your system in Karnataka?

Yes, we have many installations, especially in the northern part of the state. In Bijapur, there is Indian Nursery -- Grafting of grapes, where for the entire farm, automated fertigation system is installed. In places like Athani -- we have installed in grape belts. Near Hosur also we have installed, I can get the details.

Can all the nutrients be applied through drip irrigation?

Yes. Plants can absorb only through water. All the nutrients soluble through water can be applied through drip system, while others cannot be. Plants do not utilise them also. Plants take nutrients through water. For example, they do not need sodium, and if it crosses the level, the toxicity can be seen on the leaves because it has gone along with the water, but the plants do not know how to use it.

Is most of the absorption only at the root level or at the leaf level. Many people spray nutrients on the leaves. Can you explain? Do you have sale outlet in Hyderabad?

Absorption is possible through plasma membrane which is present throughout the plants. Quantity and efficiency of absorption is more in roots which are designed so. The older leaves do not have much absorption. If you ask the basic question, plants can absorb through all the parts, but the leaves' level of absorption is very high next to roots. Nearest outlet is in Bangalore and also in Hyderabad. We have our distributor there.

Is your equipment suitable for polyhouse or open land?

It is best suited anywhere where plants need fertigation.

Can you tell us about your project in USA?

We do not operate directly. We operate



through a company. I cannot divulge the name on a common platform.

Most of the agricultural universities recommend package of practices, only 2 or 3 split dosage. Do you have such packages of practices of your own?

The practice I follow is globally accepted. The theory of fertigation starts with every irrigation. If you go through any literature, you will find that every irrigation has to be done with fertigation. We are talking about precise agriculture and horticulture. In the case of wheat or sugar cane, nobody has applied drip yet, so no protocol of fertigation. Where the sophisticated system has come with drip irrigation system, water use efficiency is increasing, recommended fertiliser with water is delivered. You can refer any literature for this.

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Sustainable Agriculture

Surajit

Vice President, Farmsio AgriTech
Chennai, Tamil Nadu

Very much interested in product development, climate smart agriculture, traceability, and value chain development. He has more than 16 years of diversified experience in marketing, data analytics, and digital agriculture. He discusses at length about climate smart and sustainable agriculture practices in a recent interview.

Farmsio is trying to build technology to address the challenges agriculture is facing, the hardest being the climatic changes. Plenty of problems arise for the farmers due to this as there is reduction in yield, pest attack, degradation of resources, and changes in value. So we have come up with a concept called sustainable agriculture which is prevailing in the supply chain and procurement. It is about how best natural resources can be used. Any sourcing company wants to address the sustainable practices by finding the source of the farmer produce and how best agriculture value chain promotes the sustainability of the farmers. This sustainability helps in preserving natural resources, optimising it so that the future generation does not face any problem.

The challenges are:

- Increasing demand for farm produce
- Reduction of farming areas
- Challenge in adopting sustainable practices
- Labour availability
- Lack of farming standards and monitoring- some chemical fertilisers are banned and should not be used but lack of monitoring farmers use. Monitoring is lacking because of remote nature of the location, and most of the global food production is done by small farmers. Monitoring is easy abroad with large hold farmers compared to small farmers as they are scattered, in remote areas, and have small land holding.
- Lack of timely advisory services-with technology development 87% advice is done on smart phone and solve the challenges with solutions. Due to low availability of technology support, all focus is on how to address this challenge as de-





Sustainable Agriculture

cision and information are not in the farmers' hands.

- Lack of precision and predictive tools-most of the companies earlier wanted to see the best by gathering data, but now once it is digitised, people are working on how best the data can be used for prediction, precision farming, etc. We cannot put IOT in small land areas as they put hardware in a field to collect the data to transmit through cloud and analyse. This technology is scaling but it is a challenge for a small holder farmer. People want to predict which can be pest or anything to control and monitor beforehand. Once it occurs, lot of money has to be spent to curtail the spread.

- Inefficient scale of production for small hold farmers and lack of traceability – major issues in the food supply chain. There are two kinds of traceability – one is the internal, which the organisation follows to know from where they are buying the produce, location of farmers, and inputs used to cultivate the crops. The next one is external, such as buyers and sellers to get confirmation about their produce, whom they are buying from, where it is processed, if cultivation has been done using sustainability practices, etc. Coffee and palm oil growers have to get certified from various agencies that there is no harm to environment, these being high value crops. Palm oil has to get RSPO and rainforest lands certification for coffee to show that they are ethically grown without any damage to environment. This provides transparent information to the country.

- Inefficient market linkage

These are the current challenges in the agriculture field.

Climate smart and sustainability have been grouped based on certain facts.

How best to address the climate change-agriculture is an industry which contributes to global warming by emitting nitrous oxide and carbon. Now experts and advisories are trying to find out how to address this problem without affecting the production and to communicate to farmers to follow this kind of practice.

Climate risk mitigating – how to use the technology for solutions to address the

climate risk such as flood, pests and diseases, and drought. We are working on how to mitigate these risks using technologies. Due to climate change and crop loss, farmers earn less. When they are able to prevent the climate risk and other problems, they will have more trust and adapt the activities. Government and other industries associated with farmers are trying to compensate the losses.

Yield – this gets reduced due to various factors, such as lack of adequate nutrients, or proper seeds, or climatic changes.

Climate smart and sustainability practices work on how to reduce the cost of cultivation to maximise the yield with judicious use of nutrients and fertilisers. If we do not use fertiliser at optimum soil moisture condition or at the proper time, it will lead to loss. So they try to adapt the technology to suggest the best time for using fertiliser, when the soil has optimum moisture, if they can irrigate, and predict rainfall.

Nutrients are the components of the soil. If the farmers know which one to apply, the technology suggests the farmers to use it at the specified quantity. To do soil analysis, everybody is dependent on laboratory or pay amount to government institutions, or KVK, or private labs. It may take a long time depending on the availability of the lab nearby. Our technology helps in getting the result in 2 minutes about soil parameters like micronutrients. They can identify the nitrogen content of the soil. So farmers can provide the nutrients required. Farmers are advised how much fertiliser to be applied for a particular crop.

Carbon trading is another issue to a farmer because agriculture produces lot of global gas leading to global warming. They can try to minimise it by adapting the practices. They generate carbon

which can be traded internationally. Their livelihood enhances as they will be rewarded for following the practices. Climate practices are getting prevalent in the current stage.

Sustainable sources – Most of the sourcing companies are trying to adapt sustainable practices if they are trying to source coffee, cotton, tea, or palm oil. They want to know if sustainable practices are followed so that environment is not affected. There are certifications to regular monitoring and evaluation of these fields, such as child labour is not



followed. If they are complied with, the companies will source from the farmers and pass on some percentage to the farmers who get rewarded for following the practices. For example, organic cotton is being exported to Europe and US, and the buyers see that the standards of sustainable practices are followed. It is like an ecosystem completely managed.

