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Agriculture & Industry Survey

India's Leading Business Magazine for Agriculture

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Netherlands Agriculture

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Netherlands Agriculture

A Tiny country feeds the world !

It is time we in India, more so from Indian agriculture universities and other agri teaching institutes, should become updated with what is happening in other parts of the world. New agriculture research and new agri innovations. We started from here and next few months we read more about other new discoveries and new developments in other parts of the world— Editor

The world agriculture is changing. And how it is changed in the tiny European country The Netherlands! Here are some brief notes from National Geographic magazine. Almost two decades ago the Dutch made a national commitment to sustainable agriculture under a rallying cry, "Twice as much food using half as much resources". Since 2000 the farmers have reduced water for key crops more than 90 percent. They have also completely eliminated the use of chemical pesticides on plants in greenhouses.

The Netherlands is a small, densely populated country, with more than 1,300 inhabitants per square mile. It's bereft of almost every resource long thought to be necessary for large-scale agriculture. Yet it's the globe's number two exporter of food as measured by value, second only to the United States, which has 270 times its landmass. How on Earth have the Dutch done it?

Seen from the air, the Netherlands resembles no other major food producer—a fragmented patchwork of intensely cultivated fields, most of them tiny by agribusiness standards, punctuated by bustling cities and suburbs. In the country's principal farming regions, there's almost no potato patch, no greenhouse, no hog barn that's out of sight of skyscrapers, manufacturing plants, or urban sprawl. More than half the nation's land area is used for agriculture and horticulture.

Banks of what appear to be gargantuan mirrors stretch across the countryside, glinting when the sun shines and glowing with eerie interior light when night falls. They are Holland's extraordinary greenhouse complexes, some of them covering 175 acres.

These climate-controlled farms enable a country located a scant thousand miles from the Arctic Circle to be a global leader in exports of a fair-weather fruit: the tomato. The Dutch are also the world's top exporter of potatoes and onions and the second largest exporter of vegetables overall in terms of value. More than a third of all global trade in vegetable seeds originates in the Netherlands.

The brain trust behind these astounding numbers is centred at Wageningen University & Research (WUR), located 50 miles southeast of Amsterdam. Widely regarded as the world's top agricultural research institution, WUR is the nodal point of Food Valley, an expansive cluster of agricultural technology start-ups and experimental farms. The name is a deliberate allusion to California's Silicon Valley, with Wageningen emulating the role of Stanford University in its celebrated merger of academia and entrepreneurship.

Ernst van den Ende, managing director of WUR's Plant Sciences Group, embodies Food Valley's blended approach. A renowned scholar with the casual manner of a barista at a hip café, van den Ende is a world authority on plant pathology. But, he says, "I'm not simply a college dean. Half of me runs Plant Sciences, but the other half oversees nine separate business units involved in commercial contract research." Only that mix, "the science-driven in tandem with the market-driven," he maintains, "can meet the challenge that lies ahead." The challenge? Put in bluntly apocalyptic terms, he says, the planet must produce "more food in the next four decades than all farmers in history have harvested over the past 8,000 years."

That's because by 2050, the Earth will be home to as many as 10 billion people, up from today's 7.5 billion. If massive increases in agricultural yield are not achieved, matched by massive decreases in the use of water and fossil fuels, a billion or more people may face starvation. Hunger could be the 21st century's most urgent problem, and the visionaries working in Food Valley believe they have found innovative solutions. The wherewithal to stave off catastrophic famine is within reach, van den Ende insists. His optimism rests on feedback from more than a thousand WUR projects in more than 140 countries and on its formal pacts with governments and universities on six continents to share advances and implement them.

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Online Meetings @ www.agricultureinformation.com

Upcoming events

JULY 6, 2021
3:00 pm
Dr. Praveen Kumar Singh on "Sugarcane Seed Production-Breeding"

05.00 PM
Dr. PK Shrivastava on "How to establish a dairy business successfully"

JULY 7, 2021
3.00 PM
Dr. Arumugam Thangaiah on "Post-harvest technology of fruits and vegetables"

5.00 PM
Dr. G. V. Srinivasa Reddy on "Best practices for be(er soil & water conservation"

JULY 8, 2021
3:00 pm
Dr. Siddaram Waded on "Labour saving technologies in Agriculture"

05.00 PM
Dr H.C. Gena on "Wasteland development through afforestation "

JULY 9, 2021
3:00 pm
Mr. Rajender Kumar on "Profitable vegetable cultivation in tropical humid regions"

05.00 PM
Mr. Amol Khandare on "Commercial cultivation of black turmeric and its contract farming"

JULY 12, 2021
3:00 pm
Mr. Rajeshnallaiah on "How to increase soil fertility and reduce input cost"

05.00 PM
Dr. Upendra Singh on "Value addition of fruits & vegetables – Emphasis on drying technology"

JULY 13, 2021
3:00 pm
Mr. Pramod Kumar Maurya on "Farm Mechanization – How farmers can earn more profit by using machines"

05.00 PM
Dr. Lachhman Das Singla on "Early and accurate diagnosis of parasites in proper management of dairy "

JULY 14, 2021
5:00 pm
Mr. Samiran Patra on "Business opportunities in seed production of pabda and koi"

JULY 15, 2021
3:00 pm
Mr. Pankaj Navani on "Data driven dairy management "

05.00 PM
Dr. Sharanabasappa Deshmukh on "The fall armyworm (FAW) – Effective management strategies and future action"

JULY 16, 2021
3:00 pm
Ms. Joanna Kane-Potaka on "Opportunities for millets cultivation and value addition"

05.00 PM
Dr. Sitesh Cha5erjee on "Choosing right pesticides & right methods to protect your crops"

JULY 19, 2021
3:00 pm
Dr. Basavaprabhu L. Patil on "Cu5ing edge technologies for the management of viral diseases in crops"

05.00 PM
Ms. Kshitiz Srivastava on "Vegetable farming – Management of root knot nematodes"

JULY 20, 2021
3:00 pm
Dr. Geetha P.N. on "What is sustainable agriculture? What are the different types of sustainable farming methods?"

05.00 PM
Mr. Thillaikannan Veeraragavan on "Sugarcane development with mechanization to overcome labour problems"

JULY 22, 2021
3:00 pm
Mr. Yogesh Thite on "Egg Processing and marketing"

05.00 PM
Dr. Munish Kumar on "Natural Resource Management for climate resilient agriculture"

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

Dr. Bikash Ghosh on "Improved methods of cultivation of guava"

Dr. Bikash Ghosh is a Retired Professor at Bidan Chandra Krishi Viswavidyalaya in Mohanpur, Nadia District in Bidan, West Bengal. Dr. Bikash Ghosh says guava is one of the nutritious and hardy crop. It can be grown in wide range of soil and climatic condition. Right planting and density is required for sustainable production.

Mr. Vimal Panjwani on "Renewable energy for agriculture / farmers"

Mr. Vimal Panjwani is the Founder & CEO of AgriVijay in Pune, Maharashtra. To know more view https://bit.ly/3i5obwL

Dr. Chandra Kiran Sant on "Opportunities and Challenges in Indian Dairy Sector"

Dr. Chandra Kiran Sant is the Dairy Advisor at Livestock Management Centre in Mumbai, Maharashtra. He is also associated with Gomati Cooperative Milk Producers Union, Tripura as Expert Dairy Development for improving the milk quality & quantity as well as oversee installation of 40000 LPD Dairy Processing Plant. To know more view https://bit.ly/3dAjWqq

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

Dr. V. Vani is the Assistant Professor at Horticultural College and Research Institute in Periyakulam, Tamilnadu. Her interests are Food processing and preservation; Nutrition; Post harvest technology of fruit & vegetables and Quality control of processed products.

Dr. Sunil Sharma on "Papaya - Cultivation, value addition and marketing techniques"

Dr. Sunil Sharma is the Principal Scientist at Indian Agricultural Research Institute, Regional Station in Pune, Maharashtra. His interest is papaya farming. Dr. Sunil Sharma says chilling injury, high soil moisture and prevalence of viral diseases are major roadblocks in a successful papaya cultivation. The best way to cultivate papaya successfully is to avoid these stresses.

Dr. Udai Bhan Singh on "How to establish new orchard & high tech nursery"

Dr. Udai Bhan Singh is the Dean at College of Agriculture, Bharatpur, Rajasthan. His interest is establishment of orchard and high-tech nursery. To know more view https://bit.ly/3gjFxDn

Mr. Lakshmikanth on "Growing tissue culture banana plants"

Mr. Lakshmikanth is the Proprietor of Vigneshwara Biotech in Bengaluru, Karnataka. His interest is growing tissue culture banana G-9 & yelakki plants. To know more view https://bit.ly/3wQ2y8b

Ms. Kranti Choudhari More on "Direct marketing of farm products by farmers to consumers"

Ms. Kranti Choudhari More is an Agriculture Officer in the State Government, Ahmednagar, Maharashtra. Her interest is direct farm to home marketing of agricultural farm product. Ms. Kranti Choudhari More says they have connected farmers and urban consumers through whats app group. The products directly sold by them are vegetables,oils and many kitchen consumables.

Dr. Vijay Mahajan on "Breeding varieties in onion using unique genetic resources"

Dr. Vijay Mahajan is the Principal Scientist at ICAR - Directorate of Onion and Garlic Research in Pune, Maharashtra. His interest is onion and garlic. In this meeting he will cover the methods of breeding varieties in onion and how to produce pure seeds and maintain the variety for different seasons . To know more view https://bit.ly/3hBAGzO

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

Mr. Rajender Kumar, Business Development Manager-South & East Asia, Cravo Equipment Ltd., Canada. The retractable roof production system or RRPS has been developed by Cravo over the last 35 years, to help growers create superior results using a system that combines the benefits of climate optimization, nature and protection. To know more view https://bit.ly/3kJeymi

Ms. Sangita Sharma on "Food Forest, Your Healer"

Ms. Sangita Sharma is the Chair Person and Founding Trustee of Annadana Soil and Seed Savers Network in Bangalore, Karnataka. Her interests are regenerative agriculture, creation of food forests, seed conservation, sustainable living, foods that heal and empowering youth to be the catalysts for ecological change. To know more view https://bit.ly/3qIoYoP

Dr. Mallikarjuna S. Ayyanagowdar on "Issues in current irrigation system and way forward"

Dr. Mallikarjuna S. Ayyanagowdar is the Professor and Head - Department of Irrigation and Drainage Engineering at University of Agricultural Sciences, in Raichur, Karnataka. His interests are Irrigation Water Management, RS & GIS Applications in Irrigation Water Management and Agricultural Drainage.

Dr. TN Prakash Kammardi on"Importance of distribution of farm commodities during Covid"

Dr. TN Prakash Kammardi from Bangalore is the Retired Professor of Agricultural Economics, UASB and Formerly Chairman KAPC . His interests are policy research, advocacy and action related to agriculture, environment, sustainable development and just & equitable society .

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

Dr. Amit Mandal is an Assistant Professor (Fisheries) at College of Fisheries, Guru Angad Dev Veterinary and Animal Sciences University in Ludhiana, Punjab. His interests are Aquaculture Technologies and Fish Culture Practices To know more view https://bit.ly/3hAzTzc

Dr. Jyoti Dhakane-Lad on "Utilization of agro-biomass for green packaging and home-textile"

Dr. Jyoti Dhakane-Lad is a Scientist at ICAR-CIRCOT in Mumbai, Maharashtra. Her interests are Agricultural Processing and Utilization of agro-biomass residues for green packaging. Dr. Jyoti Dhakane-Lad says harvesting of various crops generates large amount of residues both on and off-farm. Globally, biomass production from agriculture is pegged at 140 billion metric tons per year. In India, around 500 million tons of crop residue is generated annually, out of which nearly 140 million metric tons surplus crop residue biomass.

Dr. Priya P. on "Integrated nutrient management in field crops"

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. Prakash Kisanrao Nagre on "How to make vegetable cultivation a profitable venture?"

Dr. Prakash Kisanrao Nagre is the Dean, Faculty of Horticulture at Dr. Panjabrao Deshmukh Krishi Vidyapeeth (Agriculture University), in Akola ,Maharashtra. His interests are Horticulture; Agro - forestry and Silviculture ; Vegetable , fruit and flower cultivation; protected cultivation; spices and plantation crops; nursery management.

Mr. Arvind V on "Mango softwood grafting for better yield"

Mr. Arvind V is the Proprietor of AVR Nursery in Salem, Tamilnadu. Mr. Arvind says that they produce around 12 varieties of mango saplings under Mango Softwood Grafting method.

Mr. Yashpal Morey on "Irrigation system designing and water management in agriculture"

Mr. Yashpal Morey is the Proprietor at Eastern Star Consulting Engineers in Nashik, Maharashtra. His interests are Lift Irrigation Schemes; Pipe Line Design; Water Management : water shed development, farm ponds, check dams etc. ; Poly House Design and Erection.

Mr. Deepak Kumar on "Proper guidance from soil testing to market linkage to increase income"

Mr. Deepak Kumar is the Founder & CEO of Yogitha Biofarming Private Limited in Kharagpur, West Bengal. They are working for small and marginal farmers in remote areas to increase their income through proper guidance from soil testing to market linkage and also protecting the life of soil & ecology by organic farming. Mr. Deepak Kumar says farmers are earning good but due to lack of guidance they can't save the earnings and Yogitha Biofarming is trying to fulfill that gap.

Dr. Nilesh Gaikwad on "Processing and value addition of pomegranate"

Dr. Nilesh Gaikwad is the Senior Scientist at ICAR-National Research Centre on Pomegranate in Solapur, Maharashtra. His interests are processing and value addition of pomegranate; Use of advanced processing technologies post harvest management of pomegranate fruit; Total utilization of pomegranate for food; pharmaeutical and cosmetics industry; Research and development for establishment of pomegranate processing industry for juice, fruit drinks, wine, seed oil, minimal processing, peel extract etc.

Dr. Basavaraju Puttalingaiah on "Agro-forestry: Scope and Sustainability"

Dr. Basavaraju Puttalingaiah is the CEO of House Plus Organics in Mysore, Karnataka. His interests are hybrid seed development and evaluation of farm crops and horticulture crops; Organic food production and marketing with nutritional evaluation; Farm development promotional activities.

Mr. Thomas T V on "Natural vanilla value-added products"

Mr. Thomas T V is the Senior Manager at Vanilla India Producer company Ltd., in Muvattupuzha, Kerala. His interests are vanilla procurement,processing and value addition.To know more https://bit.ly/3twQkik .

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

Mr.Yogesh Kumar Verma is the Deputy Director at Agriculture Department , Government of Rajasthan in Jaipur, Rajasthan. His interests are olive cultivation, protected cultivation and fertigation. Rajasthan Olive Cultivation Limited runs under the brand name Rajasthan Olive Cultivation is owned by Yogesh Kumar Verma located at S.I.A.M. Campus Agriculture Research Institute, Durgapura, Jaipur, Rajasthan.

Mr. Ashvani Shukla on "IoT products that are helping farmers in smart agriculture"

Mr. Ashvani Shukla is the CEO of Aeron Systems Pvt. Ltd., in Pune, Maharashtra. He is a Graduate from IIT Kanpur with specialization in Aerospace Engineering. To know more view https://bit.ly/3hYwVol ; https://bit.ly/3p2BtLP

Mr. Shajath Ali M.K. on "Helping farmers to know about organic farming and marketing of their produce"

Mr. Shajath Ali M.K. is the Chief Executive Officer of Salem Organic Farmers Organization in Salem, Tamilnadu. He is basically an organic farmer, having an organization to help farmers to know about organic farming, marketing of their produce and also give training on inputs preparation. Their main crop is traditional rice and additional products are vegetables.

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

Dr. Chandra Kiran Sant is the Dairy Advisor at Livestock Management Centre in Mumbai, Maharashtra. He is also associated with 1) Gomati Cooperative Milk Producers Union, Tripura as Expert Dairy Development for improving the milk quality & quantity as well as oversee .... To know more view https://bit.ly/3dAjWqq.

Online meetings are available only for Premium Members

Talking to

Dr. Hema Yadav

Director
Vaikunth Mehta National Institute of Cooperative Management

How is VAMNICOM playing an important role in the development of Cooperative Sector?

VAMNICOM, Pune plays an important role for training and development of cooperative sector in the country. The Institute organizes international and national level training programmes on various areas of cooperative management for the in-service officers of Cooperative and Government Department. The institute conducts management development training programmes in various functional areas of management.

Please share the details of different training programs, whom it benefits.

VAMNICOM has four long duration programmes viz. (a) PGDM – Agri Business & Management (ABM) which is equivalent to MBA degree for fresh graduates (b) DCBM programme for in-service officers working in cooperatives and (c)Diploma in Management of Computer Operations for middle level and operational level personnel's in the cooperatives (d) an International Online programme on Agri-business Entrepreneurship is offered as a week end programme for in service personnel's.

Regarding other programmes which includes (short term Management Development programs, webinars & workshops), the institute has conducted 136 programmes and trained 4168 participants during 2019-2020. Out of 4168, 255 participants are from SAARC countries.

You mentioned about PGDM-ABM, how has VAMNICOM become the preferred educational institute for ABM aspirants?

PGDM-ABM programme is one of the most popular among the youngsters which is approved by AICTE and recognized by Association of Indian Universities as equivalent to MBA degree & it has got accredited by National Board of Accreditation, New Delhi. The programme has got industry acceptance which is reflected in our 100 per cent campus placements.

Also VAMNICOM has a very strong and prosperous alumni network who are successful and working at good positions in different Agri input companies as well as banking, microfinance and other sectors. The institute is very active on the various online tools in today's world which keeps the alumni network intact and opening window of opportunities.

As per the guidelines of AICTE, the institute accepts national level test scores such as CAT, MAT, XAT,ATMA,CMAT & GMAT for taking admission in PGDM ABM program.

On what basis do you claim VAMNICOM claims to be among the top-ranked Agri-Business schools in the country?

Very few programmes in the country has got National Board of Accreditation status for their programmes in Engineering, pharmaceutical and Management subject areas. National Board of Accreditation, New Delhi has granted accreditation to two year full-time residential Post Graduate Diploma in Management – Agri Business & Management programme from 1.7.2015. This has been regularly inspected and extended up to 30.6.2022.

Association of Indian Universities (AIU) has granted MBA equivalence status to PGDM-ABM programme from the year 2001 onwards. Now MBA equivalence status of AIU is connected with NBA Accreditation status.

How has VAMNICOM leveraged institutional linkages through consultancy?

The Institute undertakes research projects sponsored by various institutions such as NABARD,IFFFCO including Government of India projects and also engages in consultancy services for various sectors of cooperatives viz., banking, sugar and dairy for IT implementation, recruitment of qualified professional manpower, defining job responsibilities of manpower in IT departments. VAMNICOM has successfully completed manpower recruitment assignment for few cooperative banks & NAFED during 2020.

How is Post Graduate Diploma in Cooperative Business Management enhancing competencies of practicing managers of cooperatives?

This course enables participants from

Topper of PGDM-ABM 2018-20 batch - Receiving award from Honourable Governor of Andhra Pradesh

Dr. Rajagopal, Professor and National Researcher, EGADE Business School, Mexico

Talking to

the Co-operative and allied areas to equip with the appropriate managerial know-how to meet the emerging challenges of today's business environment. The curriculum of the PGDCBM consists of the six modules with Five weeks' intensive on-campus Teaching – Learning sessions and field visits. In view of the current pandemic situation, the entire PGDCBM programme is offered as online mode.

What kind of research projects are currently being carried by the Institute?

VAMNICOM through its "Centre for Research and Publication" formulates policies to nurture quality research culture and facilitate research endeavors. The Institute provides consultancy in various areas of Management to the user organizations through its Action Research Programmes. The institute has completed 18 Consultancy projects in the area of collectives - Cooperatives, Micro Finance and Farmer Producer Organization in the previous year. The research activities are supported by NABARD, NCUI, Ministry of Agriculture & Farmers' Welfare.

The Institute is a recognized Research Centre for conducting research leading to the award of Doctorate Degrees of Savitribai Phule Pune University in the faculty of Commerce and Management with the subjects Financial Management and Computer Management.

What has been the response received by the institute for the Memorandum of Understanding (MoU) signed with various Institutions in India and neighbouring countries for maximising organization of exchange training programmes pertaining to management and development of cooperatives?

VAMNICOM has entered MoUs with eight institutions during 2020. Some of the MoUs are renewal of old association. The details are -

1. MOU with Kolhapur Urban Cooperative Banks Association for recruitment and training programmes

2. Renewal of MOU with National Cooperative College, Mauritius for collaborative training, research & Consultancy services

3. MoU with National Institute of Cooperative Development, Polgolla, Sri Lanka to conduct collaborative training, student exchange programme and Research and consultancy projects.

4. MoU with Agricultural Development Bank Ltd., Nepal for conducting short and long term programmes, study visits/ exposure visits, collaborative programmes, Training of Trainers, Research and consultancy.

5. Banking Finance and Insurance Institute of Nepal Limited For conducting and coordinating in the areas of training, education, research and consultancy services, information technology and other allied services.

6. MoU with Charotar University of Science and Technology (CHARUSAT), Gujarat to collaborate and cooperate in the areas of training, education and 6other knowledge based activities.

7. Yashvantrao Chavan School of Rural Development (YCSRD), Kolhapur for Research, training programmes, student exchange programmes

8. L J University, Ahmedabad to collaborate and cooperate in the areas of training, education and other knowledge based activities

Do you have any professional chair/association with the industry in your institute?

Yes, the institute has Indian Farmers Fertilizer Cooperative sponsored IFFCO chair which is functional for more than four decades. The institute is in the process of reviving NABARD sponsored chair for undertaking research related to agriculture credit.

What are the activities undertaken under IFFCO chair at VAMNICOM?

In order to promote agricultural research and cooperative education in the country, Indian Farmer Fertilizer cooperative(IFFCO) has established IFFCO chair in the institute. This is an outcome of partnership between scientific researchers from both industry and academia to drive innovation in the agricultural sector. Over the last 40 years, the collaboration between VAMNICOM and IFFCO has resulted in developments into practical applications that benefit their programs and members through its research and training. The mutually beneficial partnership has produced groundbreaking research

International Day of Cooperatives

New hostel building inaugurated in November 2020

and innovation that solves complex problems, drives economic growth, and creates a more skilled workforce.

How does VAMNICOM outreach Self Help Groups and Women producers group?

