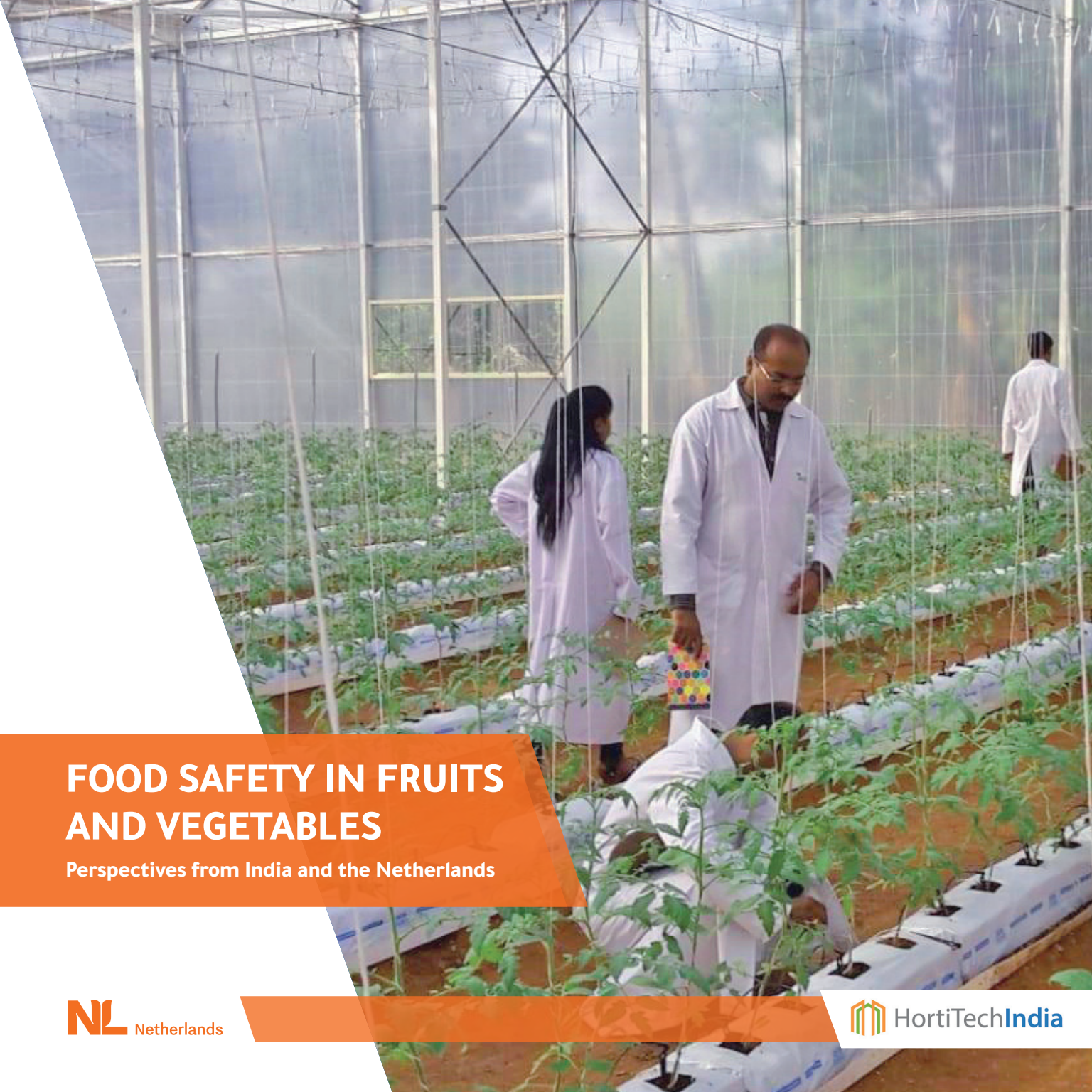

# FOOD SAFETY IN FRUITS AND VEGETABLES

## Perspectives from India and the Netherlands

Netherlands

HortiTechIndia

# Foreword

Safe fruits and vegetables are paramount to achieving zero hunger (SDG 2), good health (SDG3) and sustainable production and consumption (SDG 12). Increasing safe horticultural production also contributes to Government of India's goals of doubling farmers' incomes and agricultural exports.