Biodiversity is a key area followed by the institutions to preserve it. The agricultural activities should not damage it, and so they use satellite-based technology to address such issues and provide insights for the organisations on biodiversity being preserved. ICT tools address the climate smart and sustainability practices. They are block for the sustainability but they try to leverage mostly on the AI and for the prediction and basic use of smart phone and web applications. Through mobile applications, they try to digitise the record, and machine learning help them to use the data to predict things. Traceability and



Sustainable Agriculture



blockchain are used to give trust to the buyer.

Digitisation of both pre and post-harvest challenges in the climate smart and sustainable practices in crop cultivation and technology impact sustainable and empowerment of value chain. We should also see that farmers' livelihood is promoted across the value chain. We adopt technology, and once the farmers practice, they should be rewarded. Major challenge is the small land holders. They are scattered globally, and it is challenging to adapt technology in such a small area of land.

Climate smart solution – There are various challenges in the farm level. When the crop is sown, there can be weather challenges. Satellite and integration can be addressed to know the various kinds of crops, the stage of crops, risks associated with the crops, soil nutrients, water bodies, and decision making tools. Post-harvest and pre-harvest digitisation is mobile based, and it is difficult to collect the data at the field level. I suggest that they adapt mobile technology to collect the data, and we can use satellite technology to collect the data in smaller areas. Geo-locations are important as without them, it cannot populate the data at the ground level. The technology can be used to know the crop stress due to nutrients, pest, and disease, or climatic stress. Once they are identified it is easy to communicate to the farmers to address the challenge. It can be soil advisory or AI driven advisory or one to one kind of advisory. A pathologist or entomologist can address the challenges to the farmers directly.

Second is the finance but we are not mostly doing, although it is being done elsewhere.

Third is fair trade – This comes after post-harvest. Everybody wants to know the traceability factor, where they are coming from, which crop is cultivated, area, quantity, quality parameters, and if certification factors are followed or

not. Without technology addressing the issues will be difficult.

Various kinds of climate smart solutions can be adopted.

Weather update - This is a basic one that gives forecast on atmospheric temperature, rainfall, and cyclone predictions. There are a few software that predict for 7 or 15 days or even 6 months. They give early warning to farmers in advance to face the challenges.

Disease alerts – Due to climatic conditions, soil moisture, pH level, humidity etc there are chances of occurrence of disease. Disease managing based on the crop and prevalent weather conditions, with the help of devices, 90% prediction can be done, and alert can be issued to farmers to prevent the same and reduce the cost and mitigate risk.

Crop management alerts – If the soil moisture is low, there is an elevation in the land as land is not getting fertilisers. Such advices can be given to the farmers on how to adopt various practices to prevent this. Satellite technology method can be useful for this.

Irrigation and fertiliser application – Fertiliser emits greenhouse gases, and so optimum level of usage of fertilisers at the right time will curtail emission of such gases and reduce the expenditure of the farmers.

Evapotranspiration, land preparation schedule and crop calendar are the other solutions to be adapted for climate smart practice.

Satellite solution – This can be adopted for climate monitoring, forest, and vegetation cover, preserving biodiversity by ensuring trees are not cut, and preventing over utilisation of agriculture lands. Once somebody starts using the technology, he can actually help in practicing climate smart and sustainable solutions in agriculture practices.

Currently they use optical based satellites in getting data, but we can also use SAR based data. Optical satellites may not get the data if it is cloud covered. The resolution of optical based satellite is better compared to SAR based data, but SAR can get the data even if the cloud is covered. The two technologies can be jointly used in various seasons to get the data. They can offer solutions on supply chain management, help government and semi government bodies to know various risks and help insurance companies to settle claims by understanding the extent of damage to the field and the crops are affected. We cannot prevent natural disasters like flood, but how best we use the technology to address the climate risk is the challenge. They rely on the technology to help farmers handle the risks before-





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hand by taking preventive measures.

We have to digitise the farmers, land record, and once the geo location is done, we can collect the data using satellite technology to provide alert and advice to the farmers. Once the crop parameters are identified, we will know about the nitrogen content, different kinds of stress on plants, and stage of plants. If the plants are in the flowering stage, watering cannot be ignored, and farmers will be given alert to pursue the same. They can be alerted to spray or apply fertilisers at the right time. It helps in reduction of cost and adoption of technology and sustainable practices while growing the crop.

Since the techniques can be adapted by affluent farmers, is it possible for small land holders?

Yes. The technology is basically considering the small land holders. In most of the countries, farmers are small land holders. The farmers need not know anything; they just need to input the geo location and based on that lot of information can be collected through satellite and weather desk. If you see the carbon one, there are 2 ways. One is -- Part where we have companies suggesting various ways to farmers to follow while farming, such as technology, multilayer cropping, or soil munching. They can grow some crops that help in absorption of CO₂ from atmosphere. Second

one is companies altering the current cultivation practices such as application of fertilisers, maintaining soil moisture, curtailing release of gases into the atmosphere. Organisations that work on farmers adapt this technique and help the farmers. We also do it by giving colour codes, like when we give red alert, it means plants are in problem, or green alert. Factors such as land condition, soil pH, temperature, land, crop grown, future prediction, and nutrients are handled. This prevents diseases, carbon fixation, and other issues.

Does your organisation take up projects for group of farmers?

Yes. There are lot of farmers who want to get good prices and market linkage, and it is an end to end situation for the entire eco system to be managed. The farmers have adopted all these practices, but if they are unable to find buyers they will lose interest. We are working with state departments to adapt this type of practices.

What is the cost to get the information, and will any technicians come to do the evaluation?

Yes, we need agriculture scientists to do the analysis and get data. If you have a smart phone with applications, you can get the location and basic information when you go to their field and switch on the app. The scientists use the data to develop decision making reports.

To know the conditions and take preventive efforts, data is essential. The scientists can get a populated report or directly address to the farmers.

Do they have to register with any organisation for the updates?

No. Individual farmer will find it difficult, but we have to adapt to those organisations working with farmers. FPOs or government or any company working with group of farmers use the technology. Individual farmers can get in touch with large companies working with the farmers, adapt to the practices to mitigate the climate solutions, but they will be associated with mandi or private buyers where they sell the products. The farmers can use the technologies to know about the problems that they can prevent. They can choose the crop calendar to get alert and notifications.

As a single farmer, how to get soil analysis done?

Farmers can get alerts to advance harvesting or have a proper storage in the event of getting rain or disease. Soil moisture we can actually give the nitrogen part through satellite to the farmer. They can take decision on the fertiliser part by knowing the nitrogen content. We are working on hardware for this, but it needs machine learning capabilities which can give soil analysis in 2 minutes. It currently needs some research on the machine learning part. Farmers who are tech savvy can help the others.

What is the cost of the services?

For farmers it is done free mostly. Individual farmers may pay depending on the services they choose. Government and insurance companies help them. Single large holding farmers may pay as it helps them when they cultivate value crops like cardamom or coffee.

It looks now everything is getting into a mode of needed things of Farming. What will be the future?

