





HORTICULTURE - TECHNOLOGY TRENDS AND SAFETY

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Industry Speak

Dr. Girish Patil (Manager R&D - East West Seed)

NEWS

Sathguru Management Consultants Pvt Ltd



+91 40 6627 6200

agribusiness@sathguru.com vijayp@sathguru.com

www. sathguru.com



Can we have companies like Zespri or Chiquita in India?

The production of fruits and vegetables is estimated to touch 313 million MT in 2019-20, and has been growing at an average rate of 8% in the last five years, as per the advance estimates of the Ministry of Agriculture. This secures India the top two positions for the production of fruits and vegetables, respectively. A visible shift in the agriculture pattern and farmer mindset can be perceived from the increasing acreage and production of horticultural crops in comparison to other food crops, owing to factors like increasing demand, being less labor intensive, having a shorter duration etc. India is one of the leading producer of some fruits and vegetables like Mango, Banana, Citrus fruits, and Onions among others. Despite holding a top position for quite some years, the contribution of Indian horticulture to International trade is not significant. The domestic market also has been facing challenges like extreme price swings, poor value realization to the farmer and wastage at all levels.

This calls for three questions -Despite being one of the largest producers, why did we not see our own domestic companies' progress similar to the likes of Dole, Delmonte and Chiquita? Why are cooperatives like Amul doing alright in the dairy segment but not in the agricultural segment? Why do we not realize the value of our produce? The answers to these questions intricately are interlinked to each other.

"The average farm or orchard holding is very small in India"been the most this has commonly stated reason for the failure to incorporate most of the modern interventions into our agricultural systems. Since the land holdings are not going to change in the near future, it's time we adopt different perspective to а challenge. tackle We the cannot build enterprises like those we discussed earlier. with approaches similar to the ones they have employed. But, the important point is that they are real- life examples of the possible value creation. We should credit the research and development activities undertaken by them in perfecting the varieties and in standardizing the agronomy, production and post-harvest practices.

Indian horticulture also consists of enterprises in the area of plantation crops like Coffee, Tea and Rubber. Discounting past colonial origins and deforestation we can look for some positive learnings, from such

enterprises, to suit the local conditions. We have held on to the issue of small land holding conveniently for long, rather than making it a central point and designing solutions like farm mechanization, post-harvest infrastructure agri-business systems and around it. Combining the complex factors like diverse genetic pool, agro-climatic conditions and consumer preferences we should be able to build a model that is beneficial to all stakeholders from farmers to consumers.

We have failed to appreciate the value of our horticultural produce- collectively, at the country level and individually, at the farmer level. This explains the placid approach for failing to adopt even the simplest interventions for loss mitigation. Expecting a better value for the produce should be preceded by better care during production and handling at all stages. The farmers should change their way of perceiving value from a "lot" based approach to an "individual fruit". То understand the difference, we should compare the better handling practices employed in and value received by exotic fruits like Kiwis, Apples etc. to those of our local fruits. Why do we not handle our Mangoes with similar care? A simple operation of de-sapping and proper cleaning of fruits at farmer level can decrease the post-harvest diseases and improve the product appeal to a greater extent.

Using properly designed packaging structure by an aggregator reduce will transportation losses. At an Individual stakeholder level perceived these are as additional activities and cost for which one is not realizing any value. This is true when we compare the situation with current product. market standards and this is where a collective approach will help harmonizing therefore in mentioned factors. Support by means of providing and fiscal infrastructure is assistance required to sustain this harmonization process in the initial periodwhich can be extended either by Government agencies or Private companies who want a strong presence like that of Delmonte, Chiquita, and Zespri etc.

An interesting case to look at is-Milk. Being more perishable than fruits and vegetables, milk is handled better and the co-operatives are successful in the dairy sector. If we look at this phenomenon, this gives us some important answers. The milk collection centers and bulk milk chilling centers are present widely, are of viable scale. and meet the requirements of small dairy farmers at village or taluk level. These co-operatives are able to pool the produce from small farmers and connect them processing to the centers, forming a wide nodal network. Although dairy cooperatives have their own set of challenges in other aspects,



they were able to forge systems to consolidate the produce and standardize the operations. This scenario lays the foundational case for the need of modular, small scale post-harvest infrastructure at the village level.