VAMNICOM is undertaking training, research and consultancy in various aspects relating to women development, SHG and micro finance. Institute has created to design, plan and execute programmes of training and research in various fields of women and SHG. Institute has published a manual on Gender Sensitization and Women Empowerment in Co-operatives (Centenary Celebrations). It is collaborating with Ministry of Women & Child Development, GoI, Rastriya Mahila Kosh, Maharashtra State Commission for Women, GoM, Mumbai, National Commission for Empowerment of Women, New Delhi, NABARD, NAFCUB & others. VAMNICOM is also a recognized consultant of Government of India for evaluating women's dairy projects in the country.

Some of the most notable programmes in this regard have been financial literacy programmes for women in development sector in collaboration with NABARD, leadership and governance programme for Maharashtra State Rural Livelihoods Mission and cooperative business management programme for Uttarakhand State Government Livelihood Collectives and Cooperative Societies (Supported by IFAD).

The institute also undertakes timely and contemporary research on women collectives and cooperatives to study the various issues like rural entrepreneurship, rural banking and microfinance, financial inclusion, governance etc. and to document the best practices in the field of agriculture and rural development.

In terms of your faculty, what are some of the strong areas of capabilities available? What are the areas where you feel there is still a shortfall of capabilities?

The faculty at VAMNICOM are assemblage of fine academicians with rich experience in the co-operative sector. The ability of the faculty members to work in synergy with a wide spectrum of collaborators in this field from local to international level makes them stand out. There is not any shortfall necessarily but the faculty can be definitely encouraged to take their proficiency to new heights with innovative and diverse techniques in their training and research activities, contributing towards making the institute the Centre of Excellence. In addition to internal faculty members, experts are invited for offering special sessions.

What are the main challenges faced by the cooperative model today and how does this affect VAMNICOM?

The Covid-19 pandemic situation is having an unprecedented impact on the various cooperative models and the overall businesses as well. Lack of technological innovations and poor information dissemination system have adversely impacted the cooperative sector. Amid these current circumstances, VAMNICOM feels there is a need of strengthening existing business models and exploring new and untapped opportunities for capacity building & technology transfer to the grass root levels of cooperative societies. Moreover, the institute has already been sensitizing people through its training programmes about the Information Technology sector and how it has become a necessity in the development of the agricultural cooperatives and rural financing institutions. VAMNICOM has outreached its stakeholders through webinars and online programmes.

In the wake of several reforms in Agriculture, Banking & coop sector how has VAMNICOM played an important role?

VAMNICOM has played an instrumental role in the ongoing reforms by facilitating development of skills, building market linkages, inculcation of cooperative entrepreneurship, and promoting innovation especially in financial & digital inclusion areas.

What is the roadmap of VAMNICOM for future pathways?

The operational excellence of an institute can be achieved through a proper academic and administrative environment. VAMNICOM which deals in the unique area of cooperation since inception in 1947 in the country has expanded its focus to Agri business sector from 2004.

Further the focus has been enlarged now to collectives- in addition to cooperation, Self Help Groups and Farmer producer organizations. In order to meet the training mandate of Government of India in the areas of FPOs, livelihood missions & skill/ entrepreneurship development, the Institute envisages further diversification of training programmes through the introduction relevant certificate/diploma programmes in the referred areas. In a nutshell, the vision is to make the Institute a Centre of Excellence for cooperatives in the country.

Contact : cme@vamnicom.gov.in

Talking to

Mandeep Verma

Founder, Swaastik Farms, Solan, Himachal Pradesh

Mr Mandeep Verma is the founder of Swaastik Farms, Solan, Himachal Pradesh, and is into cultivating kiwi fruit, apple, and other crops using SPNF practices. He also propagates kiwi fruit plants and sends them to Uttarakhand, Uttaranchal, Himachal, and other North-eastern states. They follow 100% environment friendly cultivation practices and work with holistic approach towards sustainable agriculture.

About his farm, Swaastik Farms, Mr Mandeep says that once the fruits are cultivated, they are packed in crates for wholesale and in attractive small packaging for retail sale. They are preferred by people as Diwali gifts, and these packages come with details of health benefits. The fruits are also packed in biodegradable bags with Kiwi fruit recipes on the bags. These fruits boost the income of the farm. They also have a nursery system that provides quality seeds to be sent abroad. The farm follows multi-cropping strategy to increase the income.

Mr Mandeep in a recent interview talks about Kiwi fruit cultivation, marketing, and the economics involved in the process. It is in the recent years that Kiwi fruits have gained popularity in India because of the adaptation to climate, yield per acre, nutritive value, low infestation, and pest and disease. The fruit was earlier known as Chinese Gooseberry but was renamed as Kiwi in New Zealand in the year 1959. The plant grows in land 900 to 2600 metres above the sea level. It requires well drained soil and below 35 degrees Celsius of temperature with chilling hours of about 700 hours minimum.

The fruit is a rich source of Vitamin C and E and has lots of health benefits. In 100 g of Kiwi, you will find 64 mg of Vitamin C. They are highly nutritious too. After 7 to 8 years of plantation, each vine gives about 80 kgs of fruits. They are harvested between October to November each year when it is a lean period for other fruits. They start ripening after 15 to 20 days of harvesting from the vines. The fruits do not require any sophisticated packaging and can be sent to other places. They can also be stored in room temperature and 5 to 6 months in cold storages. The main varieties of the Kiwi fruits are Allison, Heyward, Monty, and Bruno, and they vary in size and taste.

Mr Mandeep points out that it was in Lalbagh in Bangalore that the fruit was first cultivated in India in the year 1960. But due to insufficient chilling hours, it was later stopped. The second successful trial was done in Shimla in 1964. With scientific packages and practices, the fruit cultivation has now been extended to mid hills of Himachal Pradesh, Uttarakhand, Jammu and Kashmir, Arunachal Pradesh, Sikkim, and Meghalaya. They help in boosting the income of farmers in these region who also grow apples and plums.

The Kiwi is a fruit for mid hills. We have to align the orchard for getting the maximum penetration of light and air. Pits are prepared and mixing of farmyard manure and filling are done by December. Kiwi fruit vines are trained on two types of trellis T Bar and Pergola. January is the ideal time for planting. Soil has to be firm around the roots. We need 9 female plant to 1 male plant for pollination. Male flowers like tamouri, and allison help in pollinating. Flowering happens in March. The fruits are delicious, and interplanting is economical.

Mr Mandeep talks about the three methods of propagation. Hardwood cutting involves wine being propagated with rooting hormone. Softwood cutting is done in summer and the saplings

are planted in greenhouse for rooting. Grafting on rootstock helps in seeds being germinated and grafting of desired species like Allison and Hayword are done on that plant. When the space is narrow and land sloping, we can go for T type training system, the name being derived because of the shape. Pergola system is followed when there is more space for the plant, and more fruiting wine can be taken in this system.

Talking about the marketing perspective, Mr Mandeep says that the share of Indian fruit production in the year 2012 was 227 mn ton. Kiwi holds a negligible share in this with an output of 77 mn tons. These fruits are majorly produced in Arunachal Pradesh, Sikkim, Himachal Pradesh, and Jammu and Kashmir. They are also imported from countries like New Zealand, Italy, and Chile.

He indulges into the SWOT analysis and focuses on the heavy regions because the cultivation is more extensive in these areas. It is because the governments encourage Kiwi cultivation and offer 50% subsidy of the total cost incurred. The large quantity and good quality Kiwi fruits production may be due to emergence of the agricultural practices in Himachal Pradesh, Uttarakhand, and Arunachal Pradesh. They have started producing 8 to 10% more annually now. The weaknesses of the industry are the lack of infrastructure, supply chain issues, and training and development of farmers. Since the fruits are new to the region, it is difficult for the department and minds of the people to adapt to the new crop. There is a lot of opportunity for the growers as the import of fruits from New Zealand is quite huge and the price is also high.

The cost of cultivation of Kiwi fruits can be high too. Organized retail sales of the fruits through retailers such as Big Bazaar is growing, and the fruits can be easily sold to these retailers. But the main threat is we are still in the developing phase and the quality is different from the imported ones. There is a lot of competition from other countries too. These countries have been growing Kiwi from the last 100 years, but India is just evolving in this. There is lot of competition for international brands like Chile.

How many acres do you have under cultivation and what is your yield per annum?
Area under cultivation is 3 acres, current yield per annum is around 6 to 7 tonnes (as the orchard is in nacent stage, post maturity production may increase to 50 tonnes.

When does the yield start? Can you send to Hyderabad in bulk?
Yield starts in 3rd year post plantation but reached peak in 9th year onwards. Yes , yield can be sent in bulk to Hyderabad.

Do you have enough production to supply in Southern Countries?
Yes, subjected to demand.

Compared to imported Kiwis how do the Himalayan Kiwis fare?
Himalayan kiwi are much tastier than imported one.

In South India, are any farmers cultivating Kiwi fruit?
No, as its not feasible due to climate.

Is there any difference in nutritional value in the Indian fruits and imported Kiwis?
No, but taste differs due to growing conditions and fresh availability.

How do you plan to meet the demand and supply gap in the country?
Currently demand is on the higher side than production. Our focus is to increase the area under cultivation and get higher yield per acre of land.

What are the issues you face currently and what is your prediction about Kiwi cultivation in future?
Only issue faced by Indian grower is the import of substandard unriped kiwi from Chile, this creates a glut in the market, consumer creates dislike for kiwi due to substandard kiwi and Indian kiwi grower suffer the hit on price.

Do you call Kiwi a seasonal fruit?
Yes it is , but round the year availability can be maintained with proper storage.

Is there any value added product from Kiwi fruit?
Yes, it can be processed to various forms like juice, crush, dry kiwi, oil etc.

Which part of Himachal Pradesh are you from? Do you allow visitors to your farm?
I am from Solan Dist. , Yes visitor are welcome through appointment only.

What are your plans for your farm in future?
We plan to venture into agro tourism and processing of our produce.

Do you have a nursery of your own, and do you supply saplings of Kiwi fruits?
Yes, our nursery is registered by Dept. of Horticulture, Himachal Pradesh. Yes, we do supply kiwi saplings.

What is your earning from the last 3 years for the Italian type of Kiwi fruits per acre?
No comments, but decent enough.

For how many years will the Kiwi wine yield fruits?
For 80 plus years, depends upon the plant health.

In a perfect condition, what is the number of fruits you can get in a Vine?
80 – 100 kg (800 -900 fruits)

Do you follow any specific plucking method to get the Kiwi fruits?
No , they are plucked via hands only.

sent to retail outlets to hotels, cafes, and restaurants.

The target market are institutional 5-star hotels, food processing industries, cafes, ice cream parlours, and organized retailers. The target markets include consumers who are health conscious and females. For market development, the growers also focus on exploring in new geographical areas like Delhi, Kolkata, Guwahati, and Shillong.

The environmental analysis for the Kiwi fruits comprises of 5 parts majorly – political, economical, sociocultural, technological, and legal. The per capita income of India has increased, and this gives more buying power to people. Since Kiwi is in the market during the lean season of other fruits, especially during Diwali and Navaratri, people have started buying Kiwi gift packs than dry fruits. Under sociocultural part, people are willing to buy healthy fruits and buying and consumption of Kiwi fruits has increased. These are very good for health. Technologically, improvement of ecommerce and supply chain have improved the income of the farmers. Legally, the growers have to follow the regulation of health and safety laws and environmental regulations.

The supply chain helps supplying fruits from growers to wholesalers, and fruits are also imported from countries like New Zealand and Chile. They are also supplied directly to hotels and cafes. The supply chain infrastructure includes collection centres, packing houses, packing infrastructure, and cold storage. It also comprises of transportation by trucks and trains. They are

On product development, Mr. Mandeep says that they are trying to come up with new varieties of Kiwi fruit and have tied up with FMCG and fragrance industries for supply of processed Kiwi oil. They also are working on upgrading the quality of handling during harvesting, processing, and packaging. They are also keen about getting international certification of Kiwis for exports.

Kiwis were earlier packed in crates of 20-25 kgs and supplied to distributors. Now each package contains 30 to 33 pieces and also gift packages are designed. Channels of distribution are supply through online marketing directly and indirect means of wholesalers, retailers, and fruit processing industries. People also have started adapting strategies like gifting and sign-up rebates. They also follow promotional methods to visit and participate in trade shows of hotel industries, retail, packaging, agriculture, farming, bakery, food and food packaging and processing sectors. They are also using social media as platform to create awareness among consumers. The digital initiatives to boost up the industry, brand building, creating consumer awareness, and research are through social media platforms like Facebook, Twitter, LinkedIn, YouTube, and other blog websites.

Elaborating on the economics of Kiwi cultivation, Mr Mandeep says that the set-up cost per vine is Rs. 4200 including plat cost, structure cost, and maintenance cost for 2 years. High yield and less prone to disease make it a good choice for farmers. Capex and Opex help get high price for the product in the market. The Kiwi fruits are called medicinal plants to cure many illnesses. In the market it is Rs. 25 per piece depending on the place and time of the year, but for us the average price per kg is Rs. 150 to 350. The advantage is there is very limited area of cultivation due to specific temperature requirements. The average plant life is more than 80 years, and Kiwi is no doubts a boon to the hilly regions.

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Ms. Archana Stalin

Founder, myHarvest Farms, Chennai, Tamil Nadu

Ms. Archana Stalin is the founder of myHarvest Farms in Chennai, Tamil Nadu. She is interested in entrepreneurship, helping people with ideas, business models, launching ventures, and women empowerment. She is a first-generation entrepreneur and interested in organic farming. In a recent interview, she talks about creating entrepreneurship in organic farming.

Ms. Archana cites that in the entire world only 3.4% of the land is cultivatable. She demonstrates this with an example comparing the earth to an apple and cutting into 4 pieces and then finally saying that only 1/32 parts of the apple is what will be land left one earth to grow our food. The outer thin layer of the earth is compared to the skin of the apple and she says that's how thin our top soil really is. We need to plan ways to regenerate and keep our top soil healthy to grow plants. She has always thought of reviving farming methods and started developing interest in growing food for oneself. She is happy she is able to cater to over 1000 families with fresh vegetables and fruits every week. She wants to create start-ups to provide meaningful jobs.

She points out to growing terrace gardens that helped families start on a small level and understand how difficult it is to produce food. She is proud to have restored a pond of 3.5 acres in 9 days with community effort. She says that to start the organic farm, you should work to save and manage our water body. She had always had doubts about products that were called organic. This led her into working deep on meeting people growing organic food and she ventured into farming full time. Archana started encouraging families to understand what to grow, and for how long it takes.

It is a well-known fact that farmers want to grow plants and do a good work. It is the middlemen who spoil the value for the products and make it difficult for the farmers to do farming. There are plenty of challenges involved in farming. More than 76% want to quit farming due to erratic income and poor land quality. Ms Archana feels so sad that about 40 chemicals are present in 200 grams of mixed vegetables. She laments that people have lost the local varieties of fruits and vegetables and prefer to go for imported ones. They do not understand how healthy and tasty the local vegetables and fruits are. It is essential that people should take lots of local, nutritional, and seasonal fruits and vegetables.

Ms Archana wants to create awareness of the goodness of local foods, how tasty they are, and how easily they adapt to the local environment. If you have the knowledge base for creating this knowledge about the local agricultural products, how to cook them, and make the information available on a portal, that itself is a job creation. We can come up with so much entrepreneurship in creating awareness about the things we have lost on. We can also guide people about natural farming or terrace garden and promote seasonal and local food.

Ms Archana says that there are plenty of misconceptions about farming of what is organic, what is natural and all. She believes in knowing what you should give the soil and take from it. It should be chemical free, and both ways it should be natural. In her farm, they are following the principle. She says that there are lots of opportunities in agriculture. It is not necessary that a farmer has to grow paddy or wheat and wait for a long time for the next

crop. He can do multi-cropping. Yields and revenue will be coming in a regular flow. Greens, vegetables and poultry farm can be developed using the land effectively for multiple farm-related activities.

She says they are growing ducks in their farm. She wonders and foresees a need for farm tourism. There are however people who make farm experience as an industry. In our farm, we invite school students and families on a regular basis. There are many students who have not seen bullock carts or farming. Parents of such kids were feeling they would lose immunity. But now the trend has changed, and people love visiting farms. Archana Stalin has created a community of over 100 farmers and over 2000 families where most of them are youngsters looking for healthy alternative food. It is also an opportunity to create a positive impact by improving livelihood and lifestyle of people by giving healthy options. It is not a business or trading.

Ms. Archana recollects that it was slightly over 2 years ago that they delivered vegetables from their farm. Now she finds many educated people want to improve the farmland and earn. Many individuals are motivated, and it can be seen that farming is undergoing a transformation. She insists on improving the scenario by bringing in new ideas and encouraging families to come together to go for organic farming. She and her associates are spreading this awareness among farmers. She firmly believes that entrepreneurship opportunity is aplenty on both the farmers' and consumers' sides. Farmers can also be helped with tools, service-based tariff, renting of equipment, helping with finance during farming season, etc. Today's Consumers are spoilt by many choices. She regrets that there are also some people who are opinionated about organic products and do not realize quality food is topmost priority. We try to connect farmers and consumers.

She goes on to elaborate on selling seeds of high quality which is as important as soil quality. Entrepreneurship, according to Ms. Archana, is a lesson that when you see a problem, there is an opportunity. To collect good species of seed and propagating and multiplying them is an opportunity by itself. There are misconceptions that lot of time is needed to prepare farm inputs, which she does not approve of. She says you can use cow dung and compost to prepare land. It is important to see an opportunity here to sell them too. They can prepare panchakavya and amrithakarisal for the land. 3G solution is used for pest control. Ms. Archana uses natural repellents such as neem oil, asafoetida, turmeric, and ginger garlic paste. Here again she sees an opportunity to cut down costs in farming.

Ms. Archana suggests that a group of farmers can come together to create farmers' market and promote them in different locations and neighbourhoods, brand them, and promote them. You can see how many families will come and buy the products which again generates huge income. She talks about using rice, mangoes, and millet and value-added products from the same that can be sold, and money earned. Many people are coming forward to venture into this. As an entrepreneur, you can work on such ideas to keep the money flowing. Ms. Archana concludes that she is very happy to have introduced nature farming to the people and creating entrepreneurs.

Having worked in corporate for some time, how do you feel coming out of it and getting close to nature?

Yes. I grew up in a city and was working for a corporate. Quitting the job there and getting into agriculture was a complete switch over. I saw struggle, and with the farmers I could develop emotional relationships. I was living in a comfort zone. I knew I would get paid if I work or not. But I preferred to take

up agriculture. I push myself and learn a lot. I have plenty of expectations in what I do now. I understand I have to work hard and help others too. Life is a lot better now!

How profitable is your farm?

We are trying to be sustainable at the farm level. We do not wait for one crop to get over and then do the next one. It becomes a continuous process. Farmers are able to make money at least once in a week by selling greens or ladies finger, and money is just fluid. They are able to make a decent amount each month. We do not make huge profits, and that is not the expectations we have.

From your experience, can you suggest any companion crop tried for successful crop rotation?

We do crop rotation all the time. We do not grow paddy and then groundnut, and that is not the crop rotation we do. We keep growing vegetables and greens. We do ladies finger one-time, next time brinjal, and different bund plants. Between bananas, we have ginger, turmeric, and marigold flowers so that flowers can attract pests. We have legumes in between to provide nitrogen to the soil. We plan a lot before we plant.

In which proportion do you use 3G?

We do not use 3G at a stretch. We use pieces of ginger, garlic, and green chillies, 1:1:1, dilute with water and use. We mainly use 10-Leaves Concoction, prepared with different leaves. 3G is only for a small patch of vegetables now and then. Weekly once, we prepare 10-Leaves concoction and use it with cow urine and other leaves.

What is the size of your farm?

We do not own any farm. We work like a collective. We are not buying farmland for contract farming. Farmers work on their field, and we help in planning and working with them on what to grow and ensure that they make profit. We give them easy crops such as pumpkin, and some greens are also easy to grow, while some are tough. We have taken a farmland on lease to prove that this model is feasible.

How do you help in marketing the produce?

As all of us are aware, it is difficult to market organic produce. That is why we do not go into wholesale. People join myHarvest because they know products are fresh. If there is anyone who wants organic products sign up and order what they want. We have a farmer consumer relationship. Through conferences, forums, and social media engagement, we connect to people. We are doing small, but we want more people to come forward. People should start looking for organic products, and we should be able to move forward.

What is the return from vegetable farming?

Return from the vegetable farming is a continuous and sustainable one. Farmers should be able to make 30% of what they spend. It is predictable. Our farmers are sure people are going to buy. We need to get them fair price. Families should be willing to buy at a higher price, thus help them get better price. It is not about making profits, but they are making money and earning better than what they were doing earlier. Throughout the year, they have fluid cash.

How do you help them choose correct quality of seeds?

Seeds are different and difficult to pick from. We have reliable people in our circle, and we help the farmers get good seeds. We bring in our contacts and help them.

There is satisfaction of growing and consuming organic products. But there is also lots of wastage. Have you come across any way to control the waste and maximize produce?

I agree wastage is there. There are many ways why wastage is happening. The products are rejected because size and shape are not good. The consumer should be convinced to buy the organic products irrespective of these issues. The other way is the pest affecting the plants. We use the waste from the poultry farm and make them into compost, which is a value-added product of the same. Every day the wastage is less than 3%. Mainly we estimate the demand,

and harvest and supply.

When we talk about selling the organic produce, customers feel that the price is high. How do you convince them?

Customers feel that since the organic products are expensive, they should not go for it. It is all in the mindset and not the reality. The price may be higher than regular produce by 30%. But they should understand that it is better to invest in organic products than on health issues later. We are not focusing on the price factor now. People have the feeling that premium is premium but expect better value. They should consider the quality of the product and should not hesitate to pay higher price for the fresh and organic products. It is all about taste and nutrition. If they understand this, things will improve. When the price is higher, it leads to doubt. People do opt for organic products for many strong reasons. There could be young kids or sick people in the family who look for healthy alternatives or those who care for environment and aware about the poison in the other products and want to prevent it now than later. From personal experience, many switch over to organic. But it is presently less than 10%.

Any exposure on drumstick farming and making powder from it? Are you aware of any machine producer for the purpose?

We do not do drumstick extensively. May be in 2 or 3 farms they are doing only drumstick. Moringa powder has medicinal values and sells like hotcake. I have no idea about machine producers. I feel it can be better if sundried and powdered.

Do your customers contact you directly or any online delivery system?

They see us on different forums and contact us. If we make Facebook posts, they come forward to buy.

Have you been asked for organic certification for the products by the clients?

Yes, they do. We want to get certification and bring in PGS certification. As of now, we do not have any certification. We value the certificate from the customers for the farmers higher!