In future, technology will be adapted to agriculture chain. By adopting mobile





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technology, most of the data are digitised, and we are working on how to use it best with the decision making tools and machine learning part. People are working on robotics. Machine learning is working on satellite technology, and data is captured through mobile to develop a model and decisions.

In future will the future of small and marginal farmers go into FPO mode?

Yes. Individual farmers have to run around to find a buyer even if they adapt these practices. Collective mode is better because of practices and also insurance. They try to give loans to group than individuals so that they get proper collaterals. If there is a joint liability, it is easy for them and have a bargaining power collectively. Farmers can also join with companies who give inputs to the farmers, know how, and buy back, so that risk is low.

How far is IOT involved in these practices?

IOT is difficult for small farmers, but they have to use it for value crops like cardamom or coffee. They use this to get local parameters. Maintenance of device is a challenge and the cloud where data is transmitted through internet. Otherwise, somebody has to download the data. IOT is prevalent in large holding areas in many countries where adaptation of IOT is large. In aquaculture, IOT is quite useful to them.

Why is it not IOT but GS that you use?

IOT can be easily used by large land holders to get data on various aspects. For a small farmer installing IOT and maintaining it is difficult. Range of IOT is also limited. We have installed IOT in various fields, but it is challenging many a times. IOT is also prevalent, mostly in aquaculture industry. We are trying to take leverage of IOT, but mostly in European and US markets as they are large landholders, can buy, and use them other than satellite data also since they need instant details. That is why IOT is prevalent there.

What will be the charges for 20 to 50 acres of moringa, medicinal, and aromatic plants to get monitoring?

The charge is less. Once we can provide monitoring capability, we can map all villages. Charges vary on the digital tools needed and the other factors.

There is no prescribed rate. Europe and African countries need this, and they want to follow cultural practices and certifications. For that monitoring is needed, and to give alerts and advice to farmers mobile technology is needed.

Where is your working model?

In India we have in Tamil Nadu and Kerala, Northeast, Gujarat, Uttara-

khand, Madhya Pradesh, and Maharashtra and in countries like Nigeria and Angola in Africa. We are working with a few FPOs.

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BharatAgri raises \$6.5 million from Omnivore, India Quotient

The Bengaluru-based startup intends to use this Series A funding to expand its subscriber base beyond Maharashtra and Madhya Pradesh, accelerate the growth of its inputs marketplace, and refine the existing technology offering.

Agritech NSE 0.40 % start-up BharatAgri has raised \$6.5 million in a Series A round led by agri-focused fund Omnivore. The Bengaluru-based startup intends to use this Series A funding to expand its subscriber base beyond Maharashtra and Madhya Pradesh, accelerate the growth of its inputs marketplace, and refine the existing technology offering.

The round also saw participation from existing investors India Quotient and 021 Capital.

In October 2020, the company had raised an undisclosed amount as part of its pre-Series A funding round Binny Bansal-backed 021 Capital and existing investor India Quotient, Better Capital and Ajay Prabhu.

The company plans to launch its Series B round in January 2022.

Founded in 2017 by Sai Gole and Siddharth Dialani, BharatAgri offers farmers an app-based platform for AI-based agronomy services on a paid subscription basis,

which increases farm incomes through systematic implementation of scientific farming techniques.

According to the company, traditional farming practices fail to factor in changing climatic conditions, dwindling natural resources, and optimal use of expensive crop inputs.

“BharatAgri’s proprietary algorithm collects data on more than 30 critical parameters to provide customized advisory across multiple crops, including grains, pulses, fruits, and vegeta-





bles. Farmers get a fully digital and automated service that provides targeted insights at appropriate times and regular monitoring of crops,” the release said.

“Even three years ago, it was unimaginable that rural Indians would be paying monthly subscription fees to Netflix and YouTube, which is normal today. BharatAgri has demonstrated that the same is possible with farmers, who see so much value in our advisory platform that they willingly pay subscription fees,” said Siddharth Dialani, cofounder and CEO of BharatAgri. “In the next few months, we will be expanding our platform to provide other agricultural services, starting with direct-to-farmer agri input supply.”

Over the past 12 months, BharatAgri has experienced 20x growth in paid subscription sales with a 65% renewal rate. BharatAgri currently has over 33,000 active paid users and aims to expand its subscription base to 150,000 by March 2022. The farmer population on the platform is evenly split between those growing horticulture crops and those growing commodity crops. On average, farmers pay approximately \$8.00 (Rs 600) per acre for a six-month subscription, the release said. “Making agronomy services widely accessible at an affordable price can help make the dream of doubling farmer

incomes a reality,” said Mark Kahn, managing partner at Omnivore. “We have observed in rural areas and specifically in agriculture that farmers like to fulfill all their needs from a single place, which is currently an inputs retailer. BharatAgri has the potential to replicate the same on a digital platform and tens of thousands of farmers have already adopted it,” said Madhukar Sinha, general partner at India Quotient.

Agri-tech startups are now increasingly attracting capital from venture capital and private equity funds. A July 2021 report by Bain & Co. says that agri-tech and agri-ecosystem sectors have received significant interest from the investor community, making India the third-largest country in terms of agri-tech funding and the number of such startups.

According to the report, several estimates show that by 2025, the value pool will be created in agri-logistics, offtake, and agri-input delivery will be anywhere between \$30-\$35 billion. Some of the marquee companies that have raised capital from risk investors include, Ninjacart, AgroStar, Mahyco Grow, Husk, WayCool Foods and Products, Jumbotail, Vahdam, and DeHaat (Green AgRevolution).

Source : economictimes.indiatimes.com

GramCover banks \$7m Series A, aims to insure 10m Indian farmers in next 3 years

Indian rural insurance startup GramCover has raised \$7 million in Series A funding. The round was co-led by Inflexor Ventures and Siana Capital. Stride Ventures was a first-time investor to participate in the funding, alongside existing backers Emphasis Ventures, Flourish Ventures, and Omidyar Network India.

This follows the pre-Series A round it closed in May 2020, which involved existing investor Omnivore, among others.

Launched in 2018, the Noida-based startup is using an online-to-offline paradigm to make insurance more accessible for farmers and their communities across rural India.

Central to this offering is its “point-of-sale-person” — or “POSP” — model, under which agents can sell insurance policies and make payouts using a smartphone to connect to GramCover’s platform.

Co-founder and director Jatin Singh

came up with the idea for GramCover while working with his other agtech startup, weather forecasting service Skymet. By providing weather-related data to smallholder farmers and crop insurers alike, he’d noticed that a gap in the market existed for accessible and affordable insurance aimed at smallholders and the rural communities they belong to — and which make up more than two-thirds of the country’s population.

“I realized the concept of insurance didn’t really exist in rural India,” he told AFN. It looked like a “great opportunity; if we [could] get a distribution network in place, we’d be looking at billion-plus-person market.”

Clearly, the rapidly expanding constellation of smartphones and wireless connectivity across India would be the route to get there. But Singh and co-founder Dhyanesh Bhatt — who is now GramCover’s group CEO — soon understood the solution wouldn’t be as simple as getting everyone to download



an app. “If you look at India in the last couple of years, lots [of people] have gained access to data and the internet,” Bhatt told AFN. “But in rural India, it’s mostly to connect socially via WhatsApp or Facebook, or to consume video or audio content. [The rural] consumers’ comfort and ability in terms of doing financial transactions online right now is still fairly low.”