We have been trying to adapt technologies created to address the needs of other agricultural systems, where the orchards and the quantum of produce handled in a single tract are huge and the subsequent supply chains are well developed. The problems by our agricultural faced sector are unique and the interventions should be designed with profound understanding of the local conditions. Research and development in areas like modular multi commodity cold storage and pack house systems, harvesting equipment for small farms, fruit ripening models with improved traditional ripening using by local structures resources, low cost packaging designs etc. will pave ways for solving the problems faced by local agricultural sector. This will also increase the chances of taking up good agricultural post-harvest practices. and These technical and infrastructural improvements should be combined with better business and operational models to realize the true value and share the benefits to all stakeholders.

FarmerProducerOrganization(FPO)gaining popularity



and a lot of support is being extended from the government as well. This can be seen as an opportunity to create similar enterprises, with local stakeholders, suiting the local conditions. One point to note is that without addressing the primary issues at a broader level, there is a high chance of failure in this case as well. The products. technology, and conventional solutions around the world, as we know them, are changing at a very fast pace. We have to make an effort to catch up in this aspect and might have to jump few stages to be relevant. Additionally, we need to be very selective in technologies/ adopting practices relevant to Indian conditions. The management systems adopted by the FPO's also play an important role in the success of these entities. The key issues to be addressed on priority by central or local body controlling the FPOs are leadership issues, Information management, post-harvest practices and skill development.

Aligning the cluster development, along with the promotion of FPO, can reduce the complexity in agri supply chains and bring up a holistic approach for value addition of fruits and vegetables. Identification of key clusters specific fruits for and vegetables, and harmonizing like various elements seasonality, production cycles, available markets. infrastructure etc. will help in establishing a strong network. For example, in India there are sizeable Mango clusters in Andhra Pradesh, Telangana, Maharashtra, Tamil Nadu, Gujrat and Uttar Pradesh. The seasonality varies from state to state and ranges from mid-March to mid-September. If consider each we state individually, their peak season ranges from two to three months But, on the whole, the production season lasts for six to seven months, with a wide range of mango varieties available across the country. Either the government or private players like large retail and agri-business chains companies can look into integrating these clusters by creating infrastructure at key designing points and appropriate operational and management systems, there bv gaining а hold on procurement. The procured produce then can be distributed across the country for a longer duration of time and the possibility of using the infrastructure for other horticulture products in lean season can be explored. Similar networks should be developed clusters in producing other fruits and vegetables.

These production clusters are analogous to a company



having multiple manufacturing units across the country. It's time change we perceptions associated with small farmers and farm holding, scattered production etc.; we should start looking at them as an opportunity and instill an enterprise approach in handling our horticultural produce. In the last 20 years, we have seen good number of cases of price extremities, glut situations in fruits and vegetables, leading to food loss.

We should have learnt our lesson to prevent such situations from happening in every crop season, in one or the other part of the country.

We have enough data and analytical tools to understand the causes, loss patterns and act accordingly, to prevent the food loss. Adopting simple interventions in post-harvest handling can be a starting step in improving the value of our fruits and vegetables.

Harmonizing our production clusters and realizing the true value of our horticultural produce can help farmers get a fair share form the price paid by consumers. Thereby, improving farm income and improving the living conditions of our farmers. This would also allow enterprises to gain a share of margin while ensuring the consumers receive high quality fruits and vegetables.

Compliance to FSMA Produce Safety Rule can Enhance Fruit and Vegetable Exports to USA

India's exports of fresh fruits and vegetables to USA stood at 3,018 MT valuing 8.61 million USD in 2019-20 as against 2,541 MT valuing 7.97 million USD in 2018-19. Fresh mango exports alone constituted 1,095 MT at 4.35 million USD (Source: APEDA). However, Covid-19 affected the mango exports to US since USDA inspector could not visit India for pre-clearance, as part of phytosanitary procedures. Besides mango, other significant fruits and vegetables export to USA include Pomegranate, Onion, Fresh Garlic & Turmeric which are covered under the FSMA Produce Safety Rule.