What is your goal in this opportunity? What do you get for promoting and marketing the products?

I am creating an online platform that recognizes farmers and families promoting naturally grown food. Families buy from our platform and we pay farmers directly on time. Farmers get better income and families get better food while we facilitate this and also get a margin for the farm to home platform. We help the farmers to go organic and advice on building the skill and procuring. When we do it in large groups, we can simplify the logistics and make the supply chain continuous. I am one of the farmers and part of the forum. It is not a trade with the farmers. We are doing together. We do it for a win-win for farmers and consumers through a for-profit model to make sure all our efforts are sustainable. As of now we are pumping money from outside and building the platform. Over a period of time, we should be able to do it better with more people coming from outside.

How do I prevent pests from surrounding farms attacking my plants?

It is a challenge. The way we plan our farm, we can change this. Outside the field, we can have live fences with trees. They act as shield from chemicals, but air and water are difficult to control. We can have shield, improve the soil health, and take precautions. You need not have compound wall but use a fence with a mix of thorns and bushy trees which will reduce the attack by chemicals. Trees like bamboo and castor plants help. Live fence requires some effort but in the long run, natural farms have to be protected thus.

What is your long-term plan?

I want to help farmers. Each plate of food should be chemical free. I want to do it like a movement. I wish I could do a small bit for such a scenario. I want India to have green spots all over and farmers to choose organic farming. When the future generation don't have to think twice before eating and don't fall sick and are safe eating food from soil, that's will be a moment of joy !!!

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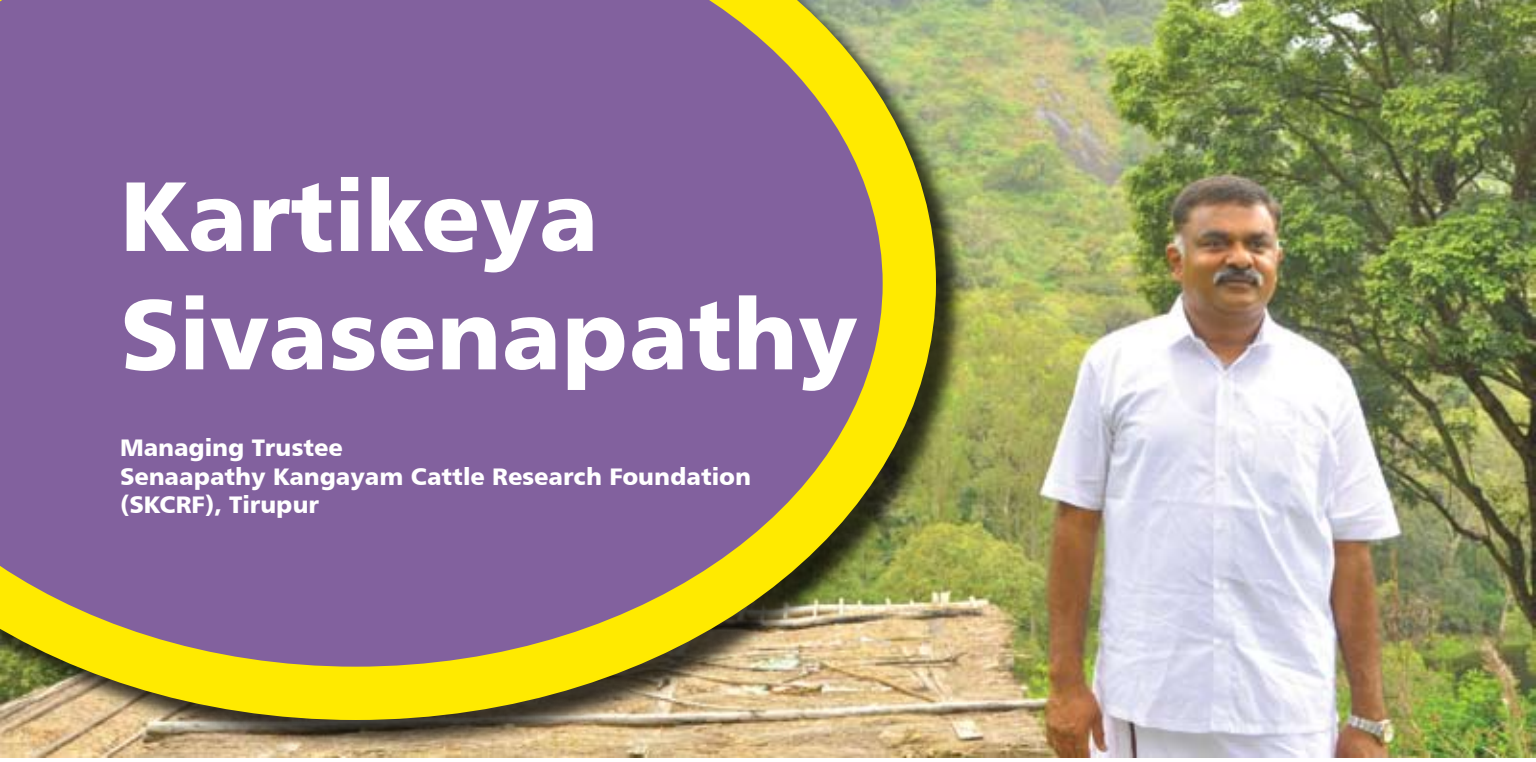
Kartikeya Sivasenapathy



Managing Trustee
Senaapathy Kangayam Cattle Research Foundation (SKCRF), Tirupur

Senaapathy Kangayam Cattle Research Foundation (SKCRF) is a resource and research centre working on conservation of native breeds of cattle.

Mr Kartikeya and his team strives to create awareness about the necessity to understand the importance of cattle to sustain a balance in our ecosystem. They particularly focus on the Kangeyam species because it is native to their area.

"Kangeyam is one of the breeds found in the Western Ghat region. We also have Bergur and Alambaady. Kangeyam population was, in the 1940s, around 31L. Today it is just 1L cows. The population has been shrinking. Owing to this, I along with a few friends formed this Senapathy Kangeyam Cattle Research Foundation. (https://www.kangayambull.com/)"

Various studies and interventions have been carried out by this organisation since 2009. They have hence, been able to create a much-needed awareness on the importance of breeding of Kangeyam cattle with a purpose.

"We believe in scientific cattle breeding as a socio-cultural connect and livelihood. We have been working on this for the last 10 years now. We are the first private NGO to organize a cattle show." The cattle show brought together a lot of Kangeyam cattle lovers and the awareness that they created has been immense.

"We have been working closely with the State and Union Government for conservation of cattle. Kangeyam is a majestic animal."

What other activity happens at your organization?

We work on creating awareness around the need to conserve Kangeyam cattle by conducting cattle shows, exhibitions, etc. We have a program called A Day in SKCR where school / college students, IT employees etc. can visit our premises for a day. It is an 8 hour programme. During the course of the day, we conduct training on zero-budget natural farming, use of cow dung, etc. We also conduct sessions around the need for environment protection, etc.

Farming today is a difficult proposition for many. It is a common opinion that people do not want their children entering this field because farming is not as remunerative as it was in the olden days. There is hardly any support that governments has also rendered since the last many years. Hence, our advise to those who choose to stick to farming is to have a mix of zero budget farming and judiciously use fertilizers, if necessary. Avoid pesticides. This is a huge burden on one's pocket and on the soil.

We have a huge presence in social media. We have around 1L followers for our webpage. We engage our followers with information related to native livestock, cattle, environmental preservation etc.

We work along with the government to bring in reforms.

What are the unique features of the Kangeyam cow?

Kangeyam is an animal that can be trained form a very young age. It is highly tolerant to high temperature zones. It's adaptability to the grazing lands of Western Tamil Nadu is a unique feature. This is a place where we have about 7 species of grasses, trees, birds etc. Kangeyam cows' cow dung and urine is highly suitable for zero budget farming in this region. The milk is highly nutritive. In this region, the calcium content in the soil, is very high and hence this is reflective in the Kangeyam cows' milk as well. This contributes to great bone density in human beings that consume this milk.

Do we have government policies safe guarding / promoting the Kangeyam breed?

We have been liaising with the government since 2003 and have appealed to start a cattle breeding centre for Kangeyam cattle in Western Tamil Nadu. This was accepted under Ms.Jayalalita's leadership. As a result we now have a Kangeyam cattle breeding centre in the Erode district. Recently, the government has come with a policy to procure native cattle milk and distribute it.

Which is the cattle breed that has gold content in the milk?

I read a few articles related to gold content in milk etc. Every metal / mineral will be present in all beings. It doesn't mean you can make a fortune out of cow dung, urine or milk in this

perspective. There is no scientific proof also regarding this aspect.

What is organic milk?

Organic milk is the milk obtained from cows that is fed organic food. You allow the cattle to graze on pastures where no fertilizers or pesticides are used.

What is your view on foreign breeds like HF and Jersey?

Similar to how Kangeyam originates from a small village in Tirupur district, HF and Jersey are breeds that originated in a place called Friesland. Any breed has to be conserved in situ. This means that breeds deserve to live in the place where it originated. It shouldnt be subjected to adapt to climatic conditions or terrains it is not familiar with.

What is different about the milk we get from local cattle breeds vs that from foreign breeds?

The taste of native cows' milk is always better. Native cattle is free-ranging cattle and so consume food from natural sources. In Europe a few years back, there was a bad case of mad cow disease. This is said to have occurred because parts of cows were chopped to pieces and fed to cows. Such unethical feeding does not take place in societies of South Asia or Africa. We tend not to look at animals as a commercial property although we make money out of it. We cannot deny the connect farmer families have towards their animals.

Then there is the controversial debate about A1 and A2 milk types. There are arguments supportive and non-supportive of the statement that A2 protein is found in desi cows alone. Today in the US almost 30% of Jersey cattle claim to have A2 protein.

How can one source Kangeyam cattle?

I recommend that you buy Kangeyam cattle if you belong to the same location as they do. If not, please source a breed that is native to where you live. If you are from Tamil Nadu, you can buy the Kangeyam breed for about Rs.30000 - Rs 1L depending on the structure, shape, milking capacity, gender, etc. As of now, all the places that trade cows have closed down due to COVID-19. Once this pandemic situation gets settled, you can buy cows.

How much of cattle do you propose for a 4-acre farm land?

A maximum of 1 or 2 cows would be sufficient. Again, go for cows native to your land. You can settle for a breed as per your budget. You can opt for buffaloes or cows, the dung of buffaloes are also good for farming.

Is commercial milk safe for consumption?

Basically, human beings who eat meat do not need milk. The concept of milk being a wholesome food is a European concept. Consuming milk up to the age of 7 is sufficient. Then, it is required for people who have had loss of blood in an accident etc. People, other than the above-mentioned two categories, do not need to consume too much of milk in their daily diet. Procuring milk from a local dairy farmer, if possible would be the best choice.

Is it true that the commercial milk packets are often adulterated with chemicals?

Milk companies, I don't think, would add chemicals because that can lead to a lot of trouble. It is not something that anybody can get away with in the long run. I know that they may be adding milk powder into it which is not harmful. Milk powder also gives the milk some amount of thickness and taste. No, I am not aware of chemical additives.

Would you know what may cause a cow to collapse all of a sudden and die?

I am not sure what could cause such a thing. When such cases occur, the body of the cow should be allowed to undergo a postmortem by a local vet. An external hurt could be the cause. There could be many reasons like internal hemorrhage etc.

How much space does a Hallikar cow require?

Any native cow would require about an acre per cow for grazing. For all round the year grazing for 10 cows, for instance, would be 10 acres of land. If this cannot be provided, you will need to provide substitute feed as well.

In terms of accommodation, you can have around 4-5 Hallikar cows in a 17x11 shed.

Desi cows seem to get adopted abroad and India seems to host a lot of foreign cows. What are your thoughts?

This is the result of how the government operated in the 70s. Instead of focusing on the local breed, they focused on bringing in foreign breeds. Even today, we have people talking about native cattle etc.; but there has been no visible improvement with respect to the government to protect native breeds. They have given rights to a private company for over 5 breeds of cattle in India. We will have to create awareness and we should have breeding centres to protect our cattle.

Where can I read more about A1 and A1 milk?

A1-A2 debate is all over the social media since a long time now. There is a lot of material with National Dairy Research Institute, Bangalore. They have lot of information and data regarding A1-A2 milk. You can access this information on their website. We have information about this on our website too.

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Post Graduate Diploma in Management
* Agribusiness & Plantation Management
* Food Processing & Business Management
* Agricultural Export & Business Management

What should the proportion of cow and bull be in case of the Kangeyam cow?

The ratio is 30 cows to 1 bull.

What is preferred open grazing or cows kept on a shelter?

Open grazing is always better. Nothing wrong with keeping them on a shelter. It is just that cows do much better with open grazing. They stay a lot healthier and do much better in general.

What is the future of cattle farming, in your opinion?

Cattle farming and livestock keeping plays a huge role in ensuring that fallow lands don't turn into deserts. Only when cows or sheep, graze over the grass and with all their droppings does fallow lands turn fertile. There is nothing called over grazing. There are many videos and documentaries by UNFAO, UNEP by which they prove that livestock keeping helps in keeping up the quality of fallow lands.

With the population on the rise and also the fact that we will have more number of people eating meat, we need ecological ways to ensure livestock keeping wherein we do not harass the environment in the name of livestock keeping.

We need to go back to the South Asian system of livestock keeping - the pastoral system. This system gives the best way for livestock and environment to coexist.

How much milk does a Kangeyam cow yield per day? Are they reared for milk or for meat?

Kangeyam gives an average of 1-2litres of milk in the morning and about the same in the evening. One among thousand cows may give you 20 litres a day. But this is a rarity. Now, that is what we need the government's support. To work on such cattle and ensure that Kangeyam gives more milk without losing its basic features.

Can Kangeyam breeding fetch money?

It is not very easy making money while breeding livestock. To be honest, people make more money by breeding dogs. Having cattle and using their waste to fertilize your land saves you a lot of money. Also cow dung is very useful to ensure that you farm economically. Utilize cattle to up your agri game.

Breeding is not very profitable.

Are there enough animal husbandry centres in the rural areas?

Yes, Tamil Nadu has one of the finest animal husbandry units in the country. We have primary health centres in the rural areas that holds very good schemes and services for the farmer and the livestock keepers.

How sensitive is the government in promoting native cattle breeds?

There has been absolutely nothing except a few confrontations in 2011-'12. I really expected the new government to do a lot owing to their policies of native cattle, etc. But, I am disappointed with the lack of any fruitful work or effort in this field.

Is the Tamil Nadu Agricultural University helping you in your efforts?

In Tamil Nadu, we have two universities. The agricultural University does not work with livestock. We have the Tamil Nadu Veterinary and Animal Sciences that is established as a separate university for livestock.

We have an excellent animal husbandry department there. This university is very supportive towards the livestock keepers both in the small sector and corporate sector. They treat everybody at par.

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Nipun Sabharwal

Business Head
Mahindra Top Greenhouses Pvt Ltd,
Nashik, Maharashtra

Mr Nipun Sabharwal is the Business Head of Mahindra Top Greenhouses Pvt Ltd, Nashik, Maharashtra, while Mr Madhu Prasad is the Sales Co-ordinator (India). In a recent interview, they talk about "Protected Cultivation – Advantages of different types of structures and growing systems". Mahindra Top Greenhouses is a joint venture between Top Greenhouses, Israel and Mahindra and Mahindra group in India. It is a leading player in protected cultivation in India and across the globe for nearly 25 years. Mahindra and Mahindra in India is known for its agriculture implements and mechanisations apart from producing seeds, crop care, potato seed production, micro irrigation, fresh produce, drip irrigation, and export of fresh fruits and vegetables.

Mr Nipun points out that they bring together a package of knowledge and global experience of crops and cater to Indian agriculture industry. They have a wide range of clients that include corporates and small farmers. Greenhouse technology is something they want everyone to have the advantage of and want to take it to the grassroot level.The cost will be for a basic ventilated greenhouse Rs. 850 to Rs. 900 per sqm and the net houses will be Rs. 250 to Rs. 300 per sqm. National and private insurance companies cover the infrastructure and not the output. Minimum claim has to be Rs. 1 lakh for the survey.

The company offers structural solutions, nursery solutions, growing system for climate control and automation, post-harvest technology and agronomy services. Greenhouses are needed for the protected cultivation. Higher quality products are achieved through them, and there are different models and technologies available. The greenhouses offer better conditions for the plants to grow and get quality products, and more produce. They protect the plants from heavy wind, rain, and insects. In a controlled environment, we can control temperature, humidity, and light to achieve better products. The benefits of growing under protected cultivation include better quality, productivity, and better IPM strategies.

Mr Nipun talks about the various net houses and greenhouses. The basic is the net house which has in the insect proof net and shade net. The net house has a flat roof structure with cable palings and costs less. There are 2 layers of net, all around the top is the insect net and below there is the shade net shading system. When the plants need more sunshine, we can retract the second layer or block the sunlight by closing the shade net and thus manipulate the temperature and light. It will also protect the crop from heavy winds and temperature.

Tunnels: Mr. Nipun says that the tunnels are not expensive. They come in aerodynamic shape. The ventilation is very good in this product and has a better microclimate creation. It reduces incurrence of pests, mites, and insects, and offers easy ventilation apart from good light. It is easy to instal too.

Naturally ventilated greenhouse – As Mr. Nipun says, this type of greenhouse is aerodynamic in shape, and the covering material is made of poly film of 200-micron thickness. There is air circulation through natural vents from top and side, and it offers protection from rain too. We can grow all types of crops and control the temperature and humidity through natural vents. We can put air circulation fans too.

The climate-controlled polyhouses help in reducing the temperature based on evaporative cooling system consisting cellulose pads and exhaust fans. There are exhaust fans on one side and cooling pads on the other and. temperature can be uniformly maintained and spread in the greenhouse with minimal gradient. The humidity is maintained with the help of high-pressure fogging system.

Mr. Nipun says that greenhouses are designed structurally to even increase the temperature by closing the top and side vent during cold winter season. The temperature can be reduced by 2 to 3 degrees. These can be automated through controllers and sensors. They are automatically switched on and off. The top shade net can be operated manually or motorised.

In a microclimate matrix, the design is such that we can increase the height and ventilation through vent. It has air circulation system and high-pressure fogging. The shading

system has shade nets to adjust the temperature. Mr. Nipun also talks about the Apron side covering which helps in maintaining CO_2 levels in the greenhouse, which has a major role in plant growth and photosynthesis. To trap it inside the greenhouse apron is used. It will arrest the CO_2 within the greenhouse, The shading system can be.

Mr Nipun suggests various growing media for the plants. Soil, soilless media, troughs, growing bags, grow buckets, and cocopeat are some of them. NFT or DWC are used for water culture. The recent ones are aquaponics and aeroponics in greenhouses. Mahindra provides turnkey solutions from basic net house, tunnel to climate control polyhouses, hydroponics, agronomies, and many other technologies. Their clientele includes government sector, corporate sector, and farmers for seed production and a few other specific research institutes.

Mr Nipun is keen on wiping out some myths and misconceptions about protected cultivation. The polyhouses will not prevent light because of the sheets on both sides. Polyhouses help in getting the light as per the requirement and quality needed for the plants.. They use different kinds of covering materials to decide on the same. There are films with light diffusion qualities, films with transparency of 90%, and films that offer high end diffusion and make less shade. There are other films that are thermo reflective, cutting out specific spectrum of light.

For pollination usually bees are used. Inside the protected areas, they will not be there. Should we use crops and vegetables that are self-pollinated ones?

There are self-pollinating verities available. We are also working on the ones that are not. In such a case, manual pollination is taken up with the help of equipment. Bees are used in greenhouses for pollination, but the restrictions are many. There are a few companies that have introduced bioproducts for biocontrol and pollination.

Will multi-cropping work within one structure?

It is not advisable as different plants require different sowing time, harvesting, and plant cycle apart from various types of irrigation. There are too many subdivisions to be made, and you will tend to lose the advantage when you plan for multi-cropping. There will also be the issue of IPM. Every plant has receptive diseases, and it is difficult to control the pests.

Is monitoring the conditions under net structure different in monitoring humidity and temperature? How are the plants protected under external circumstances, such as rain, wind, fire etc?

Monitoring different parameters will be different under protected cultivation. They are two factors that go side by side. There is the ability to control microclimate inside, temperature, humidity, and light. We prefer giving monitoring devices that are sensor based, automated, and scientific. With these, you can sense light available, CO_2, RH, and temperature. Information is sent to the controllers, and they control. In case of less light controller moves the screens from the greenhouse. You can also monitor the system with simple devices that are available in the market. It is necessary to know what microclimate you have created inside the greenhouse and the kind of protection offered from the external weather conditions. Plants should be protected from excessive heat, high winds, and rain.

Are they protective against fire?

They are not protected against fire. The cover is made of plastic and the polyethylene used is inflammable.

In hot places like Tamil Nadu, is polyhouse suitable? What type of structure would you suggest for growing vegetables and greens?

Tamil Nadu faces high temperature and high humidity. Evaporative cooling systems are not ideally suited for such places.We have specific models to suit your area that have high capability of air circulation and ventilators, this is the Sawtooth Model having high ventilation capabilities with a smaller grid size and gable width of only 6.4 m compared to the regular 9.6 or 8 m widths thereby offering enhanced roof ventila-

tion through 1.4 m vents at every 6.4m. Cubbed with an effective Air Circulation system, the design provides ideal micro-climate within the greenhouse.

How can you control pest in protected structures?

The air vents are protected by good quality 40-50 mesh IP nets, a window with IP net inside to protect and rollable plastic on the outside..

Are there any restrictions on the type of plants to grow in Tamil Nadu where we plan to use Growbags and cocopeat to grow wines and creepers?

I would categorise them into two. You can grow anything in these systems based on the availability. NFT is used for green leafy plants. It helps in reducing growing cycle. Under soilless methods, you can grow leafy greens and they are suitable for wine crops too. A structure with high ability to vent air is needed which will take care of the problem of humidity too.

What type of stand along projects do you undertake?

We are catering to a variety of market segments in the protected cultivation industry, from providing complete Turn-Key Solutions for commercial corporate projects, to high tech research projects. We have a complete range of products for Small & Marginal farmers. We have been specifically focusing on this segment and over the years developed various solutions for them. We undertake projects under our LCCB (Low Cost Cluster Based) segment to ensure the technological benefits of Protected Cultivation reaches to the small farmers.

Can you elaborate on the subsidy available to farmers?