GramCover decided it’d make more sense to have a network of partners on the ground, selling policies and making payouts in person — while giving rural consumers an actual human being to deal with, Bhatt said.

“We saw it’s good if you have someone



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locally who builds that comfort, that [the consumers] have someone they can go to – to create that access for insurance in the first place, and also helping the customer at the point of claim.”

GramCover’s rural agents are trained micro-entrepreneurs, according to Bhatt, and include housewives, students, and “village-level” businesspeople, among others.

“They have a smartphone, typically a two-wheeler to travel around, and a basic understanding of insurance,” he added.

GramCover claims that, in the past year, it has served close to 1.7 million rural customers, providing crop, livestock, motor, and health insurance worth ₹1.1 billion (\$14.8 million) in premiums. It says it has insured 3.7 million farmers since it launched three years ago, and its objective is to insure 10 million farmers in the next three years, with a premium target of ₹10 billion (\$135 million).

With that in mind, it’s using the Series A funds it has raised to shore up its tech platform and expand its on-the-ground presence.

While it will make inroads into new markets within India, GramCover will focus on enhancing its presence in the 13 states – covering around 8,000 villages – where it already operates. “Given the vastness of the geography, it makes more sense to have deeper penetration in some of those [states],” said Bhatt.

Siana Capital partner Dinesh Goel said in a statement that the GramCover team understands “the key nuances of scaling up the non-urban segment of insurance distribution,” which he described as “a gigantic opportunity” in India.

“With a solid end-to-end deep technology platform in conjunction with a human-assisted local agency network, we feel GramCover is well positioned to continue its high growth trajectory. Further, the business model helps achieve the twin objectives of profitable growth and providing livelihood risk protection to a large rural population of India,” he added.

By Jack Ellis

Source : <https://agfundernews.com>

India’s Proeon raises \$2.4m seed funding to supply plant-based protein industry

Proeon, a startup developing a range of plant-based proteins for food manufacturers, has raised \$2.4 million in seed funding. The round was led by Shaival Desai, vice president of advanced products and marketing at restaurant management platform Petpooja. Several other angel investors participated in the round, including Sanjaya Mariwala, managing director of nutraceuticals company OmniActive Health Technologies, as well as VC firms Flowstate Ventures, Peak Sustainability Ventures, and Wao Partners.

Founded in 2018, Proeon is creating what it calls “high quality” base in-



gredients for the plant-based protein industry with “superior nutritional, functional, and sensory properties.” Its product range includes proteins derived from amaranth, chickpea, hemp seed, and mung bean.

The Pune-based startup says its technology helps to solve “critical formulation challenges at the ingredient level, making it easier for food companies to make tastier and healthier plant-based meat, dairy, and egg replacement products.” It works with its customers to select and adapt suitable protein ingredients in order to get the right balance of attributes like solubility, emulsification, and gelation.

Proeon says it is collaborating with brands in Europe, North America, and Southeast Asia on “highly functional” plant-based egg as well as “clean-label” burgers, patties, and dairy alternatives.

“By relentlessly focusing on innovation and partnering with large global brands

as well as startups, we are working towards creating food products that are hassle-free to formulate, and are loved by consumers,” founders Kevin Parekh and Ashish Korde said in a statement.

“We are at the center of creating next-gen plant protein ingredients and are delighted with the trust shown by our investors.”

Proeon will use the seed capital to fuel its growth plans. This includes the establishment of an R&D facility in the Netherlands, as well as intellectual property filings and hires to build out the team. The startup’s geographical focus will be on expanding its presence in Europe and North America, where it sees uptake of plant-based protein products among consumers and manufacturers alike “accelerating at an unprecedented pace.”

India’s alt-protein and novel foods segment has undergone something of a mini-boom in recent months. According to AgFunder data, investment into the ‘Innovative Foods’ category in the country was so insignificant in the 2019-2020 financial year that it didn’t feature in the firm’s 2020 India Agrifood Startup Investment Report [disclosure: AgFunder is AFN’s parent company.]

But funding has certainly seen an uptick since then. In July, Udaipur-based GoodDot secured an undisclosed amount of funding from investors including Sixth Sense Ventures for its lineup of plant-based analogs for beef, chicken, and mutton. Faridabad’s plant-based seafood specialist Mister Veg netted \$560,000 funding in April; while Mumbai-based egg replacement startup Evo Foods has raised over \$1 million since the start of this year.

And, just in the past 24 hours, Bengaluru-based Goodmylk – which produces milk, yogurt, and cheese from peanut and other plant sources – has announced the close of a \$1 million seed round.

By Jack Ellis

Source : <https://agfundernews.com>



Trendy microgreens could help feed the world



Microgreens started decades ago as fashionable, high-value gourmet greens, but a new study suggests they have the potential to help provide global nutrition security.

The tiny plants have gained popularity among consumers for their nutritional profile and high content of antioxidant compounds.

As part of a project titled, “Food Resilience in the Face of Catastrophic Global Events,” researchers have found that these vegetables can be grown in a variety of soilless production systems in small spaces indoors, with or without artificial lighting. The findings are especially relevant amid a pandemic that has disrupted food supply chains.

With microgreens, people can produce fresh and nutritious vegetables even in areas that are considered food deserts, says team leader Francesco Di Gioia, assistant professor of vegetable crop science in the College of Agricultural Sciences at Penn State.

“The current COVID-19 pandemic revealed the vulnerability of our food system and the need to address malnutrition issues and nutrition-security inequality, which could be exacerbated by potential future emergencies or catastrophes,” he says. “Nutrient-dense microgreens have great potential as an efficient food-resilience resource.”

Grow your own

Microgreens’ nutritional profile is associated with the rich variety of colors, shapes, textural properties, and flavors obtained from sprouting a multitude of edible vegetable species, including herbs, herbaceous crops, and wild edible species.

With a short growth cycle requiring only minimal inputs of fertilizer, microgreens have great potential to provide essential nutrients and antioxidants, Di Gioia notes.

Using simple agronomic techniques, it is possible to produce microvegetables that could address specific dietary needs or micronutrient deficiencies, as well as nutrition-security issues in emergency situations or in challenging environmental conditions.

Consumers could produce microgreens at home using simple tools available in a kitchen, Di Gioia points out. A grower also would need seeds, growing trays, and a growth medium—which could consist of a common peat or peat and perlite growth mix.

Microgreens in space

Given all the characteristics of microgreens, scientists at NASA and the European Space Agency also have proposed them as a source of fresh food and essential nutrients for astronauts engaged in long-term space missions. And because microgreens may be used

as functional food to enhance nutrition security under current conditions and during future emergencies or catastrophes, Di Gioia suggests that microgreen production kits including seeds could be prepared and stored, then made available when needed.