The Indian agricultural sector already is a powerhouse - not least in the field of fruits and vegetables. Yet, there seems to be room to improve efficiency and food safety which will lead to better consumer health, increased farmers' incomes and export opportunities. As the second largest vegetable exporter and fourth largest fruit exporter in the world, the Netherlands sees huge potential for improved (protected) cultivation using good quality technology and inputs in India. This requires enhanced food safety awareness and traceability in the production chain. In this respect, food safety standards, cost-effective monitoring and enforcement as well as cooperation with industry and training of farmers are of the utmost importance. So is effective communication, as consumers are demanding more information on food safety, hygiene and quality. Online sales deserve special attention, as half of e-commerce growth in the next few years is expected to be food-related and grocery e-retail is expected to grow by 55 percent to $10.5 billion by 2023.

The Netherlands is well known for its technology and expertise in agriculture. Experts from the Netherlands have been working together with Indian agriculture stakeholders for a long time and have positively contributed to the overall development of the agriculture sector in India. For example, as part of the Indo-Dutch action plan the Government of India and the Government of the Netherlands agreed to establish Indo-Dutch Centers of Excellence (CoEs) in different states. In these CoEs, training is imparted and methods and techniques are demonstrated, thus improving production methods, enhancing logistics and food safety. Dutch technology and know-how are adapted to the Indian circumstances.

In addition, to encourage both private and Public-Private Partnership (PPP) collaboration, the Dutch government has initiated the establishment of agricultural consortiums. In these consortiums, companies represent various areas of the agriculture sector, including horticulture. The goal is to integrate Dutch knowledge and expertise locally with available resources in India. This concept creates a win-win situation for the stakeholders from both countries. An example is "HortiTechIndia" - a group of highly innovative Dutch companies and knowledge institutes operating in the horticulture sector in India.

This brochure was developed to provide insights into the way both public and private stakeholders in India and the Netherlands ensure food safety in fresh fruits and vegetables, including challenges as well as success stories. I hope it can be used as an informative tool to increase Indo-Dutch collaboration on food safety in fruits and vegetables, in line with the MoU between the Food Safety Standards Authority of India and the Netherlands Food and Consumer Product Safety Authority, and opens up new opportunities for consumer health and farmer incomes.

**Ilse van Dijl**
Attaché for Agriculture, Nature and Food Quality
India & Sri Lanka
Ilse-van.dijl@minbuza.nl

# Potential of Indian Horticulture and Food Safety

India is the world's second largest producer of fruits and vegetables, and horticulture has emerged as a key sector with the potential to contribute to the growth of the Indian economy. The steady growth in production and demand for horticulture makes food safety awareness, standards and monitoring in fruits and vegetables increasingly relevant. Unsafe food containing harmful bacteria, viruses, parasites or chemical substances in high levels such as heavy metals and pesticide residue, can cause more than 200 diseases,[1] and estimates show that unsafe food costs India $15 billion annually in productivity loss due to food-borne diseases.[2]

Increasing safe horticultural production contributes to Government of India's goals of doubling farmers' incomes by 2022 by reducing input cost and contributes towards doubling agricultural exports (which often involves stringent food safety requirements). As per APEDA data, during 2018-19, India exported fruits and vegetables worth USD 1,469 million[3]. At the same time, India's share in the global horticulture market is only about 1%; leaving its export potential in horticulture largely untapped. Addressing issues of food safety is therefore integral to India's growth story and becoming a $5 trillion economy by 2025.