There are state government subsidies up to 50% for poly and net houses and one from national horticultural board which is also 50%. Minimum area should be 500 sqm for the structures. It again differs from state to state. You can approach horticulture office in your area.

Do you manufacture netes and polyhouses?

The basic steel structure is produces in-house while the polyethylene coverings / nets / cooling systems / automation / etc are sourced from top manufacturers from across the globe. Lately we have been developing a lot of Indian vendors by asking them to enhance their product quality and have started using products made in India also. You are based in Delhi. Do you operate in other states too?

We work Pan-India having offices and support staff located at North,Central & South India. Our production facility is located at Nashik.What would you call as your biggest project?

In terms of size / area covered under greenhouse we have client in Maharashtra who is doing floriculture under 70 to 80 acres of greenhouse. In Karnataka we have several projects ranging from 5 to 20 Acres. We have covered around 500 farmers in our LCCB projects so far comprising Small & Marginal farmers.

Do you offer after sale service?

We provide after sale services through our technicians and engineers who are present pan India. Complaints are serviced Within 48 hours, depending on the problem, we connect with our clients and provide the service.

How do we maintain the temperature in long winters?

It depends on the infrastructure we have. We can have heating systems in the structure if we want the night temperature to be high. The hybrid greenhouses offer natural ventilation and natural ability to close and retain the warmth in the night also. and it is economically viable too.

Do you provide ongoing consultancy for projects?

Yes, we do provide consultancy – to improve infrastructure or upgrade and consultancy for agronomy support. Our experts can explain the agriculture practices for protected cultivation.

Would you suggest greenhouse for sugarcane?

You have to look at the viability for that.

Protected cultivation is mainly for exotic vegetables and fruits, like papaya, musk melon, vegetables, and greens. A commercial viability has to be attached to it. In India it will not work out. I would not suggest this for sugarcane.

Have you done any project in Kutch and how are they doing?

We have done one in Bhavnagar. Various products like cucumber and musk melons are grown there.

Can we grow crops of shorter duration and how many cycles can we take?

You can have crops like cucumber that have short duration. As long as the soil health is maintained you can grow crops.

How can we find out if CO2 is enough for the plants in the greenhouse?

There are gauges to measure the same. They are simple ones,.

In case of organic farming, does the soil remain nutritious? How to adjust that?

Protected cultivation is beneficial for organic farmers. Mera Kisan is an online platform of ours where we provide suggestions and sell wholesale organic products. We also help in getting organic certification for the farmers. With protected cultivation, there will be no attack of pests on your products and there will be very less use of pesticides.

Is the world moving towards greenhouse to open house or the other way?

The industry is growing at a massive rate. There is more opportunity for protected cultivation. Food grains will be grown in open cultivation only, and horticulture in protected cultivation.

Which is the most profitable crop under protected cultivation?

The demand varies in each region. You should have a good analysis of the market to sell at a good and constant price and then choose the crop. In Chennai cucumber and capsicum may make good sense.

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Abhilash Gore

Secretary, Avocado India &
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In the vast world that agriculture is, seldom people stumble upon products which reveals to them a potential which others may not necessarily see. Mr. Abhilash Gore sees such potential in avocado.

"I am into the compliance business. Crops like grapes, pomegranate etc. should be compliant depending on which market you target. In the last 18 years of my professional life, I have taken care of all types of certification in major parts of India. I find avocado to be an interesting crop. I have my roots from a farming family and have a small farm near Nasik. So, I am a farmer as well." In pursuit of building a platform for what he stands for, Abhilash founded Avocado India in 2009. In 2011, Avocado India was part of the World Avacado Congress in Australia, representing India.

"I presented a paper titled India for Avocado and Avocado for India."

What is the scope we have for this crop in India?

Avocado is best cultivated below central India. Having said that, there are crops in Himachal, near to Dehra Dun, Nainital as well. There are cultivators for Avocado in North East India as well. Bhutan and Nepal also has good Avocado cultivation. Part of Easter and Western Ghats have the potential for cultivating this crop.

There is good demand for Avocados in Mumbai, Delhi, Bangalore, etc. All cities are good consumers for this fruit. We have a good quantity of avocados getting imported as well.

Why avocado?

Looking into Indian Food, we are primarily vegetarians. Then we have Punjabi food which is a high calorie diet which may lead to obesity and other diseases. Parts of Rajasthan and Gujrat also hosts fried foods, Central India has a diverse food culture, South Indian food has rice as a staple which is also high in calorie. We need something which can neutralize. Avocado is neither a fruit nor a vegetable. By 2025, India has the potential to be the diabetes capital of the world. People need to replace their food habits and adopt foods like Avocado. It contains good fat.

Avocado is a very sturdy crop but we need to train our farm workers and consultants so that they can impart a good idea about avocado cultivation. Avocado doesn't need a high content of water. If your soil is medium or light, it is absolutely suitable for this crop. Heavy soil may cause root rot; hence, it is not advisable. You need red soil or sloppy soil and drip irrigation. We need to test our water, soil for pesticide residue.

Tell us more about Avocado India's activities.

We had to work on various project modes via Avocado India like multi level avocado sensitization and awareness projects. As part of this we launched a multi location, multi variety trial project. This has gained a lot of attention, momentum and participation. We are trying out avocado cultivation at different places in India and for this we are importing avocado, which we had to cease due to the lockdown.

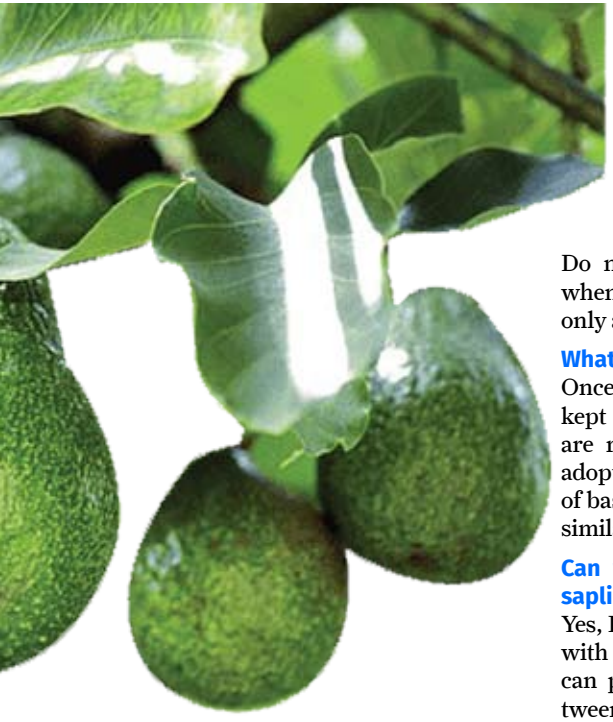
Then we have the post harvest technology development project. If you check the avocado supply in Bangalore market, there is a lot of damage to the fruits because of the packaging. It is the consumer's right to get good fruits when they pay a lot of money. Avocado is like our brain. If you refuse to use a helmet, your brain is subject to risk while you are on the go. Avocado should be harvested with the stem, which is something most people do not know. If you cut off the stem, the fruit gets injured and black fungi starts growing. By the time, you get the fruit, it is almost half gone. That is not worth the premium price you pay. Also, in South India the trees are grown up to 60ft - 80 ft height. This makes it difficult to harvest especially during the monsoons. People won't be ready to climb and harvest. If the tree is cut half way, it is easier to harvest and you get to make a good canopy of avocados.

In our multi variety multi location trial project, we are planting avocados at a distance of 15ft x 8ft. It is ultra high density cropping. Number of plants per acre goes up to 300 per acre. The plant height should be kept at 20-30 ft. The fruits can be harvested using a hydraulic tractor so that there is no damage, which can be transported in plastic crates so that there is minimal loss.

When you look at the post harvest technology development you have to certificate your avocados as per good agricultural practices and organic cultivation. This will fetch you premium prices in the international market.

We are also doing a supplies and development project. We train the farmers from the A-Z of avocado cultivation under this program. We also create awareness among traders on how this fruit should be transported. This is to make sure we have a progressive supply chain.

South India is the producer market and North India is the consumer market for avocados. Hence you get better prices by trading to North India as they do not Avocado cultivation.



Does it hold scope for value-added products?
There are lot of value added products one can make out of avocado like Avocado oil, frozen pulp, avocado desserts like cake. In Mexican food, avocado is a ingredient for many dishes.

As on date India is an optimistic market with a lot of potential for avocados. We hope to see a National Research Center for avocados soon.

After how many years would avocado plants begin bearing fruits?
For grafted plants, flowering begins by the second year as well. Such plants are available in good nurseries. You have to make good canopies for at least 2-3 seasons so that you can ensure these avocado trees bear fruit for the next 50-60 years. In high density, cropping regular pruning of the plant is required. If you harvest too early in time, this may hamper the canopy and end up being a weak tree. So, give it atleast 3 years to make a good canopy of the tree.

By the 4th year, you should be good to go.

Is it true that avocados can be grown wherever mangoes can be grown?
Yes, almost. That is the thumb rule.

Can it be grown in North India?
I have seen avocados in Uttarakhand, UP. But in the plains of Lucknow and Kanpur, we will need to try cultivating them. I always advise newcomers to plant 50-60 plants. It is not a big investment. Start with domestic varieties and if you are successful in making good canopies of the tree, you can go for commercial plantation.

Avocado, I am sure, is going to be a gold mine for all of us. But, let's play smart. Do not plant more than 50-100 trees when it is a trial. Go for large plantations only after your test run.

What is the shelf life of the fruit?
Once avocados are harvested, it can be kept for 60 days in cold chain. There are ripening technologies that can be adopted. Ripening is an art and science of basic post harvest practices. It is very similar to mangoes and bananas.

Can we approach you for fruits and saplings?
Yes, I am a networker. I can connect you with potential farmers from whom you can purchase. All dealings will be between you and the farmer you choose. We do not interfere in the trade segment.

Is it cheaper to import avocados vs growing them in India?
It is always easy to grow avocados in India and export avocados to the European market. That is Avocado India's vision and mission. We do not promote import of any fruits. We promote the initial import of planting material owing to the large variety we can experiment with. We have tried importing plant material from Peru and parts of New Zealand. We plan on such activities only for the next 4-5 years until we have a captive supply from the Indian market.

Do avocados grow throughout the year?
For almost 8-10 months you can reap fruits in the Indian market. Some trees gives you fruits for two seasons as well.

Is Hyderabadi soil suitable for avocado cultivation?
Hyderabad and parts of Telangana are always areas of interest.There are lots of activities happening in and around Hyderabad and Telangana. Near the Eastern Ghats would be a good area to cultivate, in my opinion. You can get plants from Bangalore or Coorg. Currently it costs at arange of Rs.30- 3000 in the market. Other cost factors are similar to that of mango cultivation except that water requirement for avocados is slightly lesser. It is about 15 litres per plant by drip irrigation.

What is the yield per plant per year?
It starts from 5-10 kgs and we expect 20-30 kg fruits per plant in ultra high density plantation. There are 60 year old plants giving 1 ton avocados per season.

What is the average price per kg in the domestic market?
For domestic, it ranges from Rs.60 – Rs.120. This is the farmgate price in Pilani Hills and somewhere in Coorg. From farmgate price to retail price there is about 5 times gap.

What is the growth and development of the Oz avocado variety?
There are no commercial plots with Oz avocados in India till date. There may be a couple of undocumented plots with less than 100 trees of Oz. Ours will be the biggest consignment from this year.

Which are the best varieties suited for Bangalore?
It is best to get in touch with IIHR and collect the plants from there. That is a more practical approach. There are good local varieties whose names may not be that popular. There are no commercial varieties and nurseries identified hence I can't recommend any for grafting. You will need to do the grafting yourself.

What is the average life of an avocado tree?
I have seen trees stay for 200 years here at Wayanadu.

Is it recommended to go for local varieties available at Coorg, Karnataka?
Good varieties can be obtained from Krishi Vigyan Kendra, Coorg and Central Horticulture Experimentation Station, Chettalli. There is a Dr. Senthil Kumar , Dr.Saju John etc. who will help you pick good plants.

How big an area is required for planting 50 trees?
You will need about quarter of an acre.

Why are hilly regions favorable for this plant?
During the fruit setting time, it shouldn't be dry climate. You must provide humidity for pollination and fruit checking. It has to be done by honey bees in the plains if it is hot weather in places like Central Maharashtra, Madhya Pradesh etc. Since we are still studying this crop in India, we advise that cultivation be done in hilly areas. We are trying cultivation in Bhopal. If we are successful, I will revoke this caveat.

What intercrops can be grown with avocados?
Beans, Greens, pulses, long beans, bananas etc.

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Dr.K Valliappan

Retired Professor (Environmental Science)
Tamil Nadu Agricultural University

Dr.Valliappan K, a retired Environmental Science Professor from Tamil Nadu Agriculture University is a Soil and Environmental Scientist. He brings with him over 32 years of experience in teaching, research and extension experience in this field.

Dr. Valliappan has handled 18 external funded projects as PI and Co-PI. He has published more than 23 research articles and attended 15 International and National conference/ seminar/ workshop.

Talking about utilization of industrial and urban waste water for sustainable agriculture. Dr.Valliappan says, "Water, today, is scare the world over. The accessible fresh water in the world, today, is around 1.6 percent. Agriculture is a water intensive sector. About 2500 liters of water gets consumed to produce one kg of rice alone. The food and agricultural sector uses 100 times more water than what we use for personal needs."

Across the globe, a tenth of the crops are irrigated using sewage water. 20 million hectares of land is irrigated with polluted water. The Olympic Park in London received non-potable water drived from treatment of wastewater. This recycling of black water produced by park amounts to 574 cubic mt of water per day.

Countries that largely use wastewater used for irrigation can be seen in the chart below. These countries perform this feat after having adopted all the wastewater treatment protocols.

What is the scope of using wastewater in agriculture?

It is a huge relief and efficient usage of water. In many ways, it is gratitude and humility towards the forces of nature as well.

Reusing waste water is an answer to the increasing demand of water. The recyclable water can possibly be of high nutrient value depending on the industry it has been sourced. It addresses the disposal problem of industrial effluents in a clean manner, if done as per protocol. It also ensures keeping a check on the ground water level and is a workaround during monsoon failures, which leads to frequent drought.

Can waste water from all industries be used?

To understand this, one must understand the different types of waste water:

There are three categories:

• Red category: water obtained from highly polluting industries (pollution index (PI) 60 and above) In India about 60 industries fall under this category.

• Orange category: moderately polluting industries (PI score 41 – 59)

In India about 83 industries fall under this category.

• Green category: marginally polluting units (PI Score 21-40) In India about 63 industries fall under this category.

• White non polluting units (PI Score up to 20)

India has about 24 industries in this sector.

The red category industries are paper and pulp industries, sugar mills and distilleries, textile and dyeing, leather tanneries, Good and Pharmaceuticals, Chemical and Fertilizers.

Can you elaborate on the treatment methodology?

Honestly, the treatment methodology depends upon the pollutants in the water and the nature of the industry etc. The problem in India is that all industries will follow the protocol up to primary treatment of water. They don't go for the secondary and advanced treatment phases because of the cost it entails. Hence, the treated water is again toxic.

What are the pollutants and contaminants in wastewater coming out of industries?

There are innumerable forms of compounds and minerals - harmful to soil and health.

What are the risks and benefits of using waste water

Countries with the largest volume of wastewater used for irrigation

Country	Wastewater used for Irrigation (m^3/d)	Country	Wastewater used for Irrigation (m^3/d)
Mexico	4,493,000	Iran	422,000
Egypt	1,918,000	Chile	380,000
China	1,239,000	Jordan	225,000
Syria	1,182,000	UAE	200,000
Spain	932,000	Turkey	137,000
USA	911,000	Argentina	130,000
Israel	767,000	Tunisia	118,000
Italy	741,000	Libya	110,000
Saudi Arabia	595,000	Qatar	80,000
Kuwait	432,000	Cyprus	68,000

for agricultural needs?

Risks of waste water use in agriculture

• Environmental risks:
  - o soil and ground water pollution
  - o nitrates in groundwater from sewage irrigation
  - o Salination of soils and aquifers
  - o Changes in soil structure

• Public health
  - o microbial pathogens contained in domestic wastewater
  - o increased prevalence of helminthic diseases (ascariasis, etc.)
  - o Chemical risks are greater

Benefits of using waste water

• Agricultural:
  - o reliable and possibly less cost
  - o increased crop yield
  - o more secure and higher urban agricultural production and contributiopn to food security
  - o income and employment generation in urban areas
  - o improved livelihood for urban agriculturists

Water resource management benefits

With lower cost then expanding supplies through storage transfers and desalination

Environmental benefits:

• avoidance of surface water pollution such as dissolved oxygen depletion, eutrophication, foaming, and fish kill

• conservation or more rational use of freshwater resources especially in arid and semi-arid conditions

• reduced requirements of artificial fertilizers

• soil conservation through humus build up and through the prevention of land erosion

• desertification control and desert reclamation through irrigation and fertilization of tree belts.

What is the best way to dispose industrial waste?

Without treatment, industrial waste should not be disposed. One has to follow the treatment process. After treatment process, we have to get to a community level to address things. For example, Tamil Nadu Paper Limited (TNPL), located at Karur, produces huge amounts of waste water. But they got to do a community approach. They had a lot of coconut growers in the vicinity. All the coconut farms were on drought prone areas. Hence, TNPL invested money in laying pipelines to divert water from industries up to 20kms so that the water gets utilized.

Of course, there is a build up of salts in water. But, farmers livelihood increased with this activity. Of course there are rough edges to be smoothened out. The industries should be more conscious and the community should be more cooperative. At times, many industries come forward with this proposal with well treated water. Somewhere down the line they omit certain steps of the treatment process. Such things should be ruled out.

Having said all of that, this TNPL project is verdict that much can be done.

What is the level of salts the water can have that is ok for irrigation?

It should be at a permissible limit of 2000 mg/L. The best is to have it at 700 mg/L.

Do you know for how many years the residue of such chemical waste accumulation will remain in the soil?

That depends on what chemicals being used. It cannot be generalized.

For example, in case of pesticides we consider the LD 50 value. Likewise, it depends on the soil type as well.

For example, degradation takes longer for poor porous soil and in sandy soil, degradation will be faster. At the same time, ground water pollution will be high in case of sandy soil as opposed to clayey soil.

So, many parameters must be monitored.

If distillery industry waste water causes the salinity, can it be used for agricultural purposes as the water is rich in macro and micro nutrients?

We found out that instead of diluting it with irrigation water many times, if one time pre-sown application at recommended dose is done, and the farm is left for a minimum 30 days before cultivation, no harm is caused to the crops provided the technology is followed to the particular crops. This is because there is nothing other than high salt and BOD content in waste water from such industries.

Are there any examples of successful adoption of such projects?

Almost all Tamil Nadu distilleries are coming forward with TNAU and signed MoUs to utilize their waste water for irrigating fields. But, Central Pollution Control Board is not permitting this even if the water is having rich nutrients because of the concept of zero-discharge. All red category industries have to follow the zero-discharge policy.

Pollutant/ Constituent	Parameter	Impacts
Plant food nutrients	N, P, K, etc.	➢ Excess N: potential to cause nitrogen injury, +excessive vegetative growth, delayed growing season and maturity, and potential to cause economic loss to farmer ➢ Excessive amounts of N, and P can cause excessive growth of undesirable aquatic species. (eutrophication) ➢ Nitrogen leaching causes groundwater pollution with adverse health and environmental impacts

Pollutant/ Constituent	Parameter	Impacts
Suspended solids	Volatile compounds, settleable, suspended and colloidal impurities	➢ Development of sludge deposits causing anaerobic conditions ➢ Plugging of irrigation equipment and systems such as sprinklers
Pathogens	Viruses, bacteria, helminth eggs, fecal coliforms etc.	➢ Can cause communicable diseases

Pollutant/ Constituent	Parameter	Impacts
Biodegradable organics	BOD, COD	➢ Depletion of dissolved oxygen in surface water ➢ Development of septic conditions ➢ Unsuitable habitat and environment ➢ Can inhibit pond-breeding amphibian fish mortality ➢ Humus build-up
Dissolved inorganic substances	TDS, EC, Na, Ca, Mg, Cl, and B	➢ Cause salinity and associated adverse impacts ➢ Phytotoxicity

Can we grow fish in the water stored for agriculture?

No. Without treatment you cannot use the farm water because fish fecal matter gets dissolved in the water. This water should be aerated and after analyzing the biological oxygen and salt content, you can use it as a nutrient source. Do not use it as an irrigation source.

In India, I believe, hardly 10% of the waste water is treated compared to other countries. Your comments?

That is true. We are lagging behind when compared to other developed countries. This is why we have not been able to utilize our waste water effectively. The reason is that geographically we are extremely different when compared to other countries. Our streets are extremely narrow. Even our drainage systems are not 100% efficient, even in the cities. The other countries have well secured industrial laws as well.

How about the waste from paint industry?

Paint industry belongs to the red category. Waste waters from these industries are highly toxic. It has to be properly categorized and protocols must be followed well. Proper absorbents must be used. It is extremely important or else it cannot be used for agriculture.

What about sewage contaminated water?

They are also mostly not treated well. All the municipalities have now installed waste water treatment plants in all municipality sewage plants. This water is successfully utilized for agriculture. Without treating, use of sewage water leads to quick eutrophication which leads to blooms of blue-green algae that leads to depletion of fish species, general deterioration of water quality and other effects that reduce and preclude use.

Pollutant/ Constituent	Parameter	Impacts
Stable organics	Phenols, pesticides, chlorinated hydrocarbons	➢ Persist in the environment for long periods ➢ Toxic to environment ➢ May make wastewater unsuitable for irrigation
Heavy metals	Cd, Pb, Ni, Zn, As, Hg, etc.	➢ Bio accumulate in aquatic organisms (fish and planktons) ➢ Accumulate in irrigated soils and the environment ➢ Toxic to plants and animals ➢ Systemic uptake by plants ➢ Subsequent ingestion by humans or animals ➢ Possible health impacts ➢ May make wastewater unsuitable for

What are your comments about hotel industry's waste water?

Nowadays big hotels is subjected to mandatory waste water treatments. It is reused further for their use itself. They cannot let it out into common drains. Small hotels still let their waste water out into public drains. That is why sewage water is more complex.

How can STP plants be best treated and how can it be used for agricultural purposes?

If you have an STP plant, you can dilute the water and use it. Any flocculant chemical which settles sludges is good enough, like alum. There are many now. Also all sludges should not directly be utilized for agriculture. It should be incorporated with some agricultural waste plant residues proportionately so that we can reduce the toxicity. At the same time, we can enrich the agricultural plant residues with this sludges which contains high nutrients.