Produce Safety Rule (PSR) is one of the seven rules under US FDA's FSMA which could impact the Indian exporters' export of fresh produce to USA. The PSR establishes science-based minimum standards - based on a



foundation of Good Agricultural Practices (GAPs) - for safe production and harvesting of fresh fruits and vegetables. The rule's requirement focuses on major routes of contamination including: (i) Worker health & hygiene, (ii) Agricultural water (iii) Biological soil amendments of animal origin (iv) Domesticated and wild animals (v) Equipment, tools, buildings, and sanitation; and related topics that include personnel qualifications and training; growing, harvesting, packing, and holding activities; and (vi) Sprouts.

The produce safety rule does not apply to food grains and produce that is not a raw agricultural commodity.

identified FDA has few commodities as "rarely consumed raw", like kidney beans, sugar beets, cocoa beans, coffee beans, eggplants, ginger, okra, peanuts, potatoes, etc. and are hence excluded from this rule. Under the PSR, agricultural water and biological soil amendments of animal origin are the critical requirements, along with respective record keeping requirements. Indian growers/ suppliers could face some challenges in implementing these elements of the rule. However, meeting PSR requirements may be less challenging for growers who have already adopted GAPs (with certification) and are also a supplier part of approval programs for global players.

Agricultural Water for Production and Postharvest Uses: The PSR covers the Agricultural water that is intended to, or is likely to, come in contact with the harvestable portion of covered produce or



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food-contact surfaces. Agricultural water includes (i) Production waterused during growing activities for produce and (ii) Postharvest waterused for certain activities during and after harvest. For production and postharvest water, PSR has established different two microbial quality water standards based on the presence of generic E. coli- (i) Postharvest water must meet the standard of no detectable generic E. coli/ 100 ml water sample and (ii) Untreated surface water cannot be used for postharvest uses. If the produce comes in contact with flood water from overflowing open bodies ofwater, it is considered adulterated by the FDA and cannot be used for food

The rule requires water testing at a frequency depending on the type of water source. The documentation requirements for agricultural water, include findings of the inspection of agricultural water system, results analytical tests, of of monitoring water and corrective treatment. measures taken if agricultural water does not meet the water quality criteria.

Based on the feedback from stakeholders, FDA may simplify the water requirements. Thev have already deferred the compliance enforcement for water by an additional two years from the original date. FDA has given provisions for

requests for permitting variances from one or more of the PSR requirements, wherein a foreign country may determine if the variance is necessary, considering local growing conditions as well as the procedures and practices to be followed under the variance are reasonably likely to ensure that the produce is not adulterated and provides the same level of public health protection. Such requests for variances must be submitted to FDA through a petition.

Biological Soil Amendments of Animal Origin (BSAAO)

Implementing Good Agricultural Practices (GAPs) on the farm can help reduce risks associated with the use of soil amendments. Raw aged manure, manure. untreated slurry, etc. are considered as untreated soil amendments that pose higher risk. PSR defines the treated soil amendment as "having been processed to completion to reduce microorganisms of concern". PSR provides the standards for composting processes, and provides static and turned composting, as examples of validated options for treating manure and other soil amendments. For farms producing compost on site, process monitoring to meet the microbial standard and recordkeeping are critical to ensure that the compost is adequately treated. For BSAAO purchased or received from third а party, documentation must be provided and kept by the

growers to show that the process used to treat the soil amendment is a scientifically valid, carried out with appropriate monitoring and prove that process risk minimizes the of In contamination. case the BSAAO suppliers do not have documentation of the treatment process (e.g., certificate of conformance), growers should handle them as untreated amendment or consider finding another supplier who can provide appropriate documentation. PSR also has application requirements for method application and to harvest interval.

In addition to the above, PSR has requirements for documenting-(i) personnel qualifications and trainings for various operations and (ii) operations related to equipment, tools, buildings, and sanitation used for harvesting, packing, or holding activities.