[1] https://www.who.int/news-room/fact-sheets/detail/food-safety
[2] The Safe Food Imperative: Accelerating Progress in Low and Middle Income Countries by Steven Jaffee, Spencer Henson, Laurian Unnevehr, Delia Grace, and Emilie Cassou. World Bank 2019.
[3] Grapes, Pomegranates, Mangoes, Bananas, Oranges and Onions, Mixed Vegetables, Potatoes, Tomatoes, and Green Chilly were the major fruits and vegetables exported to destinations such as Bangladesh, UAE, Netherlands, Nepal, Malaysia, UK, Sri Lanka, Oman and Qatar.



# India's Policies, Regulations and Schemes for Food Safety

## India's food safety policy

The Food Safety and Standards Authority of India (FSSAI) was created in 2008 under the Ministry of Health and Family Welfare to implement the Food Safety and Standards (FSS) Act 2006.FSSAI is an independent statutory authority that serves as a single point reference system in the country for laying down science-based standards and regulating the manufacture, storage, distribution, sale and import of food products to ensure availability of safe and wholesome food for human consumption.

FSSAI has been proactively tackling food safety through its flagship Eat Right India movement that takes a food systems approach to engage with multiple stakeholders to bring safe, healthy and sustainable food to India. Specifically, FSSAI is focussing on the following activities for safety in fruits and vegetables:

### Building a robust infrastructure for testing and enforcement

FSSAI has been building its staff strength over the years and today has a staff strength of over 800 people employed across the Delhi office and six regional offices. In addition, FSSAI has created a nationwide network of 267 FSSAI-recognized or notified labs by upgrading existing Government labs and developing new labs on a PPP model.

### Creating Standards and Regulations

FSSAI has Scientific Panels on Fruits, Vegetables and their products, Pesticides Residue and Contaminants in the Food Chain to focus on five major issues in the domain of safe fruits and vegetables as highlighted below:

- **Pesticide Residue:** The Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011 prescribes Maximum Residue Limits (MRLs) of insecticides for specified food products. At present, MRLs of 213 Insecticides are prescribed for different food commodities. In cases of pesticides where MRLs have not been fixed, a tolerance limit of 0.01 mg/kg shall apply. Use of twenty pesticides is banned as per the Insecticides Act, 1968.
- **Heavy Metals:** The Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011 prescribes maximum limits of metal contaminants in various fruits and vegetables. While Maximum Levels (MLs) for Lead and Cadmium are specified for various fruits and vegetables, the limits prescribed for 'other foods' are applicable for fruits and vegetables for other metal contaminants listed in the Regulations.
- **Artificial Ripening:** Use of Carbide is prohibited and Ethylene is permitted as artificial ripening agents.

» **Artificial Wax:** FSSAI permits the use of natural edible wax i.e. bees wax (white and yellow) or carnauba wax or shellac for coating fresh fruits at Good Manufacturing Levels with proper labels declaring their use.
» **Colouring of fruits and vegetables:** FSSAI prohibits the use of colours on fresh fruits and vegetables.

In addition, FSSAI has notified Food Safety and Standards Regulations for Organic Food in 2017 to benefit farmers engaged in organic farming and developed a Jaivik Bharat logo for consumers to easily identify organic products in the market. These Regulations recognize two systems of certification i.e. Participatory Guarantee System (PGS) implemented by Ministry of Agriculture and Farmers Welfare and National Programme for Organic Production (NPOP) implemented by Agricultural and Processed Food Products Export Development Authority (APEDA) under the Ministry of Commerce and Industry. All organic food products are required to be certified by either of these two systems. These regulations ensure integrity of Organic Food products, and help in controlling unscrupulous practices in the market.

Jaivik Bharat

### Clean and Fresh Fruit and Vegetable Market Initiative

This is an initiative of FSSAI to address safety and hygiene issues in the numerous un-organized fresh fruits and vegetable markets across India.Under this initiative, a geographical area with an aggregation of fruits and vegetables retail vendors is identified and recommended by the local food authority to FSSAI for recognition and certification. The process includes a pre-audit of the market for gap analysis followed by training, hand-holding and a final audit of the market including vendors jointly by the State Food Safety Authority and FSSAI empanelled auditing agency for certification. Recently Delhi Food Safety Authority has identified 5 markets across Delhi for certification/recognition under this initiative.