What kind of awareness is being created by the farming community?

The problem is the farmers' mindsets. When they get very good result / yield they are not bothered about anything else. Department of Agriculture should closely monitor the use of resources. Also, people or institutions donating treated waste water should receive some benefits as well. Awareness is being created.

Any final words before we conclude?

In developing countries there is a need for supportive policy and institutional arrangements to facilitate wastewater collection, treatment, use or disposal.

These institutional arrangements must be sound at different levels and may include:

• relevant policies favilitating water recycling and reuse at the local/national scale

• Strategic campaigns on water quality protection, waste water treatment and productive reuse

• instituitional collaboration such as private sector participation

The most successful countries have toiled for decades to achieve safe wastewater etc.

While each country is unique, the experiences of other countries provide lessons to improve wastewater irrigation practices.

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Tejas M.Kulkarni

Head of Operations and Business Development, Arya Biotechnologies, Aurangabad

Mr Tejas M.Kulkarni, is the Head of Operations and Business Development, Arya Biotechnologies, established in 2005 based at Aurangabad. They are a part of broader group, manufacturer of Organic Fertilizers, founded by an agrarian Mr Mukund Kulkarni, with and intention to offer inputs better. Chemical engineer by profession, turned up his gears to manufacture products to better serve the agrarian community in his region, thus established Arya Biotechnologies. Mr Tejas has done his master's in biotechnology from Pune University and is a certified Business Management professional from SPJIMR and a certified Agribusiness Management professional from GIMI, Israel.

Talking about his company, Mr Tejas says their vision is to

- Offer research validated Agricultural and Livestock bio-available organic inputs.
- Sustainable and continuous improvement in crop productivity with higher input efficiency based on new and proprietary technologies
- To offer solutions in plant and animal health-based biotechnology
- To offer organic inputs resulting in high-yielding crops with better nutritive value and enhances storage life

Mr Tejas points out that they have their presence in western and northern India states like Maharashtra, Gujarat, Chhattisgarh, Jharkhand, Bihar, Uttar Pradesh, Sikkim, Andhra Pradesh, and Telangana. Their market is also present in GCC countries, North African Region and Morocco, Algeria and also European countries like Netherlands, and Germany. They are now expanding in Latin American countries, which are developing markets. They are compliant under NOPP (India), US_NOP, EOS (Europe), Dutch Input List/SKAL, ONSSA (Morocco), MINAG (Cuba), GCC (Guld Countries) and ISO 9001:2015

Their flag ship brand "Engimins" (Engineered Minerals) - based on multiple organic acids acting as chelating agents, alternative to conventional chemical chelating agents. They provide bio-available readily assimilable source nutrients to the crops and animal feed supplements "Avishi". The oldest of their brand is "Shrungi", a brand of bio-stimulants and soil conditioners.

Mr Tejas shares information about their products range that covers Nutrients for poultry, Nutrients for live stocks, Hydrolysed proteins, Organic manures, Botanical pesticides, Flag ship brand Engimins which are Engineered Minerals, soil conditioners, and plant growth promoters. They manufacture various types of fertilizers. The bio-fertilizers contain live microbes like Rhizobia, Pseudomonas and Trichoderma. They can be applied to the crops for nitrogen fixing and nutrient stabilization. Their organic fertilizers contain products of microbes but not the microbes itself. The shelf life of organic fertilizers is marginally higher than the bio-fertilizers as they do not have live microbes. The next type of fertilizer is bio-organic fertilizers which contain both live microbes and the product of live microbes. Enriched organic manure can be considered as organic bio fertilizer. The next type is bio-pesticides" based on neem and agroids. Mr. Tejas says they are considered as part of integrated pest management. Beauveria Bassiana can be considered as bio pesticides.

Talking about his experiences in organic fertilizers business, Mr. Tejas says that during the organic fertilizers production, they have to consider the macro and micronutrient content, as the inert nutrient contents are marginally less than the conventional chemical fertilizers. The minerals in the chemical fertilizers are based on petrochemical industry, and they have higher concentration of nitrogen, phosphorus, and potassium. The quality of the organic fertilizer does not weigh in the amount of these minerals alone but also on other factors like organic carbon, solubility (there are two forms liquid and powdered / granulated), pH etc. Bioavailability is the key work when talking about organic fertilizers. As per his earlier statement, the mineral in the organic fertilizers needs to completely be absorbed in their native form. Their product Engimins has this property. There are certain criteria for a fertilizer to be called organic. According to the FCO, organic fertilizers are City Compost, Organic Manure, PROM, and enriched Organic Manure.

According to Mr. Tejas , there are several steps in their production process like physical and biochemical processes, upstream and downstream processes, and fermentation. They all have to conform to several guidelines and certification irrespective of regional / government agencies. There can be no GMO microbes, no harsh chemicals, nor any contaminants. According to him, their upstream process has 3 parts. 1)Growth of the microbes 2) Formulating the products for maximum yield and 3) Nurture

the microbes to produce desired products. In addition to the above facilities, there needs to be a strong analytical facility to analyse the product in the making at various stages like production, harvest, and packaging.

They also should have detailed documentation on the several process/ procedures that they have put in place to obtain organic attestation. They also need to get the approval from the local legal bodies to make sure that the processing facility meets the strict guidelines. The following are the set of documents needed to be kept ready at all times: Documents on the analysis of the raw material and safety data sheets, Process flow sheets, Microbial culture data sheets, Field trials details, Sourcing details, Standardized the production SOPs, Technical data sheets, Product Safety data sheets, Product data sheets, technical, and marketing / sales, performance for the products.

Another important data point that they should have is the "traceability" of the products. If there are any corrective steps that are to be taken, there should be a process that needs to be implemented, to track where and when it was manufactured, batch number, supplier details etc.

When talking about the organic fertilizer markets, Mr. Tejas mentions that the domestic markets are poised to grow as there are strong trends to move away from chemical and conventional fertilizers. Even the governments have started to encourage organic fertilizers. The markets are emerging across the globe like in South Asia, Africa, Latin America, Australia, and Europe.

Currently the fertilisers market is highly dependent on import than export. There is a heavy importing of petrochemicals. They are processed, and the new product is then exported. There is a huge parity with import /export. The import is 200 to 300 times more than exporting. Also, it is stated that the production to consumption ratio is very low. This poses challenges of the manufacturing and supplying them. This can be mitigated by identifying organic states/regions, both domestic and global, and designing solutions to cater to the requirements. He mentions that we need to give importance to "Crop and agro-ecology", that is come up with end-to-end solutions/practices to satisfy all the needs of the consumers, from cultivation to harvest of the crop to hitting the market.

He said that there are a bunch of challenges that are to be mitigated such as:
1) Understanding FCO/ CIB Compliance / amendments. Many of the new products are yet to be covered, and they are working to make the guidelines as inclusive as possible. Till then it becomes imperative to the manufactures that they have to impress the market upon how these products are in fact beneficial in spite of the lack of compliance.

2) As mentioned, a couple of times earlier the nutrient content is less in organic fertilizers than the conventional chemical fertilizers, so focus needs to be on bioavailability and the quality of the product. Another challenge is breaking the taboo in favour of chemical fertilizers, as they are broadly and easily available.

3) The short shelf-life or longevity is another challenge that needs to be addressed. We need to take leverage of technology to address this issue and come up with new products/solutions or use alternative products without any live microbes.

4) Roll out of new technologies and up take of them needs to be addressed with emphasis to scale up and increase the market depth. As in other fields it a challenge to build, maintain, share, and implement knowledge banks.

According to him, Mr Tejas learnt that customer engagement is necessary to understand and identify their needs and come up with customizable solutions. Another important learning is that to identify practices and improve them to suit the needs. He also learnt that one needs to constantly 'Learn and unlearn' by the customers' needs and experiences, as they know the practical issues, pass the profits directly to the customers, that is focus on their need. Firms need to invest in identifying good supportive, like minded regional partners, channel partners and associates, to grow their business. Also, this will lead to build trust in customers, online and offline, so that they get the help that they need.

When addressing the question "Why do I do this", he mentions that it allows to use these skills to his best. By doing this, he says he can satisfy his commercial and social needs. It also creates opportunity for him to meet interesting people and ideas, understand several aspects of business that keeps him grounded and connected.

For the new entrants, he says that they always need to be open to learning, not be over enthusiastic, and not to bite more than they can chew. Efforts need to be put to understand the current laws and regulations. They must be alert in identifying their points and coming up with solutions. This can be achieved by directly interacting with customers., identifying suitable partners with similar core value, and learning to respect the supply chains.

What is the bestselling product so far?

There are a few products like BioBoost (bio stimulant), which is in the market since 2006. This is available in liquid form, powder, and granulated form. There is a new product in the market

which is a modification on BioBoost and the Flagship Engimins (Minty, MixMins) in local and google markets.

Organic fertilizers give less output.

What is your stand on this?
True in the sense that the organic fertilizers sometimes give less output, but that is the for a short term. However, in the long term. it is always comparable, if not better. The conventional chemical fertilizers spoil the soil in the long term, and that is not the case with organic fertilizers.

Do you support contract manufacturing?
It depends on what the product is and the manufacturing capability. If you want please reach me offline for any specific ideas.

Have you done any trials on your products on major crops? Do you have references?
Yes! Trials were done on onion, citrus fruits, sugarcane, cotton, and pomegranates. Recently we have tried our products on olives in Middle East. We have association with Organic Fruits farmers in North India. If you need reference, I will be happy to provide that information.

What will be the average cost of the fertilizers?
Mass marketed products range from Rs. 700-800 per litre. The dilution rate is low, and we need not apply more than 2 or 3 litres per acre. In the case of Engimins the price is Rs. 1000-1200 per litre. It may seem pricey, but when considering the factors like dilutability, usability, and amount needed per acer, it is almost the same as conventional fertilizers.

Can you please provide any information on your Botanical insecticides / Bio fungicides?
We do have a Neem based botanical insecticide, which is an emulsified concentrate and can be used as foliage spray. No bio fungicides yet, but I can connect to sources, if you need.

Can you suggest bio fertilizer for sugar cane and soybean?
Yes. Engimins (Minty / MixMin) are organic fertilizers for these plants.

How to find more information on the contents of a product? What is a good certification agency?
Industry practice is that they do not give real content details. Our practice is to give that information of the contents on the label of the products. There are several agencies like Aditi Organic. We are working with EcoCert for certification. EcoCert is one of the most experienced certification bodies since 2006. Consumers need to identify experienced manufactures with established products. They need to make sure that the product complies with all regulations and certification. Our products are certified by EcoCert and are in compliance with NPOP, USNOP and European Organic farming regulations.

Can you please comment on the shelf life?
Liquid bio fertilizers do not have a long shelf life, may be 1 year. That too, they lose the efficacy after 8 to 10 months. Organic fertilizers with botanical origin/herbal origin/natural origin, like the ones we make with our fermentation technology, last longer, because they do not contain any microorganisms, and they have almost 2 years of shelf life.

Can you recommend an organic manure for Papaya and banana?
If there are any sugarcane compost or any similar products in your region, you can get them. Our product Aryaman, can be used. It is a sugarcane compost. This product needs to be used in lesser quantity, around 500 – 750 kg/hectare.

Do you manufacture Mycorrhizae products?
We are not producing Mycorrhizae VAM. Currently they are focusing on their proprietary organic fertilizers.

Can you please tell us about storage and longevity of pseudomonas and Trichoderma?
The shelf life is 1 year if cold stored. If it is based on bacterial spores, they will last long, if not they have to used immediately. If you know any sources who can provide good quality spores, they you might use them.

For each and every crop there is a critical phase. If the nutrients were to be supplied during that phase, the results will be impressive. Are they any research that you have undertaken on this?
Some information is available to the public. There is a product called Afresh. They are Engimins, created on the principle that if the product comprises of 2 or 3 important nutrients like potassium and boron, you can use that as a folic spray, and it could give you a better yield. We have seen that they can increase the shelf life of onions by 15-20 % with the combined use of BioBoost and Afresh. We have other products like MixMin and Minty for which we are yet to substantiate the study. The related documentation for the product Afresh will be made available online.

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Dr. Dinesh Kaippilly

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Dr. Dinesh Kaippilly is an Associate Professor and Head, Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Cochin, Kerala. He was conferred as a FELLOW of World Aquaculture Society, a global organization headquartered in the USA, and he is the second Indian to receive this award. He has a professional experience of more than 20 years in fisheries, aquaculture, and allied activities in various institutions. Dr. Dinesh is the Principal Investigator of a project funded by COOP, the largest super market chain in Switzerland on the seed production of Penaeus monodon using organic protocols. He has been appointed as the KUFOS Nodal Officer for the Chellanam Restoration Project which is a prestigious programme of the University.

I, through this interview, want to explain on how to start fish farming, importance of fish, importance of fish farming, and different species that can be cultured, and systems to cultivate fishes. Despite the current pandemic, the major food production sectors agriculture, farming and fisheries are not affected that much. During my brief overview of Indian agriculture sector, especially Fisheries, it is predicted that the industry is set to grow to 28 million metric ton from 13.8 metric ton by 2050. Fish is an aquatic organism, fisheries all the science regarding fish, and aquaculture is a subsector in fisheries which deals with farming of all types of aquatic organisms and plants.

The annual fish production of India garners 137.58 lakh ton of fish, and we have exported fish worth Rs. 46,589 crores. It contributes to 7.73% of global fish production, and we are the second largest aquaculture producer in the world. Additionally, India is the fourth largest seafood exporter in the world. This industry contributes to 1.24% of our country's GDP, while the total Agriculture sector contribution is 7.28% of India's GDP.

To keep up with the ever-growing population, we need more food sources, that too rich in protein. This is where the fish production comes in. Currently, the global per capita fish consumption is around 20.8 kg. However, in India it is only 7 kg per capita. We may have to augment the per capita fish consumption of the country by various governmental programmes to ensure health status of our common man as fish is a well-accepted healthy food.

While protein security provides adequate protein to the body, nutrient security supplies micronutrients like minerals, phosphorous, zinc, calcium, selenium, DHA, Omega 3 fatty acids and other nutrients. Consuming fish caters to all these requirements for good health.

As indicated earlier, aquaculture is the farming of aquatic animals and plants in confined environment that you have control on, and you catch the fish from that environment for consumption. This does not include catching fish from the sea or public water bodies which is known as capture fisheries. Aquaculture production is getting augmented each year. There is a total percentage growth of 7% in this, and it is an excellent opportunity of business.

I want to highlight some features of aquaculture. The cultivation medium is water where the water quality (parameters) is of paramount importance. It is 3 dimensional system, utilizing length, breadth and height of the rearing water and the cultivation occurs at all planes; the top, sides, and the bottom. Water should be pollution-free, parasites/disease causing organisms-free, unwanted chemicals-free etc. Obviously, aquaculture has high profit margin. FCR (Food Conversion Ratio) in aquaculture is very low compared to other culture systems, that is, the total weight of feed to be given for producing the same unit of fish is very low. As 60-70% of the expenditure in this sector is for the feed, the lesser the feed, more profitable is the business. Aquaculture can help in efficient in waste management, by converting unconsumable organic wastes to fish flesh through improving natural productivity in the culture ponds. The phytoplankton, zooplankton and associated micro and macro organisms form an excellent food for fish. However, the wastes from fish farming needs to be managed effectively so that they do not create imbalance and degradation of the outside environment. Such waste materials need to be taken care of inside the culture medium also so that the oxygen levels are maintained at desirable levels and other toxin levels don't exceed the limits.

There are some remarkably interesting features of aqua-farming, like utilization of waste lands and high monetary returns. Another important purpose of aquaculture is the "upliftment of Rual areas" by providing employment and livelihood to millions. Aquarium keeping which is a sub sector of aquacul-

ture is the second most popular hobby in the world. In the rural areas, when it is developed, it gives more money, employment, and recreation to people. Depending on identifying the existing opportunities, you can capture global market through this segment of aquaculture.

While starting a business, you need to identify suitable species for farming and consider the following facts:

- Rapid growth
- Ability to use natural food
- Low FCR
- Easy to breed
- Co-existence and hardiness

Let me list out a few types of aquacultures:

- **Based on where they are conducted:** Freshwater aquaculture, Marine aquaculture, and thirdly Brackish water aquaculture which happening in estuarine waters. The Brackish water aquaculture is monetarily high yielding, where you can farm Shrimp and Fish wherein the water salinity is maintained by mixing of river water and sea water.
- **Classified according to the location:** Land based and Open water aquaculture. When you set up tanks and ponds in your backyard or in your land area, it is land based. Another one is Open water aqua culture called cage culture, where it is done in seas, lakes, or other public water bodies.

- **Based on intensity** : They are extensive/modified extensive, semi-intensive/intensive/super intensive/ ultra-intensive. This is similar to agriculture.

I also want to tell you about "facilities and systems needed to do aquaculture business":

Excavated Ponds / Tanks: One can excavate the land to construct a pond to rear the fish with or without silpaulin lining. The pond can be made with bricks, clay, granites or even with concrete. There is another type of pond called "Levee ponds" which are used for holding water in the unused paddy field like areas/ marshy lands by constructing bunds around. Obviously, these are more economical to make and maintain. Sluice gates can be provided as water regulating structures.

Cages and pens: These are mostly used in marine farming and open/ public water bodies. The main difference between cage and the pens is the bottom surface of the facility. In pens set up in open waters like backwaters, lakes, rivers and reservoirs, the bottom is natural. Earlier in India, there were no policies and guidelines for this type of aquaculture. But now this sector is expanding in our country. In cage culture, the entire unit is well covered with netting not only the sides and top, the bottom as well. With corporate support and involvement of the stakeholders like fishermen, the cage farming in seas is a lucrative area for business. In many countries, cultivation of salmon and other expensive fish is done using this practice.

Recirculating Aquaculture Systems (RAS): This is an important system and tanks are comparatively small. It requires meticulous maintenance and involves high production cost. The rearing water is recirculated removing all impurities to maintain water quality and so production will be very high in this system. For example, from a 1000-litre tank easily 30-50 kg of fish is produced with proper water filtration. There are several filters, aeration facilities, water treatment mechanism etc. are integral parts of this system. Normally, submersible pumps are used to remove the excreta of the fishes and food waste to maintain the water quality. It is expensive but with restricted area under possession you can go for this.

Aquaponics: A combination of Aquaculture and Hydroponics – synergy between fish and plants. Basically, you grow fish using aquaponics, and the fish waste provides an organic food source for the plants and the bed with plants naturally filters the water for the fish. The nitrifying bacteria convert ammonia from the fish waste into nitrites and then to nitrates which is a form that plants can uptake for growth. Solid fish waste removed from the system can be turned to vermicompost which can act as manure for other plants. There are several advantages for running aquaponics as only 10% of the water than normal is needed. Plants and vegetables grow significantly faster, healthier, and bigger than traditional methods using soil. There is no need to use artificial fertilizers, to dispose of fish waste or to provide an artificial filtration system. It is easy to set up the system for year-round use, and no chemicals are used, and so the

products are purely organic. However, one needs to consult appropriate professionals to set up the infrastructure to ensure smooth functioning of the system. Units include different components such as fish tank, mechanical filter, bio filter, hydroponic containers, media, bell siphon, water lifting devices and aerators.

Biofloc: BFT is a sustainable technique for improving the quality of water in aquaculture by balancing carbon and nitrogen ratio in the system. Nitrogen is automatically produced in the system (as an excretory product in the form of ammonia) and the carbon is added externally (eg. jaggery, sugar, tapioca flour, wheat flour etc.). The most important component of BFT is

the biofloc. Biofloc is a heterogeneous aggregate of suspended particles of microorganisms like bacteria, algae, fungi, invertebrates, and detritus, etc. A protein-rich live feed is formed because of conversion of unused feed and excreta into a natural food on exposure to sunlight. Each floc is held together in a loose matrix of mucus that is secreted by bacteria and bound by filamentous microorganisms through electrostatic attraction. The floc is used as feed and also acted as biological entities which facilitate water purification to maintain the water quality. This system needs very less area, and it is an energy intensive and money intensive system. It needs constant attention and vigilance in all the aspects. Our government is encouraging advanced aquaculture systems like BF through a program called "Pradhan Mantri Matsya Sampada Yojana" with a total outlay of INR 20060 crores. The tank should be preferably round. More aeration is needed to keep the floc always in suspension. It is an eco-friendly culture system. It reduces environmental impact with improved land and water efficiency. It has limited or zero water exchange and results in higher productivity. No disease or water pollution is reported, and use of feed is limited. Equipment for fast flow-aeration and submersible pump are required to suit the capacity. There will be excreta of fishes, unconsumed feed, carbon source provided etc. in the tank which contribute to the biofloc formation. You have to remove the settled floc through submersible pump.

Brackish water aquaculture: Can grow shrimps, crabs, milk fish, mullets, Asian sea bass etc. It is a promising sector in India. In Karnataka, this is practiced in coastal belt Andhra Pradesh is the major producer of shrimp in the country while Gujarat, West Bengal, Goa, Tamil Nadu, Maharashtra etc. also play significant role. The total national shrimp production mainly pertaining to Penaeus vannamei (Mexican white shrimp) is 7 lakh tonnes worth around INR 27000 crores. While done in inland areas, you have to manipulate the water salinity, alkalinity and hardness by adding more salts.

Marine aquaculture: You have salmon, cobia, pompano, groupers, breams, yellow tail, and tunas on a global basis.

Indian carps (catla, rohu and mrigal) are cultivated in India extensively. More than 60% of production is contributed by carps. They are cultivated extensively in big water bodies with cheap food stuffs like ground nut oil cake and rice bran and sometimes with formulated feeds. Even by giving manures and fertilizers they grow satisfactorily. Within 8 months, carps attain a weight of about 1 kg. You can get 15 to 20 tonnes from a hectare if the ponds are deep enough and fed well with formulated feed coupled with water quality maintenance. Carps have very high demand in North India. It is produced in Andhra Pradesh extensively and truck loaded to Calcutta on a daily basis. Culture is very simple, if there is sufficient water area under possession. You have to prepare the ponds, kill unwanted fish with toxins, then you can refill the water, add manure, and stock the fish seed. Exotic carps (grass carp and silver carp) can grow to 1 to 1.5 kg in 8 to 9 months, if fed properly. We have introduced these from China and common carp from other Asian/European countries. The growth rate and production capacity are better than Indian carps. Silver carp utilizes phytoplankton, grass carp uses macro-vegetation for food while common carp is a bottom dwelling omnivore.