FSVP importers requirements

Under the FSVP rule, the FSVP importer in the US will be accountable for verifying that their Indian or foreign suppliers of fresh fruits and vegetables, covered under PSR, are producing food in a manner that provides the same level of protection as produced domestically, in accordance with regulation. FDA began routine inspections of large farms subject to the PSR, including large produce farms in other countries, in 2019. It also began Foreign Supplier Verification Programs (FSVP) inspections of importers of produce from large farms in



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other countries, in 2019. It also began Foreign Supplier Verification Programs (FSVP) inspections of importers of produce from large farms in other countries, in the fall of 2019.

Indian growers and exporters of fresh fruits and vegetables need to adopt the GAPs measures & processes, which minimize the risks of contamination and develop good documentation system, as per PSR requirements. It is also important for exporting firms/ farms to invest in training their farm supervisors on the requirements of PSR. The PSR mandates that at least one supervisor or responsible person on a covered farm must have successfully completed food safety training, at least equivalent to that received under the standardized curriculum recognized as adequate by FDA. The Produce Safety Alliance curriculum is recognized as one way to satisfy this training requirement.

How Sathguru can help



INDUSTRY SPEAKS

Technology & Market trends in Horticulture and Post-harvest opportunities

Market Trends in Horticulture/Vegetables indicate that crop concepts have changed subsistence selffrom to sufficiency and are now taking a stride on superfood concepts. The driving force being the food trends and health needs. Several studies indicate predictions for the top food trends that will shape the fresh produce market.

A focus on health and longevity: Consumers increasingly see a correlation between what they eat, how they feel, and their health needs. Products with specific health components such as broccoli, kale, and several leafy assortments have become more popular, and named "superfoods." The marketing for these niche products is growing, provoking a sales boom.

Convenience/comfort foods: Though the comfort foods are uptrending, 'better for you' foods are selling well. Healthy snacking is on the rise, with "grabbing and going" becoming the norm.



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Additionally, it is expected that the plant-based diet movement will keep growing. **Meat substitution products** are expected to reach a USD 2.5 billion value by 2023.



The popularity of fresh and natural: Plant-to-plate concept is a new trend. Urban gardening is scaling up as the fascination for fresh and natural is growing.

Retail success determined by quality: According to the 2019 Fruit Logistica trend report¹, consumers are selecting the place to buy their groceries based on the quality of the store's fresh food. The survey also showed evidence that customers satisfied with the store's fresh food quality would visit 7% more frequently than those who are not. Additionally, consumers are willing to pay more for higherquality fresh produce and their average basket will be 24% larger. This demonstrated the increased importance of fresh fruit and vegetables for the profitability of food retail business, over space expansion and promotion share, for driving sales.

Success of digital platforms: The pandemic has shown the immense value of digital tools and agriculture. The fact that systematic application of digital tools can support sustainable production & timely supply, especially when food production and supply involves millions of mallholder farmers, has been proven beyond doubt. Indian undoubtedly ecosystem has changed a lot since agritech started center stage startups working on solutions that focus maximizing productivity, on increasing supply chain efficiency, and improving market platforms linkages. B2B are emerging essential as an disruptive practice in the agriculture industry, focusing on supply chain efficiency



Sustainability: According to a report by the Retail Industry Leaders Association (RILA), 93% of global consumers expect the brands they use to support social and environmental issues.

Innovative disruptions: As it is said "Necessity is the mother of invention", the recent pandemic has pushed some farmers to come up with innovative use of produce during lockdown due to pandemic.

Post-Harvest Technology (PHT): PHT is an integral part of the food chain. It starts from harvesting, grading, cleaning, packing, shipping, till it reaches the plate of the intended consumer. I would say, this is tremendous area of an potential and there are ample opportunities and scope for research. Integration of agritech can enhance the success of PHT.

AgriculturalTechnology(AgTech):The fourthrevolutionhas reshaped thecontextofagriculturaltechnology(AgriTech)applications of

Optimal solutions for sustainability could be

viewed through the applications of smart and precision techniques in agrarian operations (for the problems associated with the arable-land and environment -al efficacy)

Precision farming: After the Green and Gene revolution, the world is all set for the

Brown revolution. In the US the work has already started, where soil samples are being mapped, balanced nutrient, irrigation recommended. This kind of precision agriculture has led

to a yield increase to 11 tons/ha (India-2.5t/ha).