### Consumer Awareness

FSSAI, through its multi-pronged awareness campaigns in partnership with different stakeholders at the State and Central level creates awareness amongst consumers regarding safe and hygienic food. It has also developed 'do at home' adulteration tests for all food products including fruits and vegetables, that are available on its portal to consumers.[4] In addition guidance notes on artificial ripening of fruits[5], safety of stickers on fruits and vegetables[6] and pesticides[7] are available on the FSSAI website.

FSSAI's mandate currently is post-harvest, leaving the entire cultivation cycle of fruits and vegetables out of the scope of FSSAI's monitoring mechanism. There is a need for a value chain or farm to fork approach to food safety for fruits and vegetables where all relevant Government departments work together in an integrated manner to tackle food safety for fresh produce.

## Safe Cultivation Practices and Schemes

### IPM and Protected Cultivation

Majority of the farmers in India practice conventional and open cultivation where Integrated Pest Management (IPM) approaches are the most effective in ensuring produce meets safety parameters. Protected or indoor cultivation (polyhouse/greenhouse) has proven to be an even more effective way to manage disease using IPM techniques and make fruits and vegetables fit for human consumption. According to Food and Agriculture Organization of the United Nations (FAO), in addition to yielding up to five times the land productivity and seven times the water productivity of open cultivated lands, protected cultivation also provides food safety and high protection against pests and diseases for high-value crops[8]. Some field trials in India have indicated that the usage of pesticides can drop by as much as 33 percent in protected cultivation as compared to open cultivation[9]. Results of residue analysis all over Europe show a significant reduction in the use of chemical pesticides after switching to IPM including beneficial insects. Before using IPM, 35% of Spanish sweet pepper samples were found to contain at least one active ingredient in concentrations above the MRL, which was reduced to zero in one year[10]. The Government of India promotes and provides assistance for IPM as well as protected cultivation under its flagship scheme Mission for Integrated Development of Horticulture (MIDH).

[4] https://eatrightindia.gov.in/combatingAdulteration.jsp
[5] https://www.fssai.gov.in/upload/uploadfiles/files/Guidance_Note_Ver2_Artificial_Ripening_Fruits_03_01_2019_Revised_10_02_2020.pdf
[6] https://www.fssai.gov.in/upload/uploadfiles/files/Guidance_Note_Fruit_Vegetables_25_10_2018.pdf
[7] https://www.fssai.gov.in/upload/uploadfiles/files/Guidance_Note_Pesticides_04_02_2020.pdf
[8] http://www.fao.org/neareast/news/view/en/c/1158858/
[9] Data from field trials carried out by a Dutch company



### Pesticide Sale and Use

The Ministry of Agriculture and Farmers Welfare prescribes the time, dosage and rate of application of pesticides in crops for location-specific agro-ecologies in the country and conducts specific advisory and awareness programmes through state agricultural universities and by the Department of Agriculture/ Horticulture of States. The Directorate of Plant Protection, Quarantine and Storage under the Ministry has published a list of Pesticides that are banned in India[11] for their harmful properties to ecology, soil, plant and human health.

Under the "Monitoring of Pesticide Residues at National Level" scheme the Ministry determines the levels of pesticide residues in food commodities and environmental samples. Samples of vegetables, fruits and other products are collected from retail outlets, Mother Dairy and agricultural produce marketing committee markets, farm gate and organic outlets. Together with surface water from ponds, reservoirs, lakes, river, etc. these samples are analysed by 30 National Accreditation Board for Testing and Calibration Laboratories accredited laboratories for the possible presence of pesticide residues. Between April, 2014 to March, 2019, a total of 1,18,062 samples were collected and analysed, where residues in 2,923 (2.5%) samples were found exceeding the MRL set by FSSAI.