The other varieties I want to mention are Basa (Pangas) that grows to very big. Though it is renowned for its milky white coloured meat in Vietnam, its meat is seen to be pinkish and yellowish in color in India. Still, meat-wise it is excellent. The fish has air breathing mechanism so can put more numbers per unit area in culture ponds without bothering too much on water quality. In Andhra Pradesh, e production varies from 50 to 70 tons per hectare. Fish requires high quality and protein rich feed.

Tilapia is called aquatic chicken and are from African countries belonging to different species. In Karnataka, many reservoirs remain stocked with this

fish. The fish is prone to a viral problem (Tilapia Lake Virus), but generally they are safe from other diseases. They are cultivated in biofloc method and the culture is very easy. Production is about 25 tons from one hectare from intensive ponds. You have to prepare the ponds properly and feed the fish with formulated diets.

Shrimp farming: Easy to rear and can harvest them within 120 days and economically very profitable. Global annual production is around 40 lakhs tons, out of which 7 lakh tonnes come from India. The types of shrimps cultivated in India are Tiger shrimp, Pacific white legged shrimp and freshwater prawns (high demand overseas). The Mexican species is highly amenable species for culture which can be harvested easily with surf nets or dragnets.

What are the steps in developing a fish farm?
You can start a fish farm in a pond / tank, in marshy area with or with big facility. You can even start a fish farm in a small pond in your back yard or even with a 1000-liter tank. While done in small tanks, you should have proper energy support, like electricity for removing the excreta and other wastes that will harm the fishes, as they have high ammonia content. The culture period will be around 5-6 months. You may register your area with the state's fisheries department, under your district, so that you can avail sorts of governmental help.

What is the FCR of the Biofloc system? Are they comparable with other systems?
In the Biofloc system, the FCR will be generally less than 1 and then only Biofloc will be commercially feasible. In the shrimp farming, the FCR is 1: 1.25. That means, you need to give 1.25 kg of feed to get 1 kg of shrimp. In the case of Fish farming the FCR is 1: 1.4-1.5.

How can you use irrigation tank for aquafarming?
If you want to integrate your irrigation tank as an aqua-farming tank, you stock Tilapia or Basa or Anabas species, so that the irrigation water will be more productive.

What is the minimum area required for Biofloc for shrimps? What is the investment required?
10-ton tank will be the minimum ideal and you may require INR 1.5 lakhs for the installation. If you can have a 50- or 100-ton tank, the productivity will be more. The more the volume, the more the economic viability. There are subsidies available under "Pradhan Mantri Matsya Sampada Yojana" in Kerala.

Do you need an ice plant for shrimp farming?
No! it is not necessary. However, you may need good contact to get a good price for your product. And you need to market your product in such a way that it is fresh.

Where can you get trained in Biofloc farming?
Training is available in Kerala University of Fisheries and Ocean Studies, Cochin, Kerala. Dr. Babita Rani, Senior Scientist in Central Institute of Fisheries Education is an authority in this sector provides training in Mumbai area. There are sessions by KUFOS available in Face Book (KUFOS LIVE).

Is freshwater shrimp farming feasible in North India? How much time does it take the crop with temperature fluctuate from 4 degrees to 42 degrees?
The minimum culture period is approximately 240 days. The temperature should be between 28-31 deg Celsius. One can go to Trout farming. There is a cold fish research institute in Himachal where you can get more information on this.

Is there other fishery university in India?
Yes! KUFOS is the first university of Fisheries in India. There is Jayalalitha University of Fisheries in Tamil Nadu. In Karnataka it is under Veterinary University. All states have Fisheries Colleges or fisheries department for further information.

Where can we get fish seeds? How can we find the quality of the fish seeds?
There are several suppliers, who may be or may not be completely genuine. If you contact the government department, they will be able to guide you properly.

What is the maximum water height for Biofloc?
Normally we use 1.5 to 2 meters. It can be more than this if other conditions are satisfactory. But you need more powerful motors, which will add more to the cost.

Due to aquaponics, natural habitats are destroyed. How can this be prevented?
There is no adverse effect in marine environment as this is a freshwater system. In aquaponics system, no antibiotics are being used. But if you want to treat the fishes, there are some antibiotics like Oxytetracycline for use which can be used with precaution.

In Punjab how I can start a farm?
Punjab temperature range from 3-30deg Celsius. You need at least 5 months of time with ideal temperature. With controlled environment you can start fish farming at any time and at any part of the country.

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S A Gopalakrishna

Director
Ratnagiri Impex Pvt Ltd, Bangalore

AgriMart online and Ofline Stores, marketed by Ratnagiri Impex Pvt Ltd works with a mission to get the farmers – small or large scale - of our country conscious and aware of how beneficial hi-tech equipments can be for them and their farms and thus, make them highly competitive in this competitive world.

Mr Gopalakrishna says, "We visualize farmers having a mechanized approach. so that they are empower for effient way of forming and increase their revenue.

AgriMart started with 2 employees in 1999 in 1 town. Today it is a 80+ employee strong firm and spans across India. AgriMart is a concept where farmers get everything under one roof. They will get products, training, awareness, service, etc. We have retail outlets across South India.

Is Agrimart one branded product?

AgriMart is an established network of supply chain and support activities.

We promote different brands:

• Oleo Mac, KASEI and Alrite: they are international brands

• Agrimate and Green Panther: These are our own brands

Through these brands, we offer a whole range of mechanization products:

We have all farm related products like tillers, Power sprays, weedcutters, trimmers, etc. You name the product and we have it!

• Chain saws: Oleomac chain saws are powerful that you can use to prune trees, lumber work & etc..It is absolutely safe to use. Based on the requirement, we have different models. The machine comes with all the safety fetures and safety gear necessary to use this product safely. With this you get 10 people's job completed by 1 person. Chain saws can be used to fell trees, cut logs, trim branches, perform a tree surgery and tree maintenance.

• Brush Cutters: Oleomac / Agrimate / Kasei / Green panther brands are commonly used in agriculture and horticulture. It is used for weed management. It is a multipurpose tool operated by single person. It is light weight, easy to use and maintain machine. It gives you the productivity of 10 man days with 1 person, a sure quick return on investment tool. Again, it comes with the safety feature necessary. It comes with different blades for different activities. It can be a clearing saw to cut down small trees, twings, branches, hard weeds, grass, weeds. etc. Also, the cut waste can be used as green manure. The cut waste will automatically form a layer in the ground contributing to the humus. With one machine, i.e. one person can cover up to 2 acres per day. It works with petrol as fuel. With 1 litre petrol, you can cover up to 1 acre in 3 hours depdnding type of weeds and operator efficiency.

You can use this in uneven/rocky lands as well.

• Sprayers: Agrimate sprayers come with widest range and are certain key parameters we have to consider: There are high/medium/low/ultra volume sprayers. High volume sprayers comprises of 300 microns and low volume comprise of below 50 micron, the smaller the droplet size, the less chemicals required. Remember, you need to have a thorough understanding of what chemical you need to use and which machine to use.

• Rotary Tillers: Then we have Agrimate rotary tillers from 4Hp to 9 Hp range. We also have the petrol and diesel versions. We have tillers which is suitable for small and large plots. Tillers can be used as multi-function equipment by attaching sprayer, generator, pumpset, weeder etc. It is highly multi purpose.

• Areca harvestor: We have another machine form Agrimate called the Areca harvestor. It will climb areca trees for harvesting and spraying, by this shortage of skilled laour and timly work can be achived sucessfuly

• All these products can be used in a Agriculture / horticulture / Plantation / poultory / Farms /defence /self-employment by renting

• Using appropriate and safe farming machinery helps with more coverage, less man days, faster growth, quick ROI, low cost of production and increase in profits.

• We have online stores www.agrimart.in visit and register also download AGRIMART app from goggle playstore and enjoy the latest products and information, as well as price and discounts.

For more information, vist www.ratnagiriimpex.com or write to us at gopi@ratgiriimpex.com.

Which brand and speed is best for weeding purposes for plantation with crops spaced at 3ft, 6ft, 7ft rows and a total of 3 acre plots at 2 places?

There are two brands that we offer:
1. Agrimart - has petrol and diesel options and
2. Oleo Mac - has only petrol option
The choice of the machine should be based on the farm area. With the plot area you have mentioned it is best to go with 6 Hp tillers or 5 Hp oleo Mac tillers. If you write to me, I can share some brouchers and videos based on your need.

What is the cost of these machines?

The price ranges from 35,000 to 1 L. Some models are entitled to subsidy as well.

What is the cost of the multipurpose grass /brush cutter?

We have a from 8000/- to 49,000 If you write to me, I can connect you with our local franchisee to help you out.

Do you have service contracts?

Currently, we are not in that domain. Please share your details, I can find out connections for you. I know some of our buyers lend the products they buy, for rent. I can get you connected with such people.

Do you give an on-field demo of your product to potential buyers?

Yes, definitely. You get a demo on your field and we have network of dealers where you can avail of post purchase services.

Is it a fixed subsidy that is offered?

Subsidies are given by local state government in association with the Central government. You get the subsidy depending on your eligibility.

Why don't you conduct Continuous Agriculture Education (CAE) Programs in villages?

Good suggestion! I will surely look into it.

Do you have weeders suitable for paddy crop?

Yes we have wetland weeders. It can be used for weeding within paddy fields.If you write to me, I can share videos and the pricing structure for such equipment.

Do you have onion seedling transplanters?

Honestly, we do not have such an equipment. But I am making a note of it and will definitely help you.

Do you have association with companies based out of India?

Oleo Mac is an Italian based company. These products are really high technology products which currently are not being manufactured in India. Perhaps in couple of years, we will have manufacturers for similar machines, in India. An important aspect is that ractors and tillers cover 95% of mechanization. The machines I showed here covers for the rest of the 5% of the job. In fact India is one of the largest tractor manufacturers in the world. We also export such machines.

Are the products you offer suitable for all crops?

We are present in almost all segments because cultural activities like soil preparation, weed/pest/foliar management can be done by the same machine for most crops. We always portray our products as multipurpose because that is how they are built. These products can be used for horticulture as well.

Do you have a multipurpose machine that covers weed cutting, harvesting and pest management?

Weed control and pest management can be achieved with one machine. Harvesting is a completely different ball game. Hence for that you will need a separate machine. The harvest machine we have developed so far is for arecanut and this is being used widely in Maharashtra. We are now working on coconut harvesters. It will be mechanized in such a way that a person will be transported with the machine. So the safety factors need to be implemented after which we will launch it.

Do you have any added machinery that can be linked to tractors which can help with cutting down coconut leaves?

Yes, it can be done. Please write to us with details of your tractor.

Coming to composting, is a pulverizer required or just the shredder will do the job?

The shredder can be used for multiple purposes. If you cut at very small size, it will get composted very fast. If you plan to use it as fodder for farm animals, you can use different blades.

Can you suggest mini tractors that can be purchased?

We don't deal with tractors. VST seems to be the number one player in India for mini tractors. Mahindra also has mini tractors. But VST is the first to come out with mini tractors.

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New Zealand's agritech start-up incubator

Sprout Agritech based in New Zealand helps early-stage agri tech start ups. Here are 5 startups that recently graduated from the Kiwi accelerator.

New Zealand's Sprout will kick off its latest accelerator program next month, and any entrepreneurs or startups interested in participating have just one more day to submit their applications. So if you're at the last hurdle, wondering whether its worth spending the time to get your application in – who better to hear from than startups who've been through the program before?

AFN talked to five companies that have graduated from past cohorts to find out how Sprout helped them to hone their market strategies, grow their businesses, and expand on the global stage.

AREPA

Angus Brown (AB), co-founder of Arepa (meaning 'alpha' in Maori), describes the Auckland-based startup as "working at the nexus between neuroscience and food technology to create the world's smartest food." He tells AFN that Arepa's mission is to delay the onset of neurological decline through accessible, sustainably-produced food products.

What has your business journey looked like since graduating from Sprout's accelerator program?

We're now the market leader in New Zealand, selling the highest-value, fastest-selling health drink in major supermarkets. We're also vertically integrated with our key ingredient supply chain – including the largest blackcurrant farm in the country and suppliers of our New Zealand pine bark extract, which is a natural alternative to Adderall. Professor Andrew Scholey, one of the world's top botanical neuroscientists, has signed as our chief scientific officer, helping to manage our $3 million-worth of clinical research across five different trials. And Lain Jager, the ex-CEO of Zespri, is about to invest and join the board.

How has Sprout helped your company to expand beyond your home market?

We recently launched into Coles [supermarkets] in Australia. We're about to begin a pre-Series A capital raise and have a number of global multinational F&B companies interested. Our plan is to continue Australia and Asia expansion then launch into the US in mid-2022. We supply the likes of the All Blacks [New Zealand's national mens' rugby union team], Olympic athletes, and elite CEOs around the world.

CROPSY

Auckland's Cropsy uses imaging technology and AI to help winegrowers understand the needs of every individual vine in their yard – and track how those needs change over time so they can improve their decision-making. "The best part is that we deliver this as a tractor add-on, so growers do all their daily operations while we keep eyes on the crop," says co-founder Leila Deljkovic (LD).

Why did you decide to apply for the Sprout accelerator?

The knowledge and experience within the Sprout team is really extensive. All the mentors are accomplished founders and innovators themselves, so the guidance young companies like us get is from people who've 'been there, done that.' They also have a global network of VCs, other founders, and industry professionals, so they're able to get early-stage ventures in touch with the right people.

What was the biggest benefit of participating in the program, in your view?

Our Sprout mentor has been invaluable; he's always thinking ahead and has helped guide Cropsy in the right direction, and this is a solid relationship which has continued after we completed the accelerator program, and will probably continue for long beyond that. Aside from all the practical skills we learned during the accelerator — like pitching and negotiating — I'd say having experienced people with a fresh perspective, like the mentors, is the most valuable thing to help early-stage ventures.

How has Sprout helped your company to expand beyond your home market?

The Sprout team saw bigger potential in Cropsy than even we did. That made a huge impact on us; there was a tangible shift in our mindset towards seeing the reach of what Cropsy can accomplish on a global scale.

Our ambitions are certainly global, in part thanks to the Sprout team. Our technology delivers universal value to winegrowers all over the world, not just in New Zealand.

What would you say to startups thinking of applying for the program?
If you're an agritech or foodtech startup, whether you're on the edge of taking your business to the world or you just have a solid idea, there's no excuse to not apply! The Sprout team have a diverse wealth of knowledge under their belt and global contacts. I know we've made some great friends in our cohort too, with the other companies. It's win-win.

HECTRE

This Auckland-based startup seeks to empower growers with a simple orchard management platform, including cloud-based software and an AI-driven fruit quality testing tool. This allows growers and packhouses alike to "manage their orchards from their back pocket," says CEO Matty Blomfield (MB).

Why did you decide to apply for the Sprout accelerator?
There was a perceived pathway to funding where we could learn more about building a company and bringing capital on board.

What was your biggest lesson learned from participating in the program?
There are many ways to sell your product, build a company, and raise capital.

How has Sprout helped your company to expand beyond your home market?
They said: "Matty, you should get on a plane to the US!" So I did. Hectre is now used by growers from around the world, including Stemilt [US] and Fankhauser Apples [Australia].

What would you say to startups thinking of applying?
A structured programme like Sprout's is helpful to expand your knowledge quickly on how to grow a company.

MICROPOD

Also hailing from Auckland, Micropod wants to bring indoor gardening into people's homes to inspire healthier lifestyles. Its hydroponic microgreen growing kits "are our way of sharing what we've discovered to empower anyone, anywhere to grow their own fresh microgreens using our fun, easy and sustainable process," says CEO Jeff Xu (JX). "Just add water!"

Why did you decide to apply for the Sprout accelerator?
Sprout was recommended to us by a friend. After reading and learning more about them online it was obvious that they had the knowhow to bring a small agritech startup to the world stage.

What was the biggest lesson learned from participating in the program?
That we needed to be really customer-focused and understand their pain points more than ours! This allowed us really hone in on our MVP to solve the customers' number one issue: the want to grow produce at home, but lack the space, time, climate, or knowhow.

How has Sprout helped your company to expand beyond your home market?
We were able to leverage the contacts we made through the program and also the being a Sprout alumni gave us a lot of credibility when talking to people in industry worldwide.

ONSIDE

This Christchurch-based startup provides operations software to connect and protect people and businesses in rural areas and remote locations. Its ultimate vision, according to CEO Ryan Higgs (RH), is to build a "global rural network" to provide next-generation tech for biosecurity purposes.

Why did you decide to apply for the Sprout accelerator?
We wanted to have our thinking challenged, learn from other early-stage companies, and be connected into the Sprout network.

What was the biggest lesson you learned from participating in the program?
Every early-stage company needs to learn to tell their story. It needs to be simple, clear, and compelling.

How has Sprout helped your company to expand beyond your home market?
Ultimately, if you want to expand and do it successfully, you need to have strong foundations. Sprout helped us build those foundations. This year, we've begun to focus more of our resources on expansion into the Australian market and beyond.

What would you say to startups thinking of applying for the program?
The Sprout brand has become well recognized, both here in New Zealand and also around the world.
Their program will challenge your thinking, give you an opportunity to get out of the day-to-day, and connect you into a great network for people. It is well worth it!

Source : https://agfundernews.com

From feed to fuel

This is how corn is used around the world

- **Corn has a number of uses, from acting as a key ingredien of animal feed to being devel- oped into sustainable fuel.**
- **In 2020, 14,575 million bushe were used, with 38.7% formin a key component of livestock' diet.**
- **The U.S. is the world's largest producer and exporter of corn and accounted for roughly 36% of exports in 2020.**

Corn beyond the cob

Corn or maize is the second most-produced crop in the world, and it's more than just a staple in our diets.

From the sweetener in our coffees to the ethanol that powers our vehicles, corn has hundreds of uses. Consequently, high corn prices have a domino effect that can affect many supply chains and possibly even increase the cost of our weekly groceries, especially if they include tortilla chips.

This infographic uses data from the National Corn Growers Association to break down U.S. corn use by segment in 2020, and the products that a bushel of corn can produce.

The uses of corn in the U.S.

While corn on the cob is quite popular, not all corn is sweet. There are five major types of corn grown around the world, and each one differs in taste and uses. Of these, yellow dent corn or field corn accounts for the majority of commercial U.S. production.

Corn accounts for more than 96% of U.S. feed grain use and production. As a result, animal feed makes up nearly 40% of the country's corn usage. This is because corn is a rich source of carbohydrates, and in combination with protein from soybeans, it can make for an effective diet for livestock.

In the United States, federal mandates require vehicles to use a blend of gasoline and biofuels like ethanol—94% of which is produced from the starch in corn grain. Therefore, a large portion of U.S. corn goes into ethanol production.

Interestingly, the ethanol distillation process produces a co-product known as dried distillers grain, which serves as low-cost, protein-rich animal feed for livestock. On average, the U.S. ethanol industry produces around 90,000 tons of distillers grains each week.

Animal feed and ethanol production collectively make up around 73% of U.S. corn usage. Other uses of corn include the production of sweeteners, starch, cereal, and alcoholic beverages like whiskey.

Breaking down U.S. corn exports

The U.S. is the world's largest producer and exporter of corn and accounted for roughly 36% of exports in 2020.

Up until 2019, the majority of U.S. corn exports went to Mexico, Japan, and Colombia. China wasn't among the top 10

Breakdown of U.S. corn usage in 2020:

Segment	Bushels Used (millions)	% of Usage (2020)
Feed	5,650	38.7%
Ethanol (Fuel)	3,875	26.6%
Exports	2,550	17.5%
Ethanol (Animal Feed)	1,075	7.4%
Sweeteners	780	5.3%
Starch	230	1.6%
Cereal/Other	215	1.5%
Beverages/Alcohol	170	1.2%
Seeds	30	0.2%
Total	**14,575**	**100%**

destinations, but this changed in 2020.

Between January 2020 and 2021, U.S. corn exports to China increased exponentially, reaching an all-time high in December. China's massive import appetite is because of a shortage of domestic supplies amid rising demand for feed from its recovering hog-herd, which was hit by the African swine fever in 2018.

Consequently, China became the third-largest importer of U.S. corn in 2020 after Mexico and Brazil. What's more, the U.S. Department of Agriculture projects that China's corn imports in 2021 will be much higher than 2020 levels, and the majority of those will be sourced from the United States.

The corn price boom

In addition to a drought-induced yield cut in Brazil, rising demand from China has driven corn prices to their highest level in the last eight years.

Since the beginning of 2020, corn prices have increased 68% and stand at around $6.50 per bushel as of May 19th.

The rise in corn prices is likely to affect several industries and could translate into higher prices for our groceries, including cereals, taco shells, and corn syrups. Additionally, it could also push up the price of gas due to its key role in ethanol production.