New milestones achieved quality (i)Purchasing are: inputs like seeds, fertilizers can be enabled online. seeds). (ii)Mobile (mostly apps like EWS Plant doctor online, Plantix are providing solutions for crop agronomy and disease and pest management.





Nano Urea solution by IFFCO

IFFCO has introduced the world's first nano urea solution to farmers around the world. It is also planning a large-scale national campaign exercise to demonstrate and train farmers in its usage and application. The solution is developed through a proprietary technology developed at Kalol's Nano Biotechnology Research Center.

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Fly-Cocobot, to ease the task of coconut harvesting

Simple, innovative and cost-effective drone-based product Fly-Cocobot has been designed by ICAR-Central Coastal Agricultural Research Institute and the Goa University. This state-of-the-art technology will change the landscape of coastal agriculture practices. The main advantage of the product is that it is a gender-neutral device with an operational efficiency of reaping 12-15 palms/hour. Also, the availability of this device will encourage various farmers to indulge in the combination plantation system of the two crops.

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New rice varieties released by IIRR

Hyderabad-based Indian Institute of Rice Research (ICAR-IIRR) has recently released four new rice varieties of rice. These four new rice varieties that are resistant to bacterial blight to a major extent. DRR Dhan 53 with four major bacterial resistant genes has been released for cultivation in irrigated and bacterial blight endemic areas of Andhra Pradesh, Telangana, Chhattisgarh, Karnataka, Tamil Nadu, Jharkhand, Odisha, Bihar, Gujarat and Maharashtra.

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Black pepper micronutrient foliar formulation gets patent

Crop specific designer micronutrient foliar formulations for major spices (black pepper, ginger, turmeric, and cardamom) by ICAR-IISR. They have received the patent for black pepper micronutrient foliar formulation. It has been licensed to seven entrepreneurs non-exclusive on basis for commercial production. The application of black pepper micronutrient mixture enhances the quality of the produce & contribute to to health of vines through balanced nutrition.

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Paradeep Phosphates acquires Zuarinagar plant of Zuari Agro

Competition Commission of India (CCI) approved Paradeep Phosphates Limited's acquisition of Zuarinagar, Goa plant of ZACL. With this acquisition PPL will get into the business of developing and manufacturing urea and non-urea fertiliser products presently being carried out by ZACL at the Zuarinagar plant.

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MoU in place for demand Based tele agriculture advisories'

Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and Farmers Welfare and Digital India Corporation (DIC), Ministry of Electronics & Information Technology have signed a MoU with an objective to integrate the existing interactive Information Dissemination System (IIDS) platform with the proposed KisanSarathi program of ICAR. IIDS gives an option to farmers to receive individual needs-based information for the services they have subscribed.

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Onion genome elucidated by researchers at Wageningen

Researchers from Wageningen University have unraveled the onion genome. This will enable the plant breeders to speed up and develop new onion varieties that are resistant to conditions such as drought, and meet the world's growing demand for onions. They successfully sequenced a large proportion with the help of the latest DNA sequencing technologies. The University has collaborated with three companies on sequencing the onion's DNA

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India set to become self-reliant in saffron production with onset of commercial cultivation in Himachal Pradesh

Council of Scientific and Industrial Research (CSIR) & Institute of Himalayan Bioresource Technology (IHBT) with intense research have overcome key bottleneck in saffron production related to production of disease-free good quality flowering size saffron corms. With this, Himachal Pradesh not only aim to surpass the Jammu & Kashmir production but also help in making India self-reliant in saffron production.

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Blogs



<u>Flourishing market for exotic</u> <u>vegetables in India</u>



Food Safety Modernization Act (FSMA) and its impact on Indian Food Exporters



Soilless farming: Evolving market dynamics holds potential to transform the horticultural ecosystem

Reach us at agribusiness@sathguru.com or vijayp@sathguru.com

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