The new proposed Pesticide Management Bill, 2020, will make it mandatory for importers, manufactures, or exporters of pesticides to register and provide details regarding any claims, expected performance, efficacy, safety, usage instructions, environmental impact and infrastructure available to stock that pesticide.

[10] Van der Blom, J. (2010), Applied entomology in Spanish greenhouse horticulture
[11] http://ppqs.gov.in/sites/default/files/banned_restricted_phased_out_31.10.2019.pdf

Box 1

## Food Safety and Pesticide Residues, the Dutch and EU perspective

The Netherlands Food and Consumer Product Safety Authority (NVWA), under the Ministry of Agriculture, Nature and Food quality, monitors animal and plant health, animal welfare, and the safety of food and consumer products, and enforces nature legislation.

Food safety of fruits and vegetables in the Netherlands is based on domestic as well as EU regulations and guidelines. The safety of the consumer is a key consideration when assessing the use of a pesticide and its residues. A multi-step process has been developed to evaluate a pesticide (more precisely described as Plant Protection Products, PPP) before it is authorized for use. A well described "good agricultural practice" (GAP) must be shown for each individual authorization to use an active substance for a specific crop. The active substance needs to have an EU-wide approval for use.

**EU-level approval of active substance**
To get an approval in the EU for an active substance, a company must provide a detailed dossier showing all necessary experiments that demonstrate that a safe use is possible for at least one GAP, taking into account all applicable aspects such as effectiveness, safety for human and animal health, toxic effects on ecology and ground water and effects on plants and the environment. This dossier is first evaluated by an EU Member State, following which the European Food Safety Authority (EFSA) publishes the assessment of the substance and representatives from Member State vote for approval.

**Individual country level authorization of Plant Protection Product (PPP)**
Authorization of PPPs takes place at the national level. A company can only apply for a PPP containing an EU-approved active substance and the application must describe the intended GAP. Where applicable, this description should include at least the maximum dose per hectare, the period between last application and harvest (the preharvest interval, PHI) and the maximum number of applications per year. It must be very clear from the PPP-label for which crops a PPP can be used and whether it is to be used in open or protected cultivation.

**Safety of Pesticide Residues**
Residues of the PPPs that have been applied may remain on or in the products. The expected level is determined in supervised residue trials that must strictly follow the GAP. As the residue level depends on the growing circumstances, the GAP must be well defined, e.g. it matters whether an application is indoor or outdoor. The highest level found in the residue trials leads to a proposed Maximum Residue Limit (MRL) proposal. This proposal is evaluated for safety by EFSA, both with respect to short and long term effects:

- The criterion for short term effects is the Acute Reference Dose (ARfD), the amount that can be eaten safely in one day.
- The criterion for long term effects is the Acceptable Daily Intake (ADI), the amount that can be eaten safely during one's whole lifetime.

The EU has MRLs for all pesticide/product combinations, they are publicly available on the internet[a]. When no appropriate residue trial data are available, the MRL is set at the limit of analytical determination or when a substance has not been studied in the EU a default MRL level is applied.

**Official Controls of Pesticide Residues**
When growers work with authorized products according to the GAP, the probability of MRL violations is very low. As a result, not every consignment needs to be checked for MRL levels. Instead, a low intensity sampling and analysis is carried out as verification in the market. This official sampling is partly random, to facilitate intake calculations, but to a greater extent risk-based. This risk-based sampling is directed to product/origin combinations that often show violations. This happens in particular in the case of growers outside the EU that have insufficient knowledge of the EU system and apply PPPs on a crop that have MRLs at the limit of analytical determination or at the default level.