“Under such circumstances, a variety of fresh and nutrient-rich microgreens could be grown providing a source of minerals, vitamins, and antioxidants in a relatively short time,” he says. “Or alternatively, kits could be distributed to vulnerable segments of the population as a short-term nutrition-security resource.” Di Gioia presented the research, which appears in *Acta Horticulturae*, virtually during the International Symposium on Soilless Culture and Hydroponics.

Additional researchers are from the University of Thessaly, Magnissia, Greece; Instituto Politécnico de Bragança, Centro de Investigação de Montanha, Campus de Santa Apolónia, Bragança, Portugal; and the Horticultural Research Laboratory at the US Department of Agriculture’s Agriculture Research Service. Open Philanthropy and the US Department of Agriculture’s National Institute of Food and Agriculture supported the work.

Written by Jeff Mulhollem, Public Relations Specialist/Science Writer, Penn State University

Source: Penn State



What is Airbnb farming and could it improve the wasteful food supply chain?

In 2011, amid Spain's economic crisis, brothers Gabriel and Gonzalo Úrculo quit their jobs to return to the beautiful orange grove in Valencia where they had grown up to revive the family fruit business.

But they soon encountered problems. The low prices paid by supermarkets and other intermediaries made it almost impossible to make a living. On top of that, part of the harvest would always go to waste because they couldn't sell it.

So in a bid to disrupt what they saw as an inefficient and opaque food supply chain, they came up with an idea to cut out the middleman and harvest fruit "on demand" for individual customers.

The brothers put their trees up for "adoption," allowing people to pay for each tree's care in return for receiving the harvest when it was ready. The customers knew they were getting good fruit from a small farm using sustainable methods. The farmers got a guaranteed price for a certain amount of fruit in advance of the season, allowing them to plan better and reduce waste.

In 2017, they expanded the idea outside of their own orange grove and launched CrowdFarming.com - a platform that works a bit like Airbnb for agriculture. Customers can log on, read about a farm, who runs it and the methods they use. They can then adopt a plant or part of a field to receive the harvest - whether it's avocados from Spain, or potatoes from Germany, or even wine from France. If there's any leftover, customers can also order boxes of surplus food.

The platform had been slowly growing in popularity but last year's lockdowns gave it a massive boost. More people were turning to online grocery

shopping or looking for new ways to make sure they could access fresh food. Sales tripled, and the number of farmers signed on to the scheme also doubled. CrowdFarming says it is now serving 200,000 households across Europe - particularly in Germany, Austria, France, and the Nordic countries.

"Europeans have been demanding more organic and sustainable products for years, and the pandemic has only accelerated this shift in consumer behavior," says co-founder Gonzalo Úrculo.

As for farmers, "many have seen their traditional sales channels collapse because of the coronavirus crisis."

How does it shorten food supply chains?

CrowdFarming is ambitious. In its marketing materials, it insists it is "not trying to digitalise the traditional food supply chain. We are not an online supermarket. We are building technology for a new food supply chain that allows new experiences for consumers, stable income for farmers, and that rethinks the whole cultivation, harvest, and logistic process."

It's one of a spate of initiatives that have sprung up in recent years to "shorten" the food supply chain, offering customers more transparency about where their food is coming from and giving farmers respite from the pressures of supplying supermarkets.

Emerging models include community supported agriculture (CSA), where residents share the risks and rewards of the harvest with a local farmer through arrangements such as co-ownership or investment in a farm; and online farmers' markets. It usually involves a distributor working with local farms to bundle items for the consumer.

CrowdFarming involves elements of both. "I think these hybrid models are becoming more popular," says Danielle Nierenberg, president of the Food Tank, a think tank focused on fixing the food system, "whether it's preventing food waste or supporting regional food systems."

"These kinds of innovations were being developed pre-pandemic, but the need for farmers and food businesses to pivot is increasing their spread."



Ordering in bulk requires ‘a mindset shift’

Operating across Europe, CrowdFarming offers a far bigger network than most online farmers’ markets or CSA models. Customers also don’t have to rely on options available in their local area. But there is no middleman to “bundle” items together - central to the goal of reducing inefficiencies is that customers buy directly from the farmers. That typically means buying in bulk. “It requires a mindset shift on the part of the consumer,” says Abigail, 38, who works in tech in the U.K and has used CrowdFarming to adopt a sheep (receiving the cheese from its milk in return), an orange tree and a walnut tree.

“It was intimidating at the start... but it pushed me to think and research the ways in which people traditionally manage large harvests,” she says. While things like cheese and nuts can last a long time, she has had to learn how to dry, pickle and candy citrus fruit to preserve parts of her orders - skills she thinks others may have learned during lockdown too.

For Abigail, the past year increased the appeal of options like CrowdFarming because access to fresh food hasn’t felt so reliable. “I think understanding how much we rely on, for example, mainland Europe for our fresh fruit has expanded, and people want to explore ways they can take responsibility for their own food,” she says.

A relative newcomer to the idea, 44-year-old Karin Gstöttmayr who lives with her family in Switzerland, recently made her first order of a 4kg box of avocados. They came with storage instructions to help the fruit ripen gradually.

“It worked out perfectly,” she says. “We were able to stretch the consumption to almost three weeks. They were flawless and delicious.” Some customers also split large deliveries with friends and neighbours.

Karin puts the platform’s surging popularity down to a growing desire to make consumption “more conscious, to tackle climate change and to feel independent from the ‘big, evil corporations’.” CrowdFarming has a “very personal set-up” which fits this perfectly,

she says.

What are the environmental benefits?

These social and environmental benefits are at the heart of what CrowdFarming claims to be doing. All the farms it lists are organic and have to meet certain sustainability requirements in terms of their production methods, packaging and working conditions.

Pandemic permitting, adopters can even visit the farms to check it out for themselves. The idea is that transparency incentivizes sustainable practices, and farmers can invest more in it because they are receiving a higher price for their produce.

Marco Jostmeier, a potato farmer in Germany who sells through CrowdFarming, notes that this level of transparency and personalization comes with “a huge amount of extra work” for the farmer. But for his team, being able to set their own price for their product and have a more personal relationship with customers means “we are happy to do it.” “We believe that the bond between producer and consumer will strengthen in the future and that more consumers want to know where their food comes from,” Jostmeier says. “CrowdFarming is not the only way but... it is one good way.”

The online platform is much less local than many sustainable food models. Still, Úrculo argues that it is far more environmentally-friendly for European customers to buy avocados or mangoes from Spain than from South America or Asia, where these products would typically be shipped from.



“Transportation represents 6 per cent of total greenhouse gas emissions in EU food-chains,” he says. “The most important factor is what we cultivate and how we do it.

“A short, fast, and efficient supply-chain reduces energy consumption and thus CO2 emissions.” While the social and environmental impacts can be hard to unpick, Karin and Abigail say they hope they are contributing to a positive change - even if in a small way.

“Eating oranges thousands of miles from their origin is always going to come at some cost ... but what I’ve read and experienced is sufficient to suggest to me that I am making reasonable enough choices,” says Abigail.