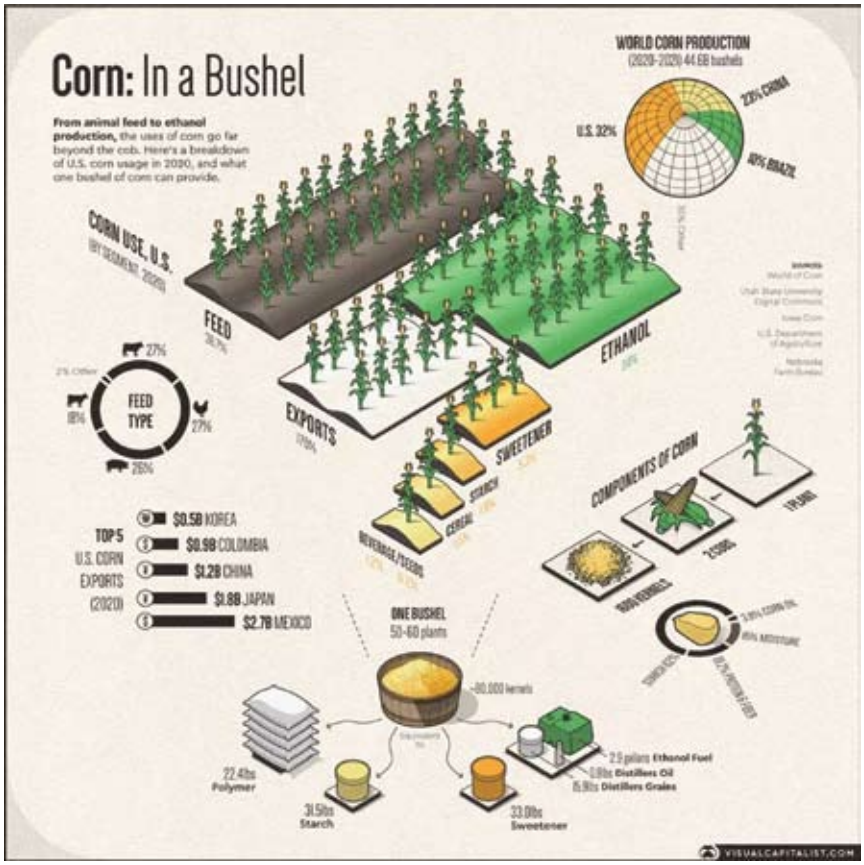
Corn, in a bushel

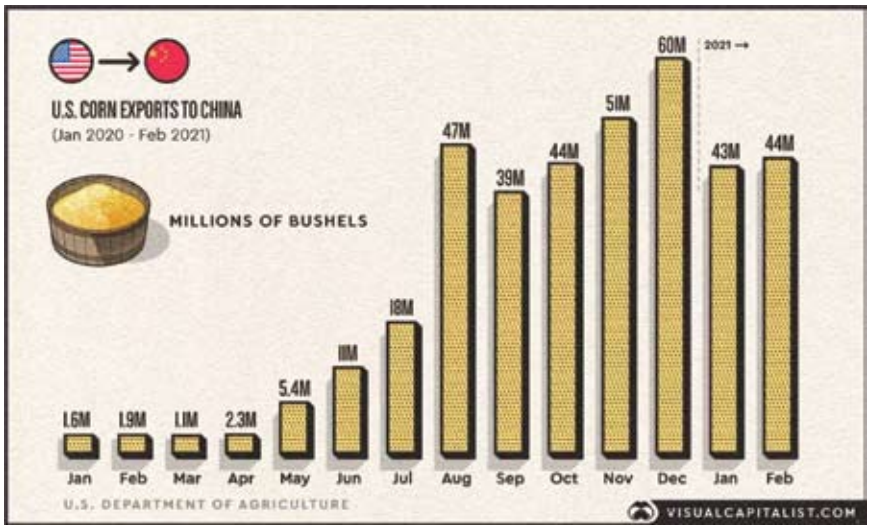
In a world where commodities like corn are often taken for granted, it's important to think about how valuable it can be.

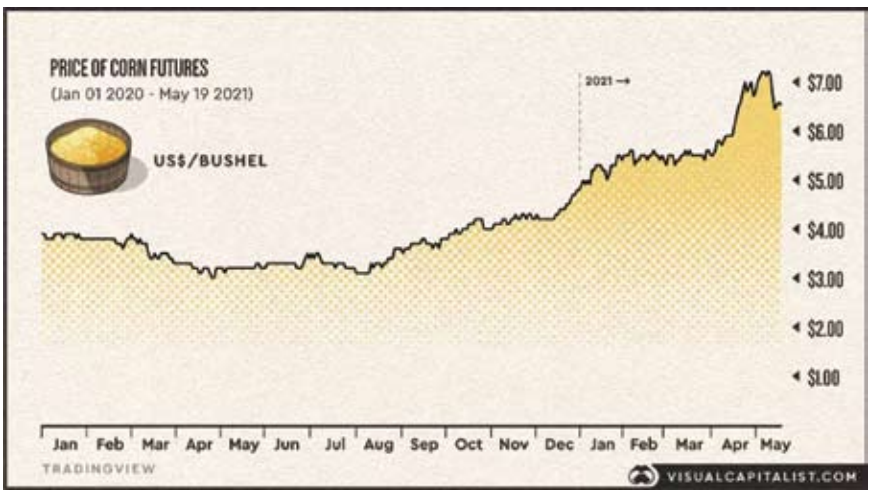
A single bushel of corn can provide 33 lbs of sweetener, 31.5 lbs of starch, or 22.4 lbs of polymers. It's also enough to produce around 3 gallons of ethanol fuel and 16 lbs of distillers dried grains for animal feed.

The uses of corn go far beyond the cob, and just like other raw materials, it supports many industries that make modern life possible.

Source : World Economic Forum







The top 5 misconceptions about satellite imagery for agriculture

From the early days of Landsat to present-day commercial providers, agriculture has always been one of the largest adopters of satellite imagery. Here are the top misconceptions we've encountered about using satellite imagery for agriculture.

From the early days of Landsat to present-day commercial providers, agriculture has always been one of the largest adopters of satellite imagery. By partnering with leading agricultural companies over the years, Planet has gained a window into the day-to-day challenges, concerns, and opportunities that growers have across the globe.

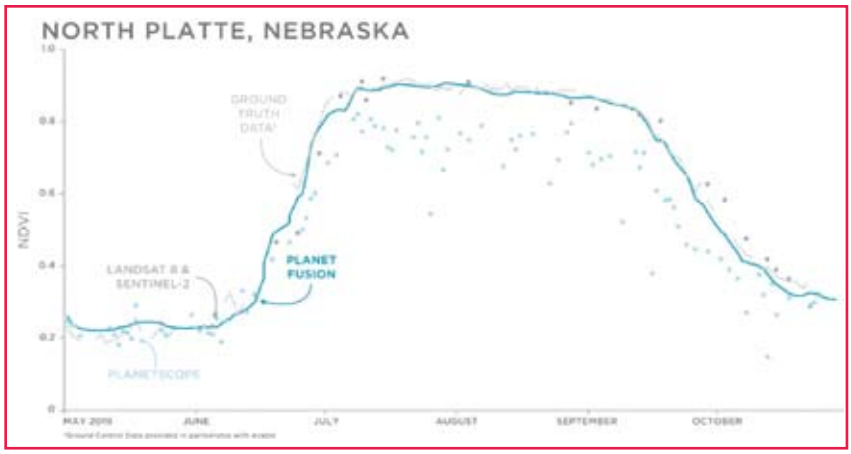
At Planet, our vision is to deliver precise and reliable field-level crop information to help agriculture companies and their growers optimize inputs, monitor crop health, and improve yield.

Here are the top misconceptions we've encountered about using satellite imagery for agriculture:

1. 'My customers don't trust results from satellite data'

We find the opposite. In addition to sending people out into the field to gather information, satellite data and insights can actually increase trust and help identify problems in the field. Our customers build vegetative indices that visualise crop health and then deploy that data to their growers and agronomists.

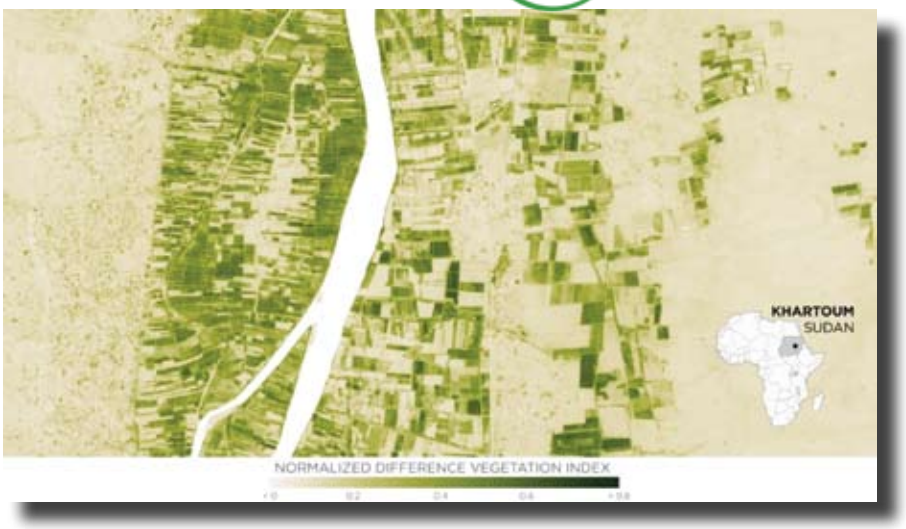
In many instances, a phone or tablet app helps spot water stress or disease, efficiently directing attention to locations in the field. Others build out reporting mechanisms that email users a list of areas for inspection.



2. 'My customers won't be able to do anything with imagery. They just want answers'

A satellite image is more than meets the eye. By combining data from different portions of the electromagnetic spectrum, satellite data can be used to assess crop vitality with indices like the Normalized Difference Vegetative Index (NDVI), which shows whether plants are under stress, and what lifecycle stage a crop is in.

Planet customers such as Granular use our APIs to generate analytic visualisations that they integrate into their digital platforms, helping farmers optimize their inputs, such as fertilizers, and stay on top of threats to their crops.



3. 'We only need a few images over the growing season'

For some agricultural use cases, a few images during the growing season can provide base-level information on crop health – but not nearly enough to really take the best action.

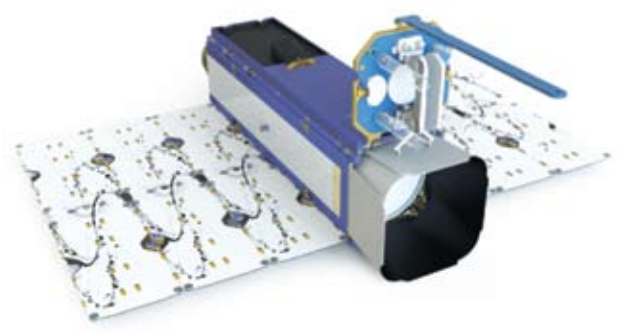
Some crops present relatively narrow time windows for action specific to key growth stages. Having a reliable source of up-to-date imagery from our daily monitoring ultimately provides a higher likelihood of getting usable data, especially when the risk of weather events like clouds can impact data continuity.

4. 'Drones are the best solution for insights. Satellites are too coarse in spatial resolution to tell me anything'

Drones are great. They provide higher-resolution imagery over fields and are capable of delivering detailed insights to growers.

But drones are expensive to fly and they can only cover so much ground. Plus, you have to know where you want to fly ahead of time and schedule that flight.

With satellite imagery, you may trade spatial resolution for coverage – but when you need to deliver reliable, cost-effective insights at scale, there's really no alternative.



While some satellite imagery may be too fuzzy to discern useful insights, PlanetScope's medium (3.7 meter) spatial resolution is ideal for discerning fine details, even in smaller-scale farming operations. And PlanetScope's satellites are always switched on.

There's no need to task them ahead of time. They deliver coverage of every acre on Earth.

5. 'Public data is good enough, and commercial satellite data isn't cost-effective'

Public Earth observation data from missions like Landsat and Sentinel can provide a ton of valuable information to scientists, researchers, and analysts.

The data itself is free – but getting insight from that 'data' is not. There are significant, time-consuming and expensive challenges involved in getting pipelines in place to transform public imagery into clean, processed data, and this can be a huge burden on customers and end users.

Planet's modern, cloud-first APIs help process, stream, and deliver analysis-ready data at scale with the growth of your business.

With Planet, you can leverage the processing power of our platform to focus your expertise on your applications, versus building your own imagery processing and cloud infrastructure.

Still weighing your options?

Watch our on-demand webinar – 'Delivering Satellite Data to Scale Digital Agriculture' – or visit us at planet.com/ag to learn more about innovative applications of satellite imagery in agriculture. Feel free to reach out to our team at sales@planet.com if you have any questions.

Source : https://agfundernews.com

Land-use change has affected 'almost a third' of world's terrain since 1960

Current estimates of land-use change may be capturing only one-quarter of its true extent across the world, new research shows. The paper, published in Nature Communications, revises previous estimates of how much humans change the Earth's land surface – such as via the destruction of tropical rainforests. It finds that, when accounting for multiple instances of change in the same place, 720,000 square kilometres of land surface has changed annually since 1960 – an area, the authors note, "about twice the size of Germany".

These new estimates are a synthesis of high-resolution satellite imagery and long-term inventories of land use. Combining these two types of data sources, the authors write, allows them to examine land-use change in "unprecedented" detail.

Despite steadily increasing rates of land-use change over the latter half of the 20th century, the global rate has been decelerating since 2005. The authors attribute this slowdown to the 2007-08 financial crisis, which they hypothesise caused economic shifts in the global north that reverberated around the world.

A 'CAREFUL RECONSTRUCTION'

"Land-use change" is any way in which humans modify the natural landscape. Some of these changes are permanent destruction, such as urban expansion. Other changes, such as cropland abandonment and forest restoration, may attempt to repair previous damage. It is a widespread phenomenon – humans have altered "about three-quarters of the Earth's land surface" in the past millennium, the authors write.

Land use is typically measured in one of two ways: by high-resolution satellite imagery, or by large-scale statistical surveys. But each of these methods has its drawbacks when assessing land-use change, the study says. Satellites can capture land use in high detail, but their records only extend back a few decades. Estimates based on satellite images also tend to miss some nuances of land use – such as the distinction between unmanaged grasslands and those used for grazing.

Statistical methods and surveys, such as those that the UN Food and Agriculture Organization (FAO) has been carrying out since 1961, extend further back in time than the satellite record, but at a much more coarse resolution. And little work has been done to combine these two approaches. "The information on land and land-use change is very fragmented," Karina Winkler, the lead author of the study and a PhD candidate in land-system dynamics at the Karlsruhe Institute of Technology and Wageningen University, tells Carbon Brief:

"The idea was to collect as many data [sources] as possible and bring them together." Combining all of these disparate data sources, the authors write, also has the advantage of reducing the inconsistencies or limitations of any single dataset. Winkler and her colleagues brought together more than 20 satellite land-use products and long-term surveys. The resulting dataset, which they termed the "Historic Land Dynamics Assessment plus" (HILDA+, for short), captures annual changes in land use across the globe with a resolution of 1km.

But not all land-use change is permanent. So rather than looking at "net" changes that only capture the overall transformation of an area, HILDA+ captures places where land use has changed multiple times – such as rotation between cropland and pasture. When these "gross" changes are summed up, the total extent of land-use change between 1960 and 2019 is 43m km2 – just under one-third of the total land surface of the Earth. Instances of multiple-change events are dominant across Europe, India and the US, while single change events are widespread across South America, China and south-east Asia.

- ***"Land-use change" is any way in which humans modify the natural landscape.***
- ***Current estimates of land-use change may be capturing only one-quarter of its true extent across the world.***
- ***New research has revised previous estimates of how much humans change the Earth's land surface.***
- ***It's found that 720,000 square kilometres of land surface has changed annually since 1960, an area twice the size of Germany.***
- ***Despite steadily increasing rates of land-use change over the latter half of the 20th century, the global rate has been decelerating since 2005.***

Global land-use change nearly doubles when considering gross change, from 17% to 32% of the Earth's land surface. And nearly two-thirds of this gross change is due to multiple-change events. Studying land-use change in this way – as an accumulation of all the changes occurring over time, rather than as net change – can help better account for the greenhouse gas emissions associated with land use, Winkler says.

A SOURCE AND A SINK

According to the Intergovernmental Panel on Climate Change's 2019 special report on climate change and land, nearly one-quarter of total human-caused greenhouse gas emissions between 2007 and 2016 were due to agriculture, forestry and other land use. In total, land use falls just behind electricity and heat production as the world's second-largest contributor to greenhouse gas emissions.

But land is also a major "sink" of greenhouse gases – for example, through the carbon taken up by forests. This balance of sources and sinks through land-use change, the IPCC report says, is a "key source of uncertainty" in considering the future of the land carbon cycle. Knowing the dynamics of past land-use change in finer detail can help inform the way climate modellers represent these changes, Winkler says.

"Land-cover change is really, really dynamic," Prof Navin Ramankutty, a land-systems scientist at the University of British Columbia, tells Carbon Brief. Ramankutty, who was not involved in the study, adds: "If you're just using net land-use changes over time, you might not actually capture the dynamic of carbon being taken back up by the land."

The new work on its own cannot provide much insight into how these gross land-use changes might affect the picture of climate change, Ramankutty says. "The devil is in the details," he explains: "It's hard to say what the implications are [for climate change] without actually running [the new estimates] through a carbon-cycle model." However, he adds, the updated estimates are "a much more careful reconstruction of how land has changed". He notes that it "seems more sophisticated than previous work" and that he would recommend using the new dataset.

PATTERNS OF CHANGE

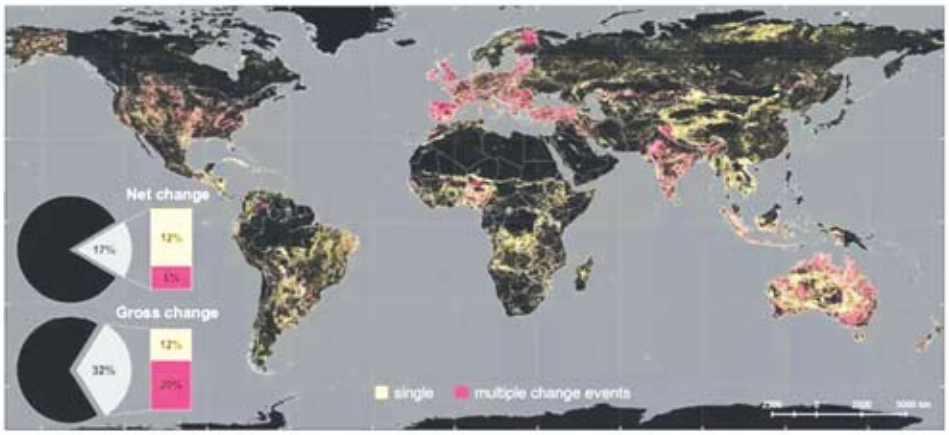
Following the definitions used in the FAO's annual surveys, the researchers separate out six categories of land use: urban areas, cropland, pasture, unmanaged grassland, forest and sparsely vegetated land. Several notable patterns jump out when looking at what types of change are occurring where, the authors say.

For example, about half of the single-change events – or nearly 20% of the total changes – occur due to agricultural expansion, such as deforestation. And 86% of the multiple-change events are agriculture-related, predominantly occurring in the global north and select rapidly growing economies. Averaged globally, land-use change steadily increased for nearly half a century since the FAO surveys began. But, in 2005, there was a "rather abrupt change" in this trend and land-use change began decelerating worldwide, the authors write.

The charts below depict the differences in land-use change rates between six geographical regions, as well as the worldwide average. The global rates of change can be defined by an acceleration period from 1960 to the early 2000s, followed by deceleration since about 2005.

Examining these changes in the context of global political and economic events, the researchers hypothesise that the "rate and extent of global land-use change is responsive to socio-economic developments and disruptions".

Although it is hard to prove such causation with certainty, they write that "the transition from accelerating to decelerating land-use change is related to market developments in the



context of the global economic and food crisis" that occurred in the late 2000s. Increasing globalisation and a fast-growing population drove expanding land use in the 1990s and early 2000s. As oil prices rose rapidly, peaking in 2008, demand for biofuels from the global north – but grown in the global south – rose, too.

However, in the aftermath of the 2007-08 global financial crisis, imports declined and agricultural expansion in the global south slowed as demand for commodity crops dropped off. Since then, reduced foreign investment and land acquisitions have meant the deceleration of land-use change has continued. This phase shift from accelerating to decelerating land-use change is just one example of a larger pattern of "teleconnections", whereby economic changes in one region of the world can have far-flung effects on land-use elsewhere, Winkler says:

"Political changes in the global north are driving some land-intensive changes in the global south and these effects have increased since the 2000s or late '90s." Changes in agricultural land use are more variable than changes in forest cover, the authors note, because agriculture....

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Source : World Economic Forum

Climate change threatens Kenyan tea sector, putting millions of workers at risk

Climate change is set to ravage tea production in Kenya, the biggest global supplier of black tea, threatening the livelihoods of millions of plantation workers, a report by British charity Christian Aid warned recently.

The report looked at how shifting temperatures and rainfall patterns in tea-growing regions in Kenya, India, Sri Lanka and China could affect the quality and yield of the world's most popular beverage. Tea is one of Kenya's top foreign currency earners, along with tourism and remittances, employing about three million people.

But the East African country - which produces almost half the tea consumed in Britain - is likely to see the areas with optimal and medium tea-growing conditions shrink by about 25% and 40% respectively by 2050, the report said.

Climatic changes will also make it increasingly difficult for tea growers to move into new, previously uncultivated regions, it said, adding that the decline in output was already being felt on the ground.

"The conditions here used to be good and we had a great tea harvest. When the climate changed, the production of tea in my farm dropped," said Richard Koskei, 72, a tea farmer from Kericho in Kenya's western highlands.

"We have nothing else to rely on here. People in my community will consider running away from tea farming, with jobs lost, and consumers of tea might see the price rise."

According to a U.N. survey of 700 growers in all seven of Kenya's tea regions, farmers observed changes in rainfall patterns, distribution, and reduced yields tied to climate change.

More than 40% of respondents said they had noticed changes in rainy and dry seasons, which led to shifts in the planting season, while 35% cited drought.

Kenya is highly vulnerable to climate change, with projections suggesting its average annual temperature will rise by up to 2.5 degrees Celsius between 2000 and 2050, said Christian Aid's report.

- **According to a report by Christian Aid, climate change is affecting tea production in Kenya, which is the biggest global supplier of black tea.**
- **This could threaten the livelihoods of millions of workers.**
- **Even though Africans generate just 4% of the world's greenhouse gas emissions, they suffer the worst impacts of global warming, such as drought.**
- **As the U.N. climate talks in Glasgow approach, campaigners are calling for measures to reduce the impact of global warming on developing countries.**

Rainfall will become more intense and less predictable. Even the slightest increase in droughts will present major challenges for food security and water availability, especially in Kenya's arid and semi-arid area in the north and east, it added.

"Africans make up 17% of the world's population but we generate just 4% of the greenhouse gas emissions that have caused the climate crisis," said Karimi Kinoti, head of Christian Aid's Africa Division, in a statement. "And yet it is we who are suffering the brunt of the impacts of climate change. Our tea industry is vital to our economy ... and now it is under threat from climate change."

Ahead of crucial U.N. climate talks in Glasgow in November, campaigners are calling for countries to cut carbon emissions, cancel the debts of developing countries such as Kenya, and mobilise climate finance to help countries adapt.

"The whole world will be watching, especially Kenyan tea farmers and other people on the front lines of the climate crisis," said Mohamed Adow, director of Power Shift Africa, a Nairobi-based climate and energy think-tank.