[a] https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=pesticide.residue.selection&language=EN



> NVWA strongly believes that sharing the Dutch experience in food safety regulation and monitoring in horticulture will move India closer to achieving its goals for food safety, doubling farmer income as well as agricultural exports.
>
> Netherlands Food and Consumer Product Safety Authority (NVWA)

# Cultivation and Marketing of Safe Fruits and Vegetables in India - reflections from the field

Indian farmers are increasingly adopting IPM, protected cultivation and GAP methods in farming. Metros such as Delhi, Mumbai and Bangalore are also seeing the rise of hydroponic and aquaponic farming. At the same time, field level observation suggests that even after they shift to protected cultivation and IPM methods, farmers tend to take time to shake off their practices from open cultivation of 'being safe rather than sorry' which means they end up spraying more pesticide than needed. Sale of spurious and sub-standard pesticides by dealers to farmers without providing details regarding safe use of the pesticide as well as unavailability of effective natural predators to naturally, without any chemicals, tackle common pests such as thrips and white fly are other challenges faced by the Indian horticulture sector.

These realities often defeat the benefit of technologies like protected cultivation from a food safety perspective as the produce sometimes ends up having residue levels of pesticides above the MRL. In addition to this lack of knowledge and awareness, India farmers are hesitant to invest in new technology such as biological control and signal traps due lack of lack of consumer awareness about safe food as well as a willingness to pay more for daily vegetables and fruits . It is possible that some farmers adopt protected cultivation for reasons other than food safety such as extended crop season, higher productivity, lesser water use and ability to grow exotic crops. The Indian Government is working to address these issues through new regulations, programs, monitoring mechanisms and consumer awareness programs as discussed earlier.

India had only 21,822 hectares of land certified under GLOBAL GAP for fruits and vegetables in 2017[12], indicating the great latent potential India has to increase its exports and domestic availability of safe fruits and vegetables.

> Introduction of IPM practices and protected cultivation in India will not only be beneficial to public health. It will also make a strong contribution to the prosperity of Indian farmers
>
> Rijk Zwaan, Dutch seed company

## Indo-Dutch cooperation for safe fruits and vegetable production in India

Under the Joint Action Plan of the Indo-Dutch Joint Agricultural Working Group, Governments of India and the Netherlands have agreed to set up Centres of Excellence (CoE) under MIDH with Dutch technical assistance. For example, the CoE at Baramati Maharashtra promotes protected cultivation and makes Dutch agro-knowledge, technology, research and education available for the Indian food production and processing sectors. The Dutch Government has also developed other initiatives to promote protected cultivation such as HortiTechIndia[13] (Box 2) and FoodTechIndia where the latter has a state-of-the-art demo polyhouse in Tumkur, Karnataka.

[12] The Safe Food Imperative: Accelerating Progress in Low and Middle Income Countries by Steven Jaffee, Spencer Henson, Laurian Unnevehr, Delia Grace, and Emilie Cassou. World Bank 2019 , page 103
[13] www.hortitechindia.com



Box 2

## HortiTechIndia

HortiTechIndia is a consortium consisting of highly innovative Dutch companies and knowledge institutes operating in the horticulture sector with a specialization in greenhouse cultivation and protected cropping. The aim of the consortium is to collaborate with Indian partners along the entire horticulture chain, from seeds to the end consumer, to upgrade the quality of the Indian horticulture sector and thereby enhancing productivity and profitability.

## Domestic markets and food safety

Traditional trade in horticultural products in wholesale markets is changing due to increasing urbanisation, changing consumer preferences towards horticultural products, changing patterns in the wholesale/ retail industry and the renewed regulatory thrust by the Government on horticulture production, processing and exports (led by the National Horticulture Board and APEDA), and food safety, hygiene, sustainability and better nutrition (led by FSSAI). Demand for healthy and sustainable food is on the rise. As per an ASSOCHAM and EY study, the organic food and beverages segment in India witnessed a market growth of INR 40,000 million in 2016-17 from INR 6750 million in 2009-10.[14]

These developments have started pushing retailers to source better quality produce and growers to adopt high quality and safe production practices and operations. Many organized retailers like Mother Dairy, Big Bazaar, Reliance Fresh have set up their own ethylene-based ripening chambers to ensure fruits are ripened using safe and approved technologies. In addition, they also check for other harmful practices of artificial colouring and acid wash of fresh produce while purchasing from farmers and traders. Many online and off-line retailers like Big Basket have started developing end to end supply chains giving them more control on safety, quality and traceability of produce sourced.

At the same time, organized retail forms less than 10% of the Indian fruit and vegetable market, with the bulk of the market still unorganized making it harder to monitor and enforce food safety regulations. Moreover, majority of Indian consumers are very price conscious and due to lack of sufficient knowledge and awareness of food safety, tend to purchase fruits and vegetables based on visual perception i.e. clean and shiny is better, thus incentivising growers and sellers to indulge in food safety malpractice.

## Export - challenges and success stories

As per an Indian Council for Research on International Economic Relations (ICRIER) working paper[15], in 2016, India's share in EU's imports of fresh and processed food products was 2.9 per cent, which was lower than that of other countries such as Brazil (7.8 per cent) and Vietnam (3.4 per cent). Between 2015 and 2017, India had a relatively high number of notifications (2240) and 66.5% border rejections as a percentage of total notifications raised by the EU on its Rapid Alert System for Food and Feed (RASFF) portal.

This was largely due to a failure in meeting EU food safety and hygiene requirements in produce such as okra, eggplant, mangoes, bitter gourd, taro, and chilli powder. A survey done by ICRIER with 145 exporters suggests that issues such as agricultural practices, fragmented nature of the supply chain, outdated technologies and a presence of dual food and safety standards in India, where APEDA and Export Inspection Council of India (EIC) set standards for exports and FSSAI for domestic and imports, contribute to India's inability to increase its share of global fresh fruits and vegetable trade.

[14] http://kisanmitra.ekrishi.net/wp-content/uploads/sites/3/2019/10/2018-ey-the-indian-organic-market-report-online-version-21-march-2018.pdf
[15] India's Exports of Food Products: Food Safety Related Issues and Way Forward, Working Paper no. 345, ICRIER September 2017.

At the same time, the success stories of horticulture produce in exports value chains such as Maharashtra grapes (Box 3) stand out as encouraging examples of how Indian growers and businesses have successfully managed to get a piece of the global horticulture trade pie. The Government of India (GoI) believes that the grapes supply chain for export to Europe is one of the finest examples of a high quality and efficient supply chain in India and has become a benchmark which the GoI wants to replicate in other horticulture chains for export. Consumer demand and appropriate regulation played a pivotal role in incentivising farmers, sellers and APEDA to develop robust systems and processes to ensure that safe cultivation, processing and packaging practices were followed in the grape value chain. It is also a fine example of successful collaboration between the Indian and Dutch Governments.

Since the success of grapes exports, Maharashtra has seen success in other value chains as well. According to Mr. Govind Hande, Export Adviser to the Maharashtra Government, Maharashtra accounted for 65 per cent of the country's fruit and 55 per cent of vegetable exports in 2018-19 composed of grapes, mangoes, pomegranates and onions.[16]

[16] https://www.thehindubusinessline.com/economy/agri-business/maharashtra-plans-to-set-up-organic-vegetable-export-clusters/article30400484.ece

Box 3

## Success Story of Grape Value Chain in Maharashtra

Export of grapes from India to the EU market, usually done through the Netherlands, suffered a severe setback in 2003 - 04 and 2010 -11 due to MRL issues. This forced Indian stakeholders to devise a strategy and mechanisms to avoid rejection of future shipments. In 2003- 2004, National Research Center (NRC), Pune, the referral laboratory for testing MRL in conjunction with the Netherlands Organisation for Applied Scientific Research (TNO) introduced pre-harvest testing for residue measurement. This was specifically beneficial for farmers with small land holdings who had limited knowledge on residue management, as it allowed extension officers to update them on the corrective measures they could take before harvest.