Karin agrees. The social and environmental benefit “is important to me,” she says. “I hope I am supporting a good cause here enjoying guacamole.”

By Jessica Abrahams

Source : www.euronews.com





How the agricultural sector can win the war on waste

According to the UN Environment Programme's Food Waste Index Report 2021, nearly one billion tonnes of food is wasted globally each year. In a world in which one in nine are hungry or undernourished, nearly a third of the food produced goes to landfill or is ploughed back into fields.

COVID-19 threw the issue of food waste into stark relief for those fortunate enough not to spend too much time worrying about food security. One of the enduring images of 2020 was the footage of thousands of litres of milk from dairy farms being poured down the drain, as demand from the hospitality sector plummeted.

A shift in behaviour

One side-effect of lockdowns was that consumers became more aware of the amount of food wasted in their households. The volume of domestic waste dropped by a fifth in the UK during each lockdown, and people's patterns of consumption changed. Notably, 63 percent of British shoppers bought food in smaller quantities and more than three-quarters (76 percent) chose more frozen food. However, we can't yet be certain that this will last, and there are still significant numbers of consumers who aren't prepared to factor food waste ethics into their shopping habits.

The onus should not be placed solely on

consumers to solve the issue of waste. One solution might be for businesses, governments and NGOs to nudge consumers towards making sustainable choices. For example, information campaigns might focus on the so-called 'adjacent benefits' of such choices – for example, home freezing saves money as well as reducing waste. Shops might help to reduce waste by making sure they don't offer 'buy one get one free' discounts on perishable foodstuffs.

Pulling together across the chain

In recent years we have seen the retail and hospitality sectors taking steps to reduce waste. However, the amount of food wasted in these sectors (two percent and five percent respectively) pales in comparison to the 14 percent of produce wasted between harvest and retail. Stakeholders across the agricultural supply chain don't just have an ethical duty to address this, but a commercial imperative, too. If consumers are doing their bit to act responsibly on waste, they are likely to take a dim view of businesses that fail to step up.

No corner of the food chain is free of waste. I have argued before that the agricultural industry should aspire to develop fragmented supply chains into a collaborative and non-linear, data-led network. A truly connected system using a common language would make it possible to identify exactly where food waste is happening and take collective

- Nearly one billion tonnes of food is wasted each year, with 14 percent of waste happening between harvest and retail.
- The sector could use technology and data transparency to stop food being rejected when it arrives at the buyer, instead diverting it for use elsewhere.
- Supermarkets and restaurants are the most visible sources of waste, but it is businesses further up the production process that need to do most to get their houses in order.

remedial action. With so many players involved from harvesting to processing, logistics and more, this remains a long-term goal. But there are also interim solutions that can be put in place now.

The benefits of collaboration

Closer collaboration between growers, agronomists and agricultural manufacturers can already help maximise yields at field level and also prevent food spoilage. For example, if an agronomist has access to granular, field-level data (such as soil, seed variety, scouting, sunlight and rainfall) they can advise more confidently on inputs, such as fertiliser and pesticides, to mitigate adverse weather patterns.

Read full @ <https://bit.ly/3oFjRHH>

Source : World Economic Forum



UK football club is trialling edible coffee cups

The pitches may be green – but how sustainable is soccer?

Next year, we are being promised the world's first carbon-neutral FIFA World Cup. Pulling this off will be no mean feat – from construction to travel and accommodation, Qatar 2022 is expected to produce up to 3.6 million tonnes of CO₂.

The event plans to tackle its emissions through a variety of measures including offsetting, reusing construction waste, and building a stadium from recycled shipping containers.

And across the sport, there are many other examples of small changes that could have a big impact if widely adopted. Here are some of them.

Coffee cups you can eat

In England's Premier League, Manchester City Football Club is trialling a sustainable coffee cup that you can eat.

The edible cups, from Scottish company BioBite, are made from wafer that is said to stay leak-proof for up to 12 hours once filled with hot drinks.

If successful, they could provide a solution to a sizeable problem: an estimated 2.5 billion disposable coffee cups are used in the UK every year – the majority of which are not recycled, according to a House of Commons report.

Sustainable shirts

Forest Green Rovers, a football club based in Gloucestershire, England, is trialling a sustainable soccer kit made from recycled coffee bean waste. Each shirt is made from three cups of used beans and five plastic bottles. And they are not the only way Forest Green is living up to its name.

The team, dubbed “the world's greenest football club”, became the first to be certified carbon neutral by the United Nations in 2017. It is owned by Dale Vince, the founder of green energy company Ecotricity.

Dutch innovation

Johan Crujff Arena in Amsterdam, the home of Dutch football club Ajax, claims to be one of the most sustainable stadiums in the world.

- English soccer club Manchester City is trialling an edible coffee cup made from leak-proof wafer.
- Another English team, Forest Green Rovers, has tried sustainable shirts made from recycled coffee beans and plastic bottles on for size.
- FIFA is aiming for Qatar 2022 to be the first carbon neutral World Cup

Its approach ranges from big investments in green energy to creative ways to use waste. The stadium is powered by 4,200 solar panels on the roof and a wind turbine. Grass mown from the pitch, meanwhile, is taken to a local farm to feed goats whose milk is turned into cheese – which is then sold in the stadium.

Sustainability will take centre stage at this month's World Economic Forum Sustainable Development Impact Summit 2021. Over four days from 20-23 September 2021, the meeting will bring together leaders across sectors to accelerate progress towards the United Nations' 17 Sustainable Development Goals.

These goals were adopted by the UN's 193 member states in 2015 and include combatting climate change and ending poverty, inequality and hunger by 2030.

Written by Victoria Masterson, Senior Writer, Formative Content

Source : World Economic Forum.





Investing in trees



Global companies are restoring forests

THE IMPACT. Companies from across sectors are working together through the World Economic Forum's [1t.org](https://www.1t.org) initiative, which supports a global movement to support 1 trillion trees by 2030. With the launch of their global pledge process in September 2021, over 20 companies have committed to conserve, restore and grow more than 2.5 billion trees in over 40 countries.

Companies work collaboratively through the [1t.org](https://www.1t.org) Corporate Alliance to drive impact by committing to leadership, action, integrity, transparency and learning. The Alliance manages workstreams that allow companies to tackle common challenges jointly, and connects enterprises with [1t.org](https://www.1t.org)'s community of innovators, partners and regional chapters.

Companies with a high dependency on forests such as consumer goods companies are adjusting practices within their supply chains to improve business resilience. For example, Nestlé has committed to planting 200 million trees in and around farms where the company sources its ingredients. By 2022, 2.8 million shade trees will be distributed in Côte d'Ivoire and Ghana, providing vital ecosystem services that are beneficial to cocoa farms through shade and improved soil health.

Other companies have limited direct impact on forests through their supply chains. For instance, AstraZeneca has committed to establishing 50 million trees globally by 2025 with 1.7m trees planted to date. Up to 40,000 Indonesian farmers are expected to benefit from agroforestry training

and support, and the project is already employing hundreds of local people in roles where they are gaining skills in seedling propagation, sustainable harvesting, organic fertilizer production and pest control. In line with [1t.org](https://www.1t.org)'s recommendations, AstraZeneca tracks both environmental and social co-benefits of forest restoration.