Source : World Economic Forum

Question

Q&A

Answer

Q01 AGROFORESTRY

setri1: *I have few questions regarding taking up agroforestry due to new to agriculture. 1) what is minimum size of land preferable to takeup agroforestry concept? 2) what are the plants/saplings that helps in long term (20years and above) wealth creation in wild conditions (less manpower utilization)? 3) what are the plants/saplings that helps in medium term (10years to 20 years) wealth creation ? please do through out ur suggestions considering both abundant water facilities and also depending upon rains i.e. no irrigational facilities.*

Answer 1 : drsantos : Very nice.. Agroforestry is dynamic, ecological and economical system. you can plan minimum 30 acers of land to develop. woody plantation is better in your case because you have scarcity of manpower. for midterm you can plan teak, subabul and eucalyptus. for long term you can plan Bamboo and acacia. in both irrigation and rainfed conditions these plantations are better.
Do not fall on trap with Sandal wood and Red Sandal plantation because of uncertainty in buying. do not plan melia dubia if plywood industries are not nearby

Answer 2 : vmap : Sir/madam, Based on availability of labour and water, you can plan eucalyptus and casuarina in case of meagre water sources.you can plan bamboo and teak and Melia dubia if water sources are good.In some of areas Teak is not successful so please choose it if same teak is success in your surrounding areas.Next Amla as well as soap nut is also good.some other forest species are also there and they are valuable.

Answer 3 : raashi : Dear Sirs, Statements above from dr. Santos and vmap is suggesting good but not specific to the area. If I plan for Sagar Taluka, Shimoga District. please recommend what is best to deal with. Forestry Department allows drilling of bore well and irrigation purposes or not. How do we determine the area - can it be fenced or benchmarked with painted stones (as done in the survey pitching). What about fruit trees like Jack fruit etc., Give some clear cut lines to operate.

Answer 4 : saipranav: Contact me, want to discuss with you.

Answer 5 : vmap : Sir/madam, Setri1 asked only suggestions but he did not invite any body to carryout his plan of work. Therefore I had given my suggestion.Infact he not stated his location and it's geographicàl details.I think he is now planning and so he wants to get full pledged knowledge before initiation of his work.

Q02 OLD AND UNPRODUCTIVE MANGO TREES

deeyen1992 : *In my farm I have few , more than 50 years old , mango trees .They do not bear fruits .*
Are there any methods to improve their productivity...
Enlightened experts` advice solicited

Answer 1 : suneelkrishna: Ya you can improve it.. just pruning and watering the plants at right time is important.Please don't remove trees.. We have 100 years trees .. Still we are getting yield. Just prune and water it..That's enough

Answer 2 : drsantos : Dear Deeyan, any verity of mango trees start to bear fruits at the age of 5–6 years and their productivity reaches at peak between 15–18 years afterwards it enters into declining phase after 25–30 years. as u mentioned it is already 50 years. no need of expecting fruits from it.

Q03 STEVIA

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

Answer 1 : vtonature : Greetings! Can stevia be grown in hill stations around 2400 meters above sea level. Rgds

Answer 2 : drsantos : Dear all, please think following aspects before planning stevia cultivation:
1. uncertainty in marketing.
2. No strong buyback agreements from direct industries as prescribed format by GOI.
3. difficulty in transporting because light weight.
4. sensitive to cold and rains
Many mediators are interested to sell saplings rather than buying back. so i request farmers to think twice before getting into stevia farming.

Answer 3 : chirag98 : Dear Mr. Santos, can i have your number please?

Q04 POMEGRANATE OR LITCHI WHICH IS BETTER IN ODISHA EASTERN PART (JAJPUR)

farm213 : *Hi All, I am a new born to agriculture and farming. My ancestor have some land and my father has given the land in lease. Rice and moong-dal are the only 2 traditional farming is happening in that land. I am thinking and planning to farming it on my own as a long term investment. I need some guidance on pros and cons between promegranate and Litchi farming. Which is easy to maintain and which have more return on investment etc. Which one can be done on our land (how to get this info). From where I can get the highest quality. of seeds or plant? Basically I have zero knowledge and need all of your guide to success.*
Total land I have is. 5-6 Acre but not in a single peace though

Answer 1 : drsantos: as your farm land in eastern part of odisha Litchi farming is much better than pomegranate farming in terms of revenue generation under following conditions

Question

Q&A

Answer

1.if your soil pH is between 5 to 7

2. availability of processing units and exporters nearby.

3. good connectivity and market linkage.

05 WHAT ARE FEW CROPS THAT SELL WELL AND ARE NOT QUICKLY PERISHABLE

kevin256: *I'm interested in part time organic gardening/farming.*

Currently grow around 1,000 lbs produce annually for my family (includes heavy stuff like melons, squash, potatoes so not that impressive).

I want to expand and try my hand at a farmers market or direct to consumer. But for the first few seasons I'd like to focus on items that I can store in a cool dry place and sell slowly.

I'm thinking that winter squash, pumpkins and gourds, ornaments corn, heirloom potatoes, while not the most valuable can be stored for some time without the need for a cold room like leafy greens require. Any thoughts or suggestions?

Answer 1 *:* ***vmap :*** Hi sir/madam It is better to go cultivation of ground nut OR you can choose medicinal plant cultivation and select only demandable plants that to suitable to your land.

06 ORGANIC CITRUS CULTIVATION IN SOUTH INDIA

pcmshetty:*Hello. We started growing lime at our organic farm in Hunsur Karnataka in the month of February. A few plants had leaf yellowing problem for a while. We figured we were over watering. so we reduced watering. Now we are getting good flush but have leaf curl problems. We needed help to identify the core problem, and organic solutions for this.*

Answer 1 *:* ***gunda :*** how many plants are planted. how many are sick. what is the source of saplings. any advice received from horticulture dept for this.

Answer 2 *:* ***garao56 :*** At initial stages you to protect with normal agro chemicals , then you can use organic methods of control of pests and diseases. Generally even you apply inorganic or organic way there will be citrus decline means complex problem the citrus plants are affected with soil nematodes, pests , diseases and deficiency of micro nutrients after bearing starts.

07 LICENSE REQUIRED TO FARM MEDICINAL PLANTS

vidyavg : *What are the licenses required to farm medicinal plants in Tamil Nadu?*

Answer 1 : ecojobsin : No license required for medicinal plants farming/planting in India. Certain controls are there on harvesting some trees like Sandalwood (Santalum album), Red Sandalwood (Pterocarpus Santalinus), Agarwood, and some other forest trees and endangered and threatened species as per IUCN Red List. You can check with local forest office about the latest government order about such controls in harvesting, transporting and selling of plants and trees.

Answer 2 *:* ***xsteelin :*** Please share your contact details. We need your valued advise on medicinal plant farming . Regards

Answer 3 *:* ***gunda:*** first is the market. there are so many medicinal plants which are high use which can replace many costly medicines. but, they are ignored. example, vahini, apamarga, sharapunkha. etc., so many are there. no body recognizes their utility.

Answer 4 *:* ***vmap :*** madam/sir, for growing of medicinal herbs no specific licences are needed.you can grow them in your farm and supply to either mandies/whole sale purchasers or herbal companies.only you need certificate of growing in your farm/land just to say it is not wild collection to show during transportation and for companies.said certificate you can get from you panchayat or village government bodies and it is not a problem and it is general procedure.

08 ULTRASONIC EXTRACTION OF TURMERIC AND MEDICINAL HERBS

murikan : *I need guidance on ultrasonic extraction of medicinal herbs like turmeric, moringa etc . to set up a manufacturing plant. Please help*

Answer 1 : maitys: Ultrasound Extraction (Sonication) - procedure involves the use of ultrasound with frequencies ranging from 20 kHz to 2000 kHz; this increases the permeability of cell walls and produces cavitation. Although the process is useful in some cases, like extraction of Saffon , Stevia etc. It's large-scale application is limited due to the higher costs. One disadvantage of the procedure is the occasional but known deleterious effect of ultrasound energy (more than 20 kHz) on the active constituents of medicinal plants through formation of free radicals and consequently undesirable changes in the drug molecules.

Answer 2 *:* ***garao56 :*** The process of ultrasonic extraction of herbs may not be economical when compared to returns hence please go for traditional methods as advised Mr Maitys

murikan: Thanks Mr Maitrys and MR Garao 56.
I am looking at a pilot project of say 100 litres extraction tank and I got a quote for 7 laks Rs including extractor evaporator and condenser. Tats not too expensive. Running costs should be less than conventional methods . What's ur iopinion ?

Answer 3 *:* ***dhayaagrowers :*** I am very well experienced in fermentation technology for breaking the cell wall through ensilage if you are interested please contact I've sent my contact to your private message

Answer 4 *:* ***garao56 :*** Please proceed

for innovative method of extraction so that others will follow the same

Answer 5 : dhayaagrowers: What is innovative all technology is innovative even orgamitis and Newton's are innovative mention which is your mean of innovative

Answer 6 : mhammedal : Ultrasound Extraction (Sonication) - system involves using ultrasound with frequencies ranging from 20 kHz to 2000 kHz; this will increase the permeability of mobile partitions and produces cavitation. Despite the fact that the manner is useful in a few cases, like extraction of Saffon , Stevia and many others. It is big-scale application is constrained because of the higher costs. One disadvantage of the technique is the occasional however known deleterious impact of ultrasound electricity (extra than 20 kHz) at the active constituents of medicinal flowers thru formation of unfastened radicals and consequently undesirable changes within the drug molecules.

Answer 7 : vmap: Sir/madam, This type of technology for extraction of active principles from medicinal plants may cause loosing their essence and so purpose will be defeated.Its my personal opinion only.

Q 09 NITROBENZENE POWDER SOLUBLE PROCESS

srikantht : *Dear sir , please help me out of nitrobenzene powder soluble process . in what type of solvents it will dissolve to this powder. please share the information for us. we used in solvents for dissolving but precipitation will be forming so what should I do.Thanking you*

Answer 1 : maitys : $C_6H_5NO_2$ is soluble in most organic solvents and is completely miscible with Diethyl ether, Benzene, and Alcohol .

Q 10 NEED GUIDANCE TO START WHEAT GRASS POWDER MANUFACTURING UNIT

veeresha hirematt : *Hi. I am planning to start Wheat grass powder manufacturing unit. So that I want detail information regarding this matter. I am requesting,can please share the details..Thanking you*

Answer 1 : garao56 : Dear Sir, There two aspects in wheat grass production.

1. Raising of wheat grass
2. Processing for making powder
3. The investment cost may higher
4. Marketing may be problematic

Already there so many players in the market who are supplying wheat grass powder already. Users are lesser and yet to be educated for use of the powder for health benefits. Please think of and act accordingly.

Answer 2 : aksharambs: We are business planning company, we surely help you on this project. Our business planning experts are working on Wheat Grass Powder Manufacturing Business.

Get consultation for all your wheat grass powder manufacturing business queries - at Meticulous Business Plans

We Provided,

Initial Consulting – Business Modelling
Business Plans /Project Report
Fund Raising
Company Registration
Land Selection Assistance
Project Design
Assisted Machinery Buying Program and Much more ...

Q 11 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.*

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. G. Ananadarao B.Sc(Ag)

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

Answer 1 : garao56 : Please obtain latest quotations for machinery and size of work shed and other facilities required .

Answer 2 : 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 Northeast 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 3 : garao56 : If there is good demand in your state import raw material from other states G.Ananadarao

Answer 4 : 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?

Q 12 INTER CROPPING OPTIONS IN EUCALYPTUS FARM?

setri1: *A friend of mine has a three acre three year old eucalyptus farm but the growth of the plants was not upto the mark as he is having a regular job and couldn't provide sufficient time to farming. Now he wishes to plan for inter crops between the eucalyptus plants simultaneously as he got work from home option for some months due to covid. So, any guidance by experienced people with inter crop knowledge could be helpful.*

Answer 1 : garao56 : Generally no inter crops are raised in Eucalyptus plantations under rain fed cultivation . Under irrigated conditions if space between plants is 14 x 2 meters inter crops such as turmeric, ginger, wheat , sugarcane, banana etc can be grown.

Question

Q&A

Answer

Answer 2 : setri1 : Thank you for the information, it is on irrigation basis and not rain fed cultivation, but not sure of the spacing between plants.

Answer 3 : garao56: Generally Eucalyptus plants spacing is 8 x 5 feet in which tractor can be moved for inter cultivation getting 1000 plants per acre. In case of inter cultivation more space is required. Farmers rarely taking up inter cultivation in eucalyptus plantations.

Q12 FARMING OF MOSAMBI

maheshkumarpatel: *Kindly advice for the plantations of satgudi mosambi in Gujarat.*

Answer 1 : maitys : Mosambi and Satgudi are two different citrus varieties commonly grown with almost similar fruit characteristics. Mosambi, has prominent streaks on the thick rind and a circular grove at the styler end or base. Fruit shape is sub-globose and has more numbers of seeds mostly cultivated in Maharastra . It lacks flavour and sometimes it can be almost insipid due to unbalanced sugar acid ratio.

Sathgudi fruit surface is smooth, spherical in shape, rind is thin, semi glossy, finely pitted and has segments , mostly cultivated in Andhra Pradesh . Telangana & Tamilnadu

This variety is a high yielder (16-18t/acre) and popular in South India because of wider adaptability and better consumer acceptance.

Batavian (Bathayi) another lesser known variety of sweet orange mostly grown in the coastal districts of Andhra Pradesh . Batavian variety closely resembles Sathgudi. It develops yellow patches on green background when it is basked to protect itself from fruit sucking moth

Soil : A well drained loamy soil of uniform texture upto depth of 2-3 m having good fertility is considered ideal for cultivation. The plant is highly sensitive to waterlogged situation. Heavy soils, if well drained, yield good crops but the cultivation becomes difficult. Soil pH of 6.5 to 7.5 ideal.

Climate : Tropical climate with moderate annual rainfall of i.e., 750 mm are ideally suited to Sweet orange and Acid lime. They can be grown successfully even upto an elevation of 900m above mean sea level and the best growth performance occurs around temperature of 32 deg C.

Q13 PAPAYA - TREES FALLING AND SOME FRUITS HAVE ISSUES

sankaracs: *Dear experts, Please kindly help me with the below issue. I planted around 1500 papaya red lady before 8 month. Fruits are not at yielding stage. Below are the issues I have 1. Every week 2 or 3 trees are falling down - Almost lost 25 trees in last 1-2 months*

2. Some of the fruits has white fungus inside (attached photos) 3. some fruits has holes and insects inside.

I am doing organic farming and please kindly help me with solutions

Answer 1 : garao56: Control of diseases and pests of papaya crop

1. Every week 2 or 3 trees are falling down - Almost lost 25 trees in last 1-2 months

The symptoms may be collar rot:

Collar rot/Foot rot and wilt (Pythium aphanidermatum)

The disease occurs both in nursery and in main field. The fungus attacks the collar region and causes soft rot. Externally the leaves turn yellow, and drop off. The plant may collapse with a break down at the bottom. The disease will be severe in ill drained conditions.

Control: Bordeaux mixture (1:1) or Metalaxyl + Mancozeb @ 2g/l or 3g. of Cooper oxychloride dissolved in 1 lit. of water may be used to drench the nursery bags to protect against wilting of young seedlings and also the main field. Water stagnation should be avoided.

Management : Uproot and burn the badly damaged plants.

Apply Trichoderma (50g/plant) mixed in well decomposed FYM around the root gone at the time of planting.

Drench copper oxychloride (0.2%) or Bordeaux mixture(1%) @ 2-3 lites/ plant. Repeat the drenching after one month.

Avoid water logging by providing good drainage.

2. Some of the fruits has white fungus inside (attached photos)

The symptoms may be due to water logging as well as allowing fruits beyond over ripening stage. When the fruits are fully grown and start developing a tinge of yellow color at the apex, it is time

to harvest them. Another indication of harvesting time is the latex. Once the latex start turning watery instead of being milky, the fruits must be harvested. Not all papaya varieties turn yellow on ripening. Some turn yellow while others remain green even when fully ripe.

3. some fruits has holes and insects inside.

Fruit fly (Bactrocera cucurbitae, Tozotrypana curvicauda)

The fruit flies damage ripe fruits of papaya. Maggots feed in the fruit pulp, causing rotting.

Control : Using of Methyl eugenol traps is effective in controlling fruit flies. If the problem is serious, spray Deltamethrin 0.003% or Dimethoate 0.045% when fruits are fully mature. Do not retain birds' damamged fruits on trees because they attract fruit flies for oviposition. Collect all fallen infested fruits and destroyed.

Please do contact us for further clarifications

Answer 2 : sankaracs : Thank you very much, please kindly let me know any organic methods to follow. I didn't bring any chemicals inside my farm from beginning. Not getting help from agriculture department as well

Answer 3 : garao56: At this high infection stage control may be difficult, we have to adopt organic methods from the beginning. Please destroy the affected plants

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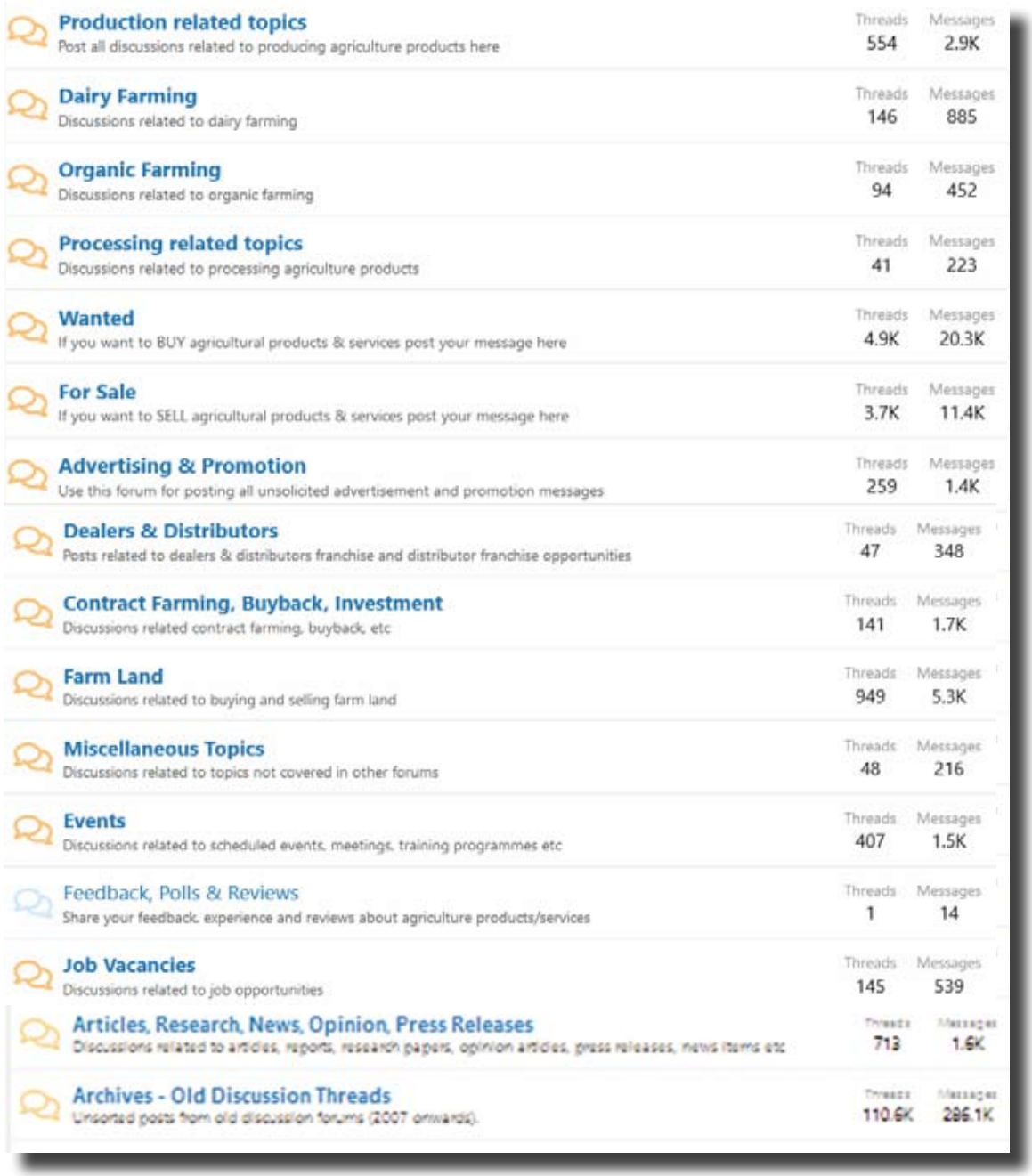

	Threads	Messages
Production related topics Post all discussions related to producing agriculture products here	554	2.9K
Dairy Farming Discussions related to dairy farming	146	885
Organic Farming Discussions related to organic farming	94	452
Processing related topics Discussions related to processing agriculture products	41	223
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
Advertising & Promotion Use this forum for posting all unsolicited advertisement and promotion messages	259	1.4K
Dealers & Distributors Posts related to dealers & distributors franchise and distributor franchise opportunities	47	348
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
Feedback, Polls & Reviews Share your feedback, experience and reviews about agriculture products/services	1	14
Job Vacancies Discussions related to job opportunities	145	539
Articles, Research, News, Opinion, Press Releases Discussions related to articles, reports, research papers, opinion articles, press releases, news items etc	713	1.6K
Archives - Old Discussion Threads Unsorted posts from old discussion forums (2007 onwards).	110.6K	286.1K

AGRICULTURE INFORMATION
Connecting Growers, Buyers & Experts

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JOIN OUR TEAM

VMG

OPPORTUNITIES AVAILABLE

- We hire a wide range of people (from freshers to senior experts) in a wide range of industries
- We offer full time, part-time and work from home jobs
- Earn good incomes with flexible working hours bpo jobs
- We hire based on experience, skill and performance
- We do not discriminate on the basis of education, gender, age, demography, or physical/medical disability

WHY VMG ?

- We offer flexible working hours and exciting internet based projects/ tasks
- Full time/ part time and virtual assignments
- Project based staffing
- Move between projects. Do multiple projects based on your interests
- Work with clients from around the world
- We are a respectable company in existence since 2005

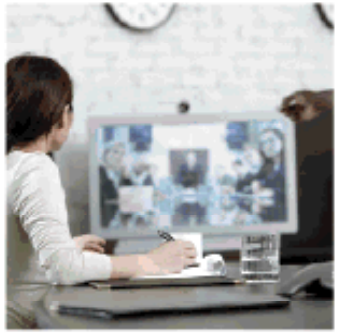
OUR SERVICES

Contact Center Outsourcing

We set-up and manage customised outsourcing contact centers to handle phone calls, emails, and live chat conversations for businesses.

Back-Office Outsourcing

We set-up and manage outsourcing back-office operations in India for growing businesses. We take care of everything from initial set-up to daily supervision.



Virtual Assistant

We provide virtual executive assistants outsourcing to handle a range of tasks remotely. Delegate some of your pending tasks and increase your productivity!

Interested to work with us?

Contact

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