In 2007, APEDA launched GrapeNet, an online software that facilitated testing and certification of Grapes for export from India to the European Union in compliance with the standards identified by NRC, based on consultation with the exporters. GrapeNet collects, stores and reports - forward and backward traces and quality assures data entered by the stakeholders, i.e., exporters, laboratories and port state control (PSC) authorities within the Grapes supply chain in India. The Dutch Government provided training and hand holding support to the Indian counterparts throughout this process. The Sustainable Grapes Initiative of IDH, a Dutch organisation aims to work with small holder farmers to increase the sustainability of grape production in India.

Today India exports grapes to Netherlands, Germany, UK and Russia successfully meeting EU food safety requirements. In 2018-19, India exported 246133 MT of Grapes worth USD 334 USD Millions.



# Session on Food Safety Standards, Analysis, Certification and Traceability for Fresh Fruits and Vegetables

A discussion session was organized on February 28, 2020 by FSSAI and NVWA (Netherlands Food and Consumer Products Safety Authority) under their bilateral MoU, in partnership with the Embassy of the Kingdom of the Netherlands and the consortium "HortiTechIndia" on the issue of food safety in fresh fruits and vegetables. Experts from the Indian Government including FSSAI, APEDA, GrapeNet, ICAR, NVWA and Indian and Dutch industry such as Mother Dairy and TwinsYeald were present to discuss the current policies and industry initiatives, challenges as well as opportunities for collaboration between India and the Netherlands to increase food safety in fruits/vegetables in India for the benefit of consumer health and agricultural exports.

Some of the key highlights and opportunities that emerged from the session are summarized below:

- A common consensus that consumption and production of safe fresh fruits and vegetables is important for good health, farmers' incomes and provides export opportunities.
- India and the Netherlands are leading fruits and vegetables producing countries, and face similar challenges. Public and private stakeholders in both countries are taking action to ensure food safety.
- The Netherlands has achieved a great reduction in pesticides use by following appropriate IPM techniques including working with natural predators using protected cultivation.
- India has acquired a large overseas market presence in grapes and pomegranate through a coordinated approach by APEDA.
- Bringing stakeholders together, applying new technologies and approaches such as GrapeNet and increasing farmers' knowledge and practices in crop protection provides opportunities to increase safe production of fruits and vegetables, exports and farmer incomes in India.
- In the Indian domestic market, there is an opportunity to increase consumer awareness, for example, through better labelling. This will provide the necessary impetus in the fruits and vegetable value chain especially retailers and growers to increase food safety and traceability measures.

> India is the second largest producer of fruits and vegetables in the world, while Netherlands has one of the best agricultural technologies for growing and conserving fresh fruits and vegetables. There is a lot of potential to use NL help and expertise in Indian horticulture especially in challenge areas such as post-harvest losses, food safety and adulteration. It is high time to take a "farming to framing" approach in India to develop policies with action plans that ensure safety of fresh farm products for the consumers.
>
> Food Safety and Standards Authority of India (FSSAI)

# Conclusion

The Indian cultivation, marketing and regulatory regime is creating an enabling environment for all stakeholders to make food safety in fruits and vegetables a priority. There is a promising opportunity to create synergistic partnerships between Governments, private sector and research institutes to bring to India, global best practices in food safety in cultivation, marketing and regulation adapted to the unique Indian scenario. We hope the Indo-Dutch collaboration plays a catalytic role in improving food safety and consumer health in India.

Note: This booklet was developed after conversations with a range of Indian and global stakeholders active in the fruits and vegetables value chain including representatives from Indian and Dutch regulators FSSAI and NVWA respectively, growers, retailers, exporters, seed companies and technical experts. Though carefully considered, the content of the booklet does not mean to convey any individual specific vision, and is meant for information and discussion purposes only on the topic of food safety in fresh fruits and vegetables.



Contact Us:

**Agricultural team of the Embassy of the Kingdom of the Netherlands**
6/50 F Shantipath, Chanakyapuri,
New Delhi, Delhi, 110021
NDE-LNV@minbuza.nl

Netherlands

HortiTechIndia