WHAT'S THE CHALLENGE?

Forests are critical to the health of the planet. They sequester carbon, regulate global temperatures and freshwater flows, recharge groundwater, anchor fertile soil and act as flood barriers. They harbor 80% of the world's terrestrial biodiversity, and are a treasure trove of innovation and a source of subsistence and survival for 350 million people.

Degradation and loss of forests are destabilizing natural systems on a scale unseen in human history. We have lost nearly half of the 6 trillion trees that existed on Earth before the onset of agriculture 12,000 years ago. Each year, despite ardent conservation efforts, we lose around 15 billion more.

Conserving and restoring degraded forest landscapes are essential to combating global climate change and preventing biodiversity loss. Learn how companies are doing their part.



Foreign Agriculture

collaborating with a group of partners to connect 1t.org's reporting process with geospatial platforms and ground-level data collection. For instance, Tentree's Veritree uses blockchain to validate successful planting efforts through collecting and sharing ground-level data. Restor informs and connects restoration initiatives, using geospatial data layers.

Further, 1t.org hosts stakeholder engagement in our regions of focus which include: the Amazon Basin, China, India, the Sahel's Great Green Wall and the United States. Through the 1t.org US Chapter, launched in August 2020, organizations with headquarters in the US or with forest activities in the US have pledged over 50 billion trees from over 70 organizations, including companies, NGOs, cities and states. With regional working groups on relevant topics like forest carbon, the US Chapter demonstrates the power of a global-local multistakeholder approach.

HOW CAN YOU GET INVOLVED?

Collaboration and partnerships are key to meet the 1 trillion trees vision.

We encourage companies that have committed to set a company-wide emissions reduction target, such as a 1.5°C Science-Based Target or credible net-zero goal by 2050, to pledge their forest commitments.

The global goal to conserve, restore and grow 1 trillion trees is ambitious but it is achievable.

Image Courtesy: UNSPLASH/Kazuend

Written by Alexander Court, Marketing Communications Lead, World Economic Forum

Source : www.weforum.org

Deforestation and forest degradation are responsible for 15% of the planet's greenhouse gas emissions and are primary drivers of species loss and extinction.

The cost to business is increasingly evident. More than half of our annual global GDP, or \$44 trillion, is potentially threatened by nature loss because business depends on nature and its services. As trees disappear, the services they offer are undermined, reducing the productivity of soils and natural carbon sinks, diminishing our access to clean water and reducing our resilience to extreme weather events.

OUR APPROACH.

Launched at the World Economic Forum Annual Meeting 2020 in support of the UN Decade on Ecosystem Restoration, 1t.org supports the growing momentum around nature-based solutions as a means to help address climate change and nature loss.

1t.org engages the private sector in the 1t.org Corporate Alliance by facilitating a learning environment around ecologically and socially responsible approaches that meet the needs of forests, local communities, and global decarbonization goals. For instance, 1t.org profiles global standards like the IUCN Global Standard on Nature-based Solutions to help ensure planning is informed by local knowledge and scientific evidence. When conservation and restoration initiatives move to the implementation stage, the 1t.org Corporate Alliance requires members to report annually on progress to foster accountability.

With rapid advances in monitoring technology, 1t.org is



VAIKUNTH MEHTA NATIONAL INSTITUTE OF CO-OPERATIVE MANAGEMENT

(A National Institute of Ministry of Agriculture & Farmers Welfare, Government of India)

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ADMISSION NOTICE

POST GRADUATE DIPLOMA IN MANAGEMENT- AGRI BUSINESS & MANAGEMENT - PGDM- ABM (2022-24) 30th BATCH

(Approved by All India Council for Technical Education & Recognized as equivalent to MBA degree by Association of Indian Universities and Accredited by National Board of Accreditation, New Delhi)

CAT, MAT, XAT, ATMA, GMAT, and CMAT (NTA) scores are accepted

Candidates can apply online on VAMNICOM website with valid score of CAT/ MAT / XAT / ATMA/GMAT/ CMAT (NTA) from 11th January 2022 to 31st March 2022 OR send the application form with required documents by post alongwith demand draft of Rs. 500/- in favour of the "The Director, VAMNICOM, Pune".

Dr. Hema Yadav
Director

Question

Q&A

Answer



01

DESIGN OF DRIP IRRIGATION SYSTEM

shishyapr: Any latest printed books or free-downloads regarding how to step-by-step design a drip irrigation system based upon the already-decided crops & their periodic water requirement? Or, can someone do a design for my specific requirement, given that I have just cleaned up my farm and am ready to install the drip irrigation hardware and to then plant my saplings?

Answer 1 -- garao56: Please inform the crops / fruit plants to be taken up on the land

Answer 2 -- man1950: have read somewhere that you can use waste Bisleri Bottles, Flexible Plastic Tubings for drip irrigation. Please try about 5 or 10 Bisleri Bottle first and then install on your entire farm if the results are satisfying for you.

Answer 3 -- drsantos: hi, I can give best possible design and drip options available.

Answer 4 -- garao56: Depending upon the crop's requirement we can arrange the drip systems already designed by the manufacturing companies

Answer 5 -- minalahm: Please send me contact number, Sure, I will help you.. and 2nd thing where are you from please. Regards..

02

CONSIDERATIONS WHILE CHOOSING AGARWOOD/SANDALWOOD/SRI GANDHAM AS INTERCROP

nkpaladugu: Hi I'm considering to plant Agarwood/sandalwood/sri gandham as intercrop in my palm oil (1yr) & coconut (10 yr) in telangana. Climate wise all 3 are suitable in Bhadrachari district in Telangana. I'm looking for something that would be beneficial in longer time i.e. >10 yrs. Wanted to know what could be considered while choosing one of these to plants as intercrop in palm oil & coconut like the aspects of marketing conditions, cutting/export policy restrictions by Govt etc. Thanks

Answer 1 - garao56: Even though the Sandal wood (Srigandham) survives on 100 varieties of other plants (Hosts) in wild conditions, it will attain better growth if grown in Citrus gardens, Avisha, Custard Apple etc. If at all you want to grow the sandal wood in Oil palm and coconut shade will be coming growth may not be there and host support is limited.. Please think of once again before planting. Instead of sandal wood go for areca nut, cocoa and banana, pine apple, betel wine etc.

nkpaladugu: Thank you sir. Valuable insights. However, I stay outside of India, I have severe issue with farm care taker & agricultural workers if I go with cocoa, banana, areca nut etc. I'm looking for crops like agar wood/sandal wood etc which doesn't need continuous monitoring.

Also, from your reply, I got a feeling that you treat Sandal wood and Srigandham as same? aren't they different trees sir?

Answer 2 - garao56: Sandal wood takes nearly 25-30 years to fetch us returns where as agarwood will take only 8-15 years to mature and fetch us good returns, Please take up agarwood.

REQUIRE VERMICOMPOST PROJECT CONSULTANT

gosampada: Looking for a consultant to setup a Mid-Scale Vermicompost Plant near NCR. Consultant should be well versed in Latest Technical and Financial aspects including Subsidies available from Government.

moronx: Same here, even I am looking for a consultant in Palghar District

Answer 1 -- drsantos: I can provide you consulting regarding this.

Answer 2 -- rekha666: We have good experience, and knowledge of making vermicompost, I can provide consulting free of cost contact

RICE PROCESSING

agvenki: We are planning to setup idly rava and rice floor processing unit in West Godavari, Dt, Andhrapradesh. Any guidance or information regarding this.

Answer 1 -- garao56: Please contact us for project report

Answer 2 -- futurezen: Please connect with us.

NEED TRAINING FOR ALOEVERA JUICE MAKING MACHINE SETUP

shubash: I am a farmer with 6 acres of aloe vera, I need training to setup aloe vera juice making machine. Pls update me where I can get training on aloe vera setup.

Answer 1 -- garao56: The gel extraction machine consisted of two stainless steel rollers arranged in horizontal plane. The front roller had more clearance than the crushing roller. The front roller compressed the leaf while crushing roller helped in extraction of gel.

images.healthshots.com





Answer 3 – garao56 : Please inform us the capacity of the unit and accordingly acquire machinery. For detailed project report contact us

06

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 Informa-

tion on

1. How lemon grass can be grown and have network 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 network in Karnataka and project report, plant machinery and buyers in Karnataka.

Answer 2 – garao56: Please avail services and technology from Empero, If any financial assistance is required from banks please consult us for project report.

Answer 3 – darshanprabhu : We are interested in taking your services, kindly contact.

Answer 4 – vermaaditya : Hi, I am interested. Please contact me. I am at Kolhapur

Answer 5 – asahi89 : Send details for Akola, Maharashtra.

Answer 6 – mhammedal : Hiya, 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.

Answer 7 – jayannpol : Sir your personal mobile number and mail

07

NEED GUIDANCE FOR MAIZE PROCESSING INDUSTRY

subbu577: I want to install a maize processing plant can any body please help me by briefing it.

Answer 1 – ashishp111 : One of my friend at Vadodara (Gujarat) having food processing machinery manufacturing unit, with experience of so many factories related to pulses and maize too. They have experience of so many years in this field. If you are interested , please send me your mobile number or contact me

Answer 2 – futurezen : Please connect to us. we have already done projects on maize



GUIDANCE ON TENDER COCONUT WATER POWDER

08

vpatel009: I am looking for complete production process, machinery and all for manufacturing Tender Coconut Water Powder,

If anyone knows or have an Idea then please advise,

Answer 1 – garao56 : In countries like Philippines and Tailand tender coconuts outer skin is chopped like a square bottle and packed sold for tender coconut water, even packaged coconut water is not successful in India as people prefer freshness. The process of extracting coconut water powder may not be successful in our Country

Answer 3 – atas2020: If you are still looking for maize processing machinery, please connect with me. We have installed many successful projects all over India and overseas.

09

IS SOLAR FREEZER AVAILABLE?

chi_abr7: Dear friends does anyone of you have solar freezers or has contact no. of someone who manufactures it.

Answer 1 – shibutmat : Please contact will provide the details.

SOYA MILK AND SOYA PANEER

rajgh29: I want to set up a soya milk and soya paneer making plant in Kolkata, West Bengal. I need training and plant.

10

Answer 1 – garao56 : Dear sri Rajgh29.

Soya milk and soya panner making plant can to be established with a minimum cost of Rs.15.00 to 20.00 Lakhs. You can avail subsidy also from PMEGP scheme (25%) . If you require any project report please consult us .

rajgh29: Yes sir, i want details Project report, please help me

Answer 2 – garao56 : Please obtain latest quotations for machinery and size of work shed and other facilities required .

Answer 3 – maitys : What is the source of your soyabean feedstock ? Soyabean are not cultivated in West Bengal? Procuring soyabean from other states i.e. MP, Rajasthan, Maharastra or North-east

Question

Q&A

Answer

will increase the basic raw material cost initially. Finally, have you done any kind of market survey in Kolkata? Benagli taste buds do not relish soya fresh (Milk, Tofu, Chaap etc.) or fermented products (Miso, Tempeh, Natto etc.) except dried soya chunks ...

Answer 4 – garao56: If there is good demand in your state import raw material from other states

Answer 5 – vivekranawat : I am from Ujjain- MP and our main crop is soyabean only, we can provide good quality raw material. Main challenge is market for soya panner ?

11 WHICH HERBAL PLANTS TO GROW IN MUMBAI AGRICULTURE LAND.

kamilmask: Have a small agricultural land in Bhiwandi area in Mumbai approx. half acre, want to know which herbs to grow so that we have a steady income on it? Kindly contact me

Answer 1 – garao56 : If you want study income on the 0.50 acre land take up plantation of Taiwan Guava , you will be getting study income , 320 plants can be accommodated (high density) , provide drip system, at least 5 tons of guava fruits can be harvested which will fetch 1.50 Lakhs , expenditure is 0.50 Lakhs , you will get Rs.1.00 Lakhs profit. No other type herbal plant will fetch income on a small plot for which there may not be any demand.

Answer 2 – kamilmask : Is there a market for Noni fruit and can we plant and fetch enough on half acre land?

Answer 3 – garao56 : Not so sir somewhat large scale plantation is required , Noni is known to be prepared healthy tonic, but cultivation not much popular in south India

12 HOW CAN WE FARM NANNARI(HEMIDESMUS INDICUS)?

mubaris: How can we farm nannari(Hemidesmus indicus)?

Answer 1 – madhavs1: contact me for nannari cultivation.

INTERCROP FOR COCONUT TREES

nprabhs: Hi, We have a coconut farm with 1 year old and our area is dry during summer situated in western ghats 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 .

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.

14 WATER TREATMENT IN NATURAL METHOD TO REDUCE THE SULPHATE AND CHLORIDE IN WELL

karunaraj: Is there any natural ways to treat the well water from excess of sulphate and chloride in well water suggestions is expected please

Answer 1 – vraja1963 : Please contact me .. thanks



















Image Courtesy : www.fluencecorp.com

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 Production related topics Post all discussions related to producing agriculture products here	554	2.9K
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 Organic Farming Discussions related to organic farming	94	452
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 Wanted If you want to BUY agricultural products & services post your message here	4.9K	20.3K
 For Sale If you want to SELL agricultural products & services post your message here	3.7K	11.4K
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 Contract Farming, Buyback, Investment Discussions related contract farming, buyback, etc	141	1.7K
 Farm Land Discussions related to buying and selling farm land	949	5.3K
 Miscellaneous Topics Discussions related to topics not covered in other forums	48	216
 Events Discussions related to scheduled events, meetings, training programmes etc	407	1.5K
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 Archives - Old Discussion Threads Unsorted posts from old discussion forums (2007 onwards).	110.6K	286.